Isolation and Molecular Identification of *Candida glabrata* Causing Vulvovaginitis

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Objectives: The incidence of Vulvovaginal Candidiasis (VVC) caused by *Candida glabrata* (*C. glabrata*) has substantially increased due to the wide-ranging utilization of antimycotic therapy. This study aimed to determine *C. glabrata* from vaginal discharge of patients with VVC.
Methods: One hundred twenty vulvovaginal candidiasis were isolated from 550 patients referring for vulvovaginitis to Sayyad Shirazi teaching hospital of Gorgan. The isolates were determined by standard mycological methods. All clinical isolates were analyzed by *C. glabrata*- specific PCR with specific primers. In this study, *C. glabrata* CBS 138 was used as reference strain.
Results: Forty two (35%) *C. glabrata* isolates were identified. Clinical yeast isolates produced purple or pink colonies on CHROM agar. Carbohydrate assimilation profiles (by API 20C system) and 423 bp fragments amplified with specific primers confirmed that these isolates were identical to *C. glabrata.*
Conclusion: The results demonstrated that *C. glabrata* should be considered as one of the clinically important agents in the VVC patients in view of reported intrinsic drug resistant in some strains of this species.

Possibility Existence of Fungal DNA in Blood Culture Bottle of Severe Burn Patients and Its Relation with Possible Invasive Fungal Infections

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Objectives: Severe burn patients are at high risk of invasive fungal infections. The aim of this study was to detect fungal DNA in blood culture of severe burn patients suspected to fungemia.
Methods: 400 blood cultures belonging to 112 burn patients referring to Zare burn hospital in Sari, Iran during 2011-2012 were included in this study. DNA extraction was used with QIAmpDNA minikit by Ramirez 2008 procedure. Universal fungal PCR with 18SrRNA primer and ready- made master mix (Sinagen) through 25 µl total volume reaction were performed. After sequencing the amplified gene, the fungal species were identified using Blastn program and compared.
Results: Of 400 blood culture bottles, 44 bottles were PCR positive (44/400 or 39.2%) which is higher than 11.0% positive result of blood culture. All PCR positive patients who had received systemic antibiotics suffered from inhalation injury due to severe burn and had central venues catheter.11 *Aspergilus*, 5 *Candida*, 1 *Penicillum* and 1 *Agaricomycotina* were detected by sequencing of 20 samples and using Blastn program. In the PCR positive patients, the mean of age, percentage of total burn size of body (TBSA) and length of stay were 31.9 years, 42.6% and 21.8 days, respectively. Total mortality rate and mortality in PCR positive patients was 46.0% and 51.3%, respectively.
Conclusion: According to the results, it seems that universal fungal PCR can be useful for detection of fungal elements to diagnosis of fungemia in severe burn patients suspected to invasive fungal infections.

Natural Herbal Substrates: Promising Agents to Face with Fluconazole-Resistant *Candida albicans* Isolates.

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Objectives: Natural substrates are recently considered as promising agents with regard to their unique characteristics. Crocin, the main effective substrate of *Crocus sativus* (Saffron) is a traditionally coloring and flavoring agent showing antioxidants and antimicrobial effects. Additionally, polyphenolic flavonoid glabridin which is the main constituent of the roots of *Glycyrriza glabra* associates with a wide ranging effect of anticancer and antiparasitic activities. As their antifungal effects had not been previously mentioned, we aimed to evaluate the antifungal properties of Glabridin and Crocin on *Candida albicans*.
Methods: Antifungal effects of both glabridin and crocin were investigated on a total number of 10 Fluconazole (Flu)-resistant and 10 Flu-susceptible clinical isolates of *C. albicans*. Crocin and glabridin were provided from Mashhad pharmachemical research centre and Sigma Company, respectively. To compare the effectiveness of the natural substrate with flu, antifungal susceptibility test (AFST) against fluconazole was performed along with the tests. AFST against the mentioned substrates was determined using the broth microdilution reference method (CLSI document M27-A2).
Results: For flu-resistant isolates, the minimum inhibitory concentration (MIC) ranges were 4-8µg/ml and 0.5-1mg/ml against glabridin and crocin, respectively. MIC_{50} values were obtained as 8 and 1mg/ml. In case of flu- susceptible strains, MIC_{50} were determined as 8µg/ml and 1mg/ml against glabridin and crocin, respectively. Compared with fluconazole, The MICs significantly decreased (P<0.05) for flu-resistant isolates using glabridin. However, only 80% inhibition was seen using 1 mg/ml of crocine on both susceptible and resistant strains.
Conclusion: Along with the antibacterial characteristics of glabridin reported from other researchers, its antifungal effectiveness was shown in the present study. In contrast to fluconazole, no side effect against human cell lines has been reported as this natural substrate is currently used in cosmetic industry. In summary, glabridin might be used as an alternative agent for the treatment of *Candida*-related candidiasis especially when the infection caused by flu-resistant isolates.

Molecular Identification of Non-*albicans Candida* Species by Using PCR-RFLP Method

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Objectives: Vulvovaginal candidiasis is caused by the increasing number of *Candida* species as the normal flora in the vagina. Due to rising of *non-albicans Candida* species as well as azole-resistant isolates, finding a reliable diagnostic method is crucial for appropriate treatment of *Candida*-related infections. The researchers advocate the correct and rapid identification of *Candida* species to lessen the burden of this disease which involves %75 of women in fertility age. The aim of this study was to evaluate the identification of *Candida* species using restriction fragment length polymorphism (RFLP) method.
Methods: Totally, 100 vaginal discharge samples were obtained by wet sterile swap from women with VVC referred to Golestan social security organization hospital during 1392-93. Each sample was cultured on Sabouraoud's dextrose agar and incubated at 35°C. For primary identification, fresh colonies were examined by morphologic and physiological methods such as culture on CHROM agar *Candida* media, germ tube, and chlamydospore formation. To confirm the primary identification, PCR-RFLP method was applied. DNA extraction was done from grown colonies and universal primers ITS1 and ITS4 were considered to amplify internal transcribe spacer region. *Msp*1 and *Bln*1

Restriction enzyme were used for RFLP.
Results: out of 100 suspected samples, 58 grown colonies were identified by morphologic and physiological tests. Thirty-five *Candida* samples were identified as *C. albicans* and 23 isolated were reported as *non-albicans*. Among those 23 mentioned isolates, 14(60.86%), 3(13.04%), 2(8.69%), 1(4.34%), 1(4.34%), 1(4.34%), 1(4.34%), were identified as *C. glabrata*, *C. parapsilosis, C. kefyr, C. tropicalis*, *C. krusei*, *C. guilliermondii*, respectively by using PCR RFLP method.
Conclusion: In summary, identifying *Candida* species by using PCR-RFLP, which is a rapid and economical molecular approach, could be beneficial for more accurate diagnosis of opportunistic fungal infection and a more suitable treatment protocol selection.

Rapid Identification of aflatoxigenic Fungals Isolated from Environments of Chaharmahal and Bakhtiari, Iran

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Objectives: The *Aspergillus* genus consists of various groups and species. Species identification of these fungi is important from pathogenic, toxigenic and industrial points of view. Conventional laboratory methods for delineation of *Aspergillus* species are based on macro- and microscopic characteristics of the colonies. These methods are time consuming and need expert technicians. The present study was conducted to detect *Aspergillus* fungi producing Aflatoxin in some environments of Chaharmahal and Bakhtieari, Iran.
Methods: fungal strains, isolated from environment and food samples were used. All isolates were subcultured on potato dextrose agar (PDA). They were preliminarily identified based on microslide-culture. Hyphes were prepare by lysis buffer. lysis buffer were contained: EDTA,Tris HCL, Nacl and the primers were used for amplification of aflatoxin genes by Colony PCR reaction for each sample.
Results: The use of universal primer which contains tubulin (TUB1) could be suitable amplification of a sequence with 140 bp. This sequence was found very similar in nearly all fungal .By PCR, neither aflR nor omt-A was detected in wild type fungi. Of the samples *Aspergilus* aflatoxigenic aflR and omt could be detected.
Conclusion: The use of this molecular Colony PCR method for aflatoxigenic fungal is applicable because of fast diagnosis in4 hours. This method is a fast, reliable, cost-effective and simple method for the simultaneous detection and identification of numerous pathogenic fungi.

Is it Possible Antifungal Resistant of *Candida albicans* Isolates Analyzed by the MLST Attributed to Particular Clonal Clusters?

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Objectives: Systemic candidiasis is uncommon but increasing, particularly among severely immunocompromised individuals. *Candida albicans* is the most prevalent *candida* species in clinical samples. Recently, voriconazole and caspofungin are new drugs for the treatment of invasive fungal infections. In particular, voriconazole shows a broad-spectrum activity with antifungal activity against clinically relevant yeasts.
Methods: A total of 44 clinical isolates of *C. albicans*, from 36 patients, were collected from hospitalized at four hospitals in Mazandaran province. These isolates previously analyzed by MLST based on the seven housekeeping genes. Antifungal susceptibility testing for five Antifungal drugs (fluconazole, itraconazole, voriconazole, caspofungin and amphotericin B) was performed according to CLSI M27-A3 and CLSI M27-S4 guidelines. Microdilution trays were incubated at 35°C and MIC was read after 24 or 48 hr. The two strains (*C. parapsilosis* ATCC 22019, *C. krusei* ATCC 6258) were included in each susceptibility test as quality control.
Results: The MIC ranges against VRZ and CASP were the narrowest, ranging between 0.031-1 µg/ml. We found the widest range and the highest MICs for FLZ (0.25-16 µg/ml). The lowest MIC_{50} (0.063 µg/ml) was related to ITZ and the highest MIC_{50} (1 µg/ml) to FLZ, so the lowest MIC_{90} (0.25 µg/ml) to CASP and the highest MIC_{90} (4 µg/ml) to FLZ. Generally, 34 isolates were susceptible to all of five antifungal drugs while four isolates showed susceptible or SDD and six isolates were SDD or resistance to some antifungal drugs.
Conclusion: The forty four isolates in this study already analyzed by MLST, clustered within 14 clonal clusters by eBURST analysis. The ten isolates which showed SDD or resistance to five antifungal drugs, belonged to 6 different clonal clusters (69, 124, 918, 461, 172 and 1865). It is necessary to mention that our finding does not attribute drug resistance to specific clonal cluster or clade.

The Kerateinease and Proteinase Producing Ability, Antifungal Drug Susceptibility in Clinical Dermatophyte Isolates

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Objectives: Evaluation of virulence factors, the assessment of their role in infection, and the evaluation of gene sequences in specific regions to identify and subtraction of dermatophytes are very important for differentiating clinical endemic species. In the present study, we first assessed the production of virulence factors such as keratinases and proteinase and also evaluated their activities in clinical strains of *Microsporum, trichophyton* and Epidermophyton were isolated from a variety of human Dermatophytosis.
Methods: Dermatophyte strains isolated from clinical samples and strain Standard were inoculated in tube of dextrose agar medium. The spectrophotometry was used to assess the activity of enzymes. Drug sensitivity of these fungi was determined using the agar diffusion method. In total, 6 antifungal agents frequently used to treat dermatophytosis were tested.
Results: The mean keratinases activity in different strains of dermatophytes ranged from 6.16 ± 0.21 in *Trichophyton rubrum* to 6.69 ± 0.54 in *Microsporum gypseum* and the mean proteinases activity ranged from 1.17 ± 0.22 in *Microsporum canis* to 2.10 ± 1.81 in *Trichophyton rubrum*. Comparing sensitivity of various stains of isolates to the antibiotics, the highest sensitivity to Ketoconazole was revealed in *Epidermophyton floccosum* and *Trichophyton mentagrophytes*, the highest sensitivity to Itraconazole was found in *Trichophyton rubrum* and *Epidermophyton floccosum*, the highest sensitivity to Griseofulvin was found in *Trichophyton verrucosum*, and the highest sensitivity to Terbinafine was revealed in *Trichophyton verrucosum*. In total, the sensitivity to Ketoconazole and Itraconazole in different strains was higher than that to other types of antibiotics including Griseofulvin and Terbinafine.
Conclusion: We found the highest and the lowest keratinases activity in the strains of *Microsporum gypseum* and *Trichophyton rubrum*, respectively, while the highest and the lowest proteinases activity was revealed in *Trichophyton rubrum* and *Microsporum canis*, respectively. Our study could show high sensitivity of different strains of dermatophytes to Ketoconazole and Itraconazole, while sensitivity to the isolated to Fluconazole, Griseofulvin and to Terbinafine was indicated to be lower.

Comparative Study of Pharmacokinetics and Pharmacodynamics of the Antifungal Agents

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Objectives: The diagnosis and treatment of many fungal diseases are associated with problems because of the similarity of clinical symptoms with other diseases. In recent years, new antifungal agents with successful treatments have increased. However, their number is less than
20 agents. Knowledge about their role in therapy, toxicity and interactions with other drugs is important.
Methods: A review of published studies in scientific resources over the last 20 years about more effective antifungal drugs, their pharmacokinetics and pharmacodynamic properties was evaluated and compared.
Results: The spectrum of activity, routes of administration, patients' conditions and drug-drug interaction have significant roles in the selection of an appropriate antifungal agent. Amphotericin B preparations and Echinocandin agents are available only as intravenous, and Posaconazole and
Flucytosine only as oral preparations. However, Fluconazole, Itraconazole, and Voriconazole can be administered by multiple routes. There are often differences in mechanism of action, absorption and elimination. The inhabitation of ergosterol, cell wall, proteins or spindle apparatus synthesis is the important target for many antifungal drugs. Sometimes, some fungi are resistant to some drugs.
Conclusion: A better knowledge of drugs leads to achieving better treatments with correct chemical changes in formulation, dosage and route of administration. With understanding and comparing pharmacokinetics and pharmacodynamics of drugs such as absorption, distribution,
spectrum of activity on fungal agents, metabolism and accumulation in tissue, we will be able to make better and effective drugs in the future.

Fungal Aerosols Agents as New Occupational Hazards

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Objectives: Fungi are occupational hazards in two main groups, allergenic or toxic agents forming bioaerosols, and agents causing zoonoses and other infectious diseases. Fungal aerosols are the main health problem in agriculture and the agricultural industry, they may be also an occupational risk factor in many other work environments, such as: medical and veterinary facilities, diagnostic laboratories, libraries and many others.
Methods: In this retrospective study, the authors did an extensive literature review of published studies about fungal aerosols and their role in diseases in Medline journals and virtual media during recent 50 years.
Results: Fungal aerosols are particles of organic dust and/or droplets suspended in the air. In the lungs of exposed workers, fungal aerosols evoke an inflammatory process mediated through the CD14 receptor and Toll like Receptor 4 (TLR-4), leading to impairment of lung function, bronchitis, and asthma. The studies showed that occupational exposure to fungal aerosols is associated with an increased lung cancer risk. Spores, little particles (β-glucans), low molecular secondary metabolites (mycotoxins) of fungi pose an occupational hazard as a source of allergens and mycotoxicosis. Mycotoxins are regarded as potential factors of respiratory occupational risk in agriculture, especially at occasional high exposures. Also they may exert an adverse effect on liver and other organs. β-glucan is an important agent causing the development of pulmonary diseases, both of an inflammatory and an allergic nature. β-glucan can induce Th 1 as well as Th 2 driven immune responses. Fungal aerosols can cause rhino conjunctivitis and dermatitis in workers that work in polluted environments.
Conclusion: Potential health effects of fungal aerosol exposures are diverse including infectious diseases, acute toxic effects, allergies and cancer. Methods to assess bioaerosol exposures are available (culture and non-culture methods); however, these methods are still limited and are generally not widely available. Therefore, more research is needed to establish better exposure assessment tools and to reduce pollution or to prevent exposure.

Aflatoxin B1 Risk Biomarkers for Food Born Hepatocellular Carcinoma

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Objectives: Hepatocellular carcinoma (HCC) is a common malignant disease with poor prognosis. Hepatitis B virus, hepatitis C virus infections and alcohol intake are widely recognized as the main causes of HCC. Illness due to contaminated food is perhaps the most widespread health problem in the contemporary world. Aflatoxin B1 is produced by some *Aspergillus* and *Penicillium* species. This mycotoxin changes the nutritional factors and, according to the International Agency for Research in Cancer, prolonged exposure to Aflatoxin B1 in the diet is related to cancer. Among several etiological factors, Aflatoxin B1 is defined as one of the critical risk factors for nonviral HCC.
Methods: In this study, the role of Aflatoxin B1 in HCC over the past25 years was searched. The most valuable and relevant articles were selected and analyzed.
Results: Aflatoxin B1 is produced by some fungi that contaminate food during storage, production and processing. Aflatoxins are metabolized by hepatic enzymes, generating reactive epoxide species that are able to form a covalent bond with guanine. The resulting adducts can promote cellular and macromolecule damage including producing a characteristic mutation in the p53 tumor-suppressor gene and have already been described as biomarkers for aflatoxin contamination. Aflatoxin appears to act with chronic HBV infection as a cofactor for HCC, further increasing the risk for disease.
Conclusion: Aflatoxin contamination in food is a serious global health problem, particularly in developing countries. The studies show that aflatoxin B1 plays a role in about 4.6- 28.2% of total annual HCC cases worldwide. The most heavily afflicted parts of the world are sub-Saharan Africa, Southeast Asia, and China. Iran is one of the developing countries in tropical and subtropical areas nearly ubiquitously exposed to moderate to high levels of aflatoxin, but aflatoxin-related HCC is still unknown in Iran. Rural populations generally have higher levels of aflatoxin exposure than do urban dwellers in developing countries because urban populations typically consume more diversified diets than do rural dwellers and may have food that is better controlled for contaminants. Moreover, HBV prevalence is generally higher in rural areas than in urban ones, and higher among males in most. Our study highlights the significant role of aflatoxin in contributing to HCC. Although it is impossible to completely eliminate aflatoxin from food worldwide, it is possible to significantly reduce its levels and dramatically reduce liver cancer incidence worldwide

Expression Role of *veA*, *laeA* and *aflR* Genes Involved in Cyclopiazonic Acid Production Ability of *Aspergillus* section *Flavi*

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Objectives: Cyclopiazonic acid (CPA) is a toxic indole-tetramicacid which is mainly produced by some species of the genera *Aspergillus* and *Penicillium*. The pathogenic effects of this mycotoxin is well demonstrated in human and animal models and Co-contamination of food materials by CPA and aflatoxins has been reported. Biosynthesis of fungal secondary metabolites is relguated via a number of similar gene clusters which are controlled by global genes such as*veAlaeA, aflR*. In this study, the role of *laeA*, *veA* and *aflR* genes in determining morphology and CPA producing ability in *Aspergillus flavus* strains isolated from pistachio orchard'soils was investigated.

Methods: 53 strains of *A.flavus* isolated from soils of pistachio orchards were cultured on several differential media and mycotoxin producing profile (CPA & AFB_1) were detected by using Thin layer chromatography& high performance liquid chromatography (HPLC) techniques. Expression of the genes *laeA*, *veA* and *aflR* in CPA and AFB_1 producer and non-producer isolates of *A. flavus* was evaluated by real time PCR on genomic fungal RNA using specific primers.
Results: Based on the obtained results, 56.0% of the *A. flavus* isolates were able to produce both CPA and AFB_1, while 15.09% of the isolates were non-toxigenic. The maximum amounts of CPA and AFB_1 produced by the isolates were reported as 403.85 and 7446.28 µg/g fungal dry weight. No significant correlation was reported for the expression of genes *laeA*, *veA* and *aflR* and CPA, AFB_1production in 4 toxigenic and non-toxigenic isolates.
Conclusion: The present study revealed the ability of CPA as well as AFB_1production in *A. flavus* isolates as a public health threat. Our results demonstrate that further study on large numbers of *A. flavus* populations from different geographic regions is recommended for better evaluation of correlation between involved gene expression CPA, AFB_1 and sclerotia production.

Multilocus Sequence Typing of *Candida glabrata* Isolates from Patients with Candidiasis in Iran

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Objectives: The haploid pathogenic yeast *Candida glabrata* is the second most common *Candida* species isolated from the cases of bloodstream infection. In recent decades, a wide range of molecular techniques have been developed for genotyping *Candida* species. Multilocus sequence typing (MLST) analysis has a good discriminatory power in genotyping. The purpose of this study was to investigate the MLST analysis of clinical isolates of *C. glabrata* obtained from patients with candidiasis. To the best of our knowledge, it is the first nationwide MLST study for strain typing of *C. glabrata* in Iran.
Methods: Forty clinical isolates of *C. glabrata* were obtained from 1055 patients with candidiasis from medical centers in Iran. After PCR- RFLP, *C. glabrata* isolates were evaluated epidemiologically by Multilocus sequence typing (MLST). MLST was performed based on the six housekeeping genes via *FKS*, *LEU2*, *NMT1*, *TRP1*, *UGP1*, and *URA3*. The specific primers used to amplify these genes were described previously which are also available at the global MLST database (http://cglabrata.mlst.net/).
Results: A total of 3,345 bp from six most variable loci were sequenced in the collection of 40 isolates. From the 3,345 bp sequenced in each isolate, 136 variable nucleotide sites were found. Forty-five alleles were identified among the six loci of the 40 *C. glabrata* isolates.
The polymorphisms at these loci defined 8 new alleles and 10 new sequence types (STs) among these 40 strains.
Conclusion: In the present study, our data demonstrated that majority of *C. glabrata* isolates from several patients with candidiasis were genetically related.

Isolation and Identification of Potentially Mycotoxigenic *Aspergillus* and *Fusarium* from Dried Fruits Using Molecular and Morphological Techniques in Semnan

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Objectives: In many countries, producing and exporting agricultural products is considered as an economic pillar. Among these products, nuts and dried fruits are two of our country's most important export products. Due to the high sensitivity of these trees, they have a wide range of fungi that are contaminated by mycotoxins. Studies of consumer food contaminated by the toxin may ultimately limit the risk of major diseases and carcinogenic activities of toxins that negatively impact human health. In this study, toxin producing *Aspergillus* and *Fusarium* species were evaluated using morphological and molecular approaches.
Methods: For this purpose, the dry fruits were collected from markets and transferred to the laboratory. Samples were divided into smaller parts and cultured on Sabouraud dextrose agar under sterile conditions, then the isolated organisms were purified through repeated subculture method. *Aspergillus, Fusarium, Penicillium, Alternaria, Humicola, Cladosporium, Mucor, Rhizopus, Scopulariopsis, Chrysosporium, Scedosporium* and *Chaetomium* were identified in cultur. For to molecular identification of *Aspergillus* and *Fusarium* species, both were cultured in YEPD media. Then, the genomic DNAs of them were extracted. Elongation factors and *Beta tubulin* regions were used for designing primers in *Fusarium* and *Aspergillus* species respectively. These regions were amplified using PCR and then purified. After that, the yearning products were cloned into *E. coli*. Cloned PCR products were sent to be sequenced in Pishgam biotech company.
Results: According to the comparative analysis of Gen Bank sequences of Elongation factors and beta tubulin with the published sequences data in Gene Bank, both isolated *Fusarium* and *Aspergillus* showed 99% similarity to *Fusarium acuminatum*, *F. equiseti* and *Aspergillus flavus* respectively, considering high fungal contamination of these products.
Conclusion: As a result, it is advised to measure the mycotoxin residues before consumption by people.

Determination of Synergistic Effect of *Myrtus communis* Essential Oil and Linalool with Itraconazole against Azole-Resistant *Candida* Species.

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Objectives: *Candida* species are responsible for a variety of infections in humans ranging from simple dermatosis to life-threatening candidemia. The emergence of resistance of *Candida* species to current antifungal drugs including itraconazole (ITC) is a universal crisis. Combination therapy is successfully used to overcome this resistance. In the present study, the synergistic effects of the essential oil of *Myrtus communis* (myrtle) and linalool- one of its major constituents-in combinations with itraconazole against azole-resistant *Candida* spp. were determined.
Methods: The minimum inhibitory concentration (MIC) values of ITC, EO (myrtle) and linalool was determined by broth microdilution assay as recommended by the Clinical and Laboratory Standards Institute (CLSI). Checkboard micro titer assay was used to evaluate the synergistic effects between the essential oil, linalool and Itraconazole. To evaluate the combined effects of EO/linalool with ITC, fractional inhibitory concentration index was calculated.
Results: The treatment of ITC-resistant isolates with the combination of EO and ITC resulted in 60% decline of resistance rate reaching to a point below 0.5 µg/ml. Combination therapy of linalool with ITC exhibited an strong synergetic activity and resulted in the reduction of the ITC MICs to >0.125 µg/ml in 6 out of 10 isolates.
Conclusion: Considering the strong synergistic activities of ITC with each of EO of *M. communis* and linalool (FICI≤0.5), they seem to have the potential to be used in antifungal therapies to enhance their activities.

Evaluation of Fungal Contamination of Automated Teller Machines (ATMs) in Isfahan.

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Objectives: Physical transmission of microorganisms from hands, surfaces and the environment can contaminate paper currencies since almost every socio-economic setting commonly hold and transfer paper currencies. Contamination of objects by pathogen microorganisms is the serious concern of public health as transmitting contaminated materials with handling could produce a chance of contamination by wide spread pathogenic microorganisms. In this study fungal contamination on the surface of automated teller machines (ATMs) especially the part of finger touch has been evaluated.
Methods: A total of 60 samples of ATMs from the 6 areas in Isfahan were collected. Samples were put in sterile tubes and transferred to the laboratory then were cultured on sabouraud dextrose agar (SDA). The plates were incubated at 28±2°C for 7 days. During the incubation period, any emerged fungus was isolated on SDA and purified .Generally, 140 pure colonies of fungi and 110 of bacteria were isolated. The isolates were identified using microscopic and cultural characteristics. The frequency occurrence of each fungal isolate was expressed as the percentage of sample.
Results: The results indicated that the frequency of different fungi isolated from ATMs were as following: Penicillium spp 12%, Aspergillus flavus 11.2%, Rhizopus spp 10%, Aspergillus niger 8.8%, Aspergillus fumigatus 6.8%, Pheohyphomyces 4%, Fusarium spp 1.2%. The frequency of bacteria was 44% including Staphylococcus spp, Bacillus spp, Streptococcs spp.
Conclusions: Although using ATMs is important in business and transferring of money, our data showed that the surfaces of machines specially the finger touch part are contaminated with bacteria and fungi, which may transmit pathogenic microorganisms. Therefore, regular washing of hands during handling of money or using ATMs is advised.

Investigation of Superficial and Cutaneous Mycoses Diseases among Patients Referring to Kashan Referring Laboratory during 2013 - 2015.

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Objectives: The most external layer of the skin as well as keratinous parts of the skin and its annexes including nail and hair are attacked by pathogenic fungi in superficial and cutaneous mycoses and cause symptoms.
Methods: In this research, those patients referring to mycological department of Kashan Refrans laboratory, if qualified (haven't taken a douche within three days and used anti-fungi medicines within 7 days), were sampled and an amount of samples were investigated by KOH or transparent Lactophenolor, if required, their films were prepared and stained through different methods and investigated microscopically. The rest of samples were cultured in S and SCC media. After fungi have been grown and the colony was formed in media, the related fungi was identified through Teased mount or Slide Culture methods and recorded in a special notebook.
Results: This research was performed during 22 March 2012 – 2015. 699 people suspected of having superficial and cutaneous mycosis infection referred to Kashan Refrans Laboratory, 193 (27.6%) of whom suffer from superficial and 237 (33.9%) form cutaneous mycoses. These two types of diseases have had the following frequencies: dermatophytosis 106 (15.2%) had the highest level of outbreak. Cutaneous candidiasis100 (14.3%), tinea versicolor 92 (13.2%) and pityrosporosis 62 (8.9%), otomycosis 40 (9.3%), and erythrasma 30 (4.3%). 106 cultured positive samples of dermatophytosis consisted of 44 (41.9%) *Epythermophyton fluccosum* which was the most prevalent and after that was 22 cases (20.9%) *trichophyton mentagrophytes* and 16 (12.2%) *Trichophyton verrucosum*. In this study, 8 cases of tinea capitis, 7 cases of ectothrix and 1 case of endothrix were observed.
Conclusion: Based on the obtained results, it's recommended to prevent outbreak of the disease while accurately planning and providing personal and public health trainings.

Evaluation of airborne Fungal Pollution in the Various Parts of Kashan Shahid Beheshti Hospital in 2014-2015

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Objectives: Nowadays, One of the important issues is that most are faced hospitals with an increase in hospital infections. Fungi spores are important pollution sources for hospital operating rooms in special departments and maybe responsible for many nosocomial infections. The aim of this study was to evaluate fungal contamination of air, surfaces and equipment in various departments of Kashan Beheshti hospital.
Methods: At first, from sampling was performed March 2014 to July 2015 at the Center. 180 samples of air and surfaces and 120 equipment (total 300 samples) from 8 various departments of the hospital including medical 3 (Oncology), infectious diseases, internal emergency room, emergency surgery, pediatric operating room, ICU and CCU were collected. Sabouraud Dextrose Agar medium was used for sampling. To identify different fungal species Teased mount and slide culture method (Slide culture) was used. The statistical analysis samples were done using SPSS method.
Results: Out of total of 300 samples, 264 isolates (88%) were positive for fungal growth. Finally, 1005 colonies and 12 various fungi were isolated fungal. The most common fungi isolated from the air, were *Alternaria* (35.9%) and *Cladosporium* (20.3%) respectively. *Aspergillus* spp. (unknown) (0.5%), the lowest frequency in the fungus was isolated. *Aspergillus Niger* (40.1%) and *Aspergillus fumigatus* (19.4%) with the highest frequency and *Nigrospora* (0.8%), the lowest frequency among the fungi were isolated from surfaces and equipment. *Aspergillus Niger* (53.7%) isolated from *Aspergillus* species was the predominant species. Based on statistical analysis of the medical 3 (Oncology) with other sectors in terms of air pollution in the hours before the meeting, there ($p<0.001$). The medical section 3 (Oncology) was a significant difference from other sectors in terms of pollution surfaces and equipment was significantly different ($p<0.001$). The medical section 3 (Oncology), the highest percentage of pollution but the ICU had the lowest percentage of contamination.
Conclusion: Abundance and diversity of fungal spores in the air are seen in the various surfaces of the hospital, which indicate the importance of using appropriate methods for Control and Prevention. If so, removal of the fungal elements and prevention hospital infections, the health of patients, staff and physicians will be raised.

Comparing the Therapeutic Effects of Local Cream Clotrimazol 1% and Local Cream Terbinafin 1% in Patients with Tinea Corporis and Tinea Cruris

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Objectives: Tinea corporis skin dermatophyte infection without hair and tinea cruris is actually a kind of tinea corporis. For treatment of these diseases, azols and alilamin are generally applied locally. This research aimed at selecting suitable medicine regarding efficiency and effectiveness and costs from among two local creams of terbinafin 1% and clotrimazol 1%.
Methods: After preparing Smear with KoH, for 100 patients with tinea corporis and 50 patients with tinea cruris was approved in Kashan Refrains laboratory, one of the mentioned creams was administered randomly and single- blind two times a day during two weeks and if needed for 4 weeks while culturing in SCC medium. After 2 and 4 weeks, the improvement results were investigated medically and regarding laboratory conditions.
Results: In this research, the rate of curing with terbinafin compared to clotrimazol for tinea corporis and tinea cruris after 2 weeks of administration was 69.3% and 77.3% with respectively P= 0.505, while in case that the when duration of administration was 4 weeks, those rates were 78.3% and 70.6% with P = 0.849 without any side effects. Moreover, the rate of curing with terbinafin compared to clotrimazol in case of tinea cruris after two weeks of administration for both groups was 89% with P = N.S while in case of 4 weeks of administration, it was 100% with P = N.S for both groups. In this research, terbinafin and clotrimazol had statistically considerable effects on *Trichophyton mentagrophytes*, *Trichophyton verrucosum*, *Trichophyton rubrum*, *Epidermophyton fluccosum* but in case of *Trichophyton tonsurans* and *Microsporum canis*, it was just terbinafin that had considerable effects statistically. Generally, medical groups had no difference regarding their age, occupation, duration of disease, contact background with animals, type of

lesion, medical symptoms, danger, type and number of fungi.
Conclusion: Regarding the fact that the effects of the two abovementioned drugs are different on Dermatophytosis, thus more analytical studies is recommended to be performed in this field in future.

Design, Synthesis, and Antifungal Activity of Triazole and Benzotriazole Derivatives.

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Objectives: This study described the design, synthesis, and evaluation of a novel series of 1,2,4-triazole and benzotriazole derivatives as inhibitors of cytochrome P450 14a-demethylase (14DM). The chemical structures of the new compounds were confirmed by elemental and spectral (1H NMR, 13C NMR, Mass) analyses. The compounds were designed by a generating virtual library of compounds and docking them into the enzyme active site. Furthermore, they were found to have in vitro activity against *Microsporum canis*,*Trichophyton mentagrophyte*, *Trichophyton rubrum*, *Epidermophyton floccosum*, and *Candida albicans* comparable to fluconazole and clotrimazole.
Methods: Triazole derivatives and benzotriazole derivatives were synthesized and, for the modeling studies, the compounds were drawn in the hyperchem 7 and minimized using the AM1 method with a gradient cut-off of 0.01 Kcal/mol. The protein was obtained from Protein Data Bank (1E9X) and then water molecules were removed from the protein for docking. All compounds as well as fluconazole were docked into the active site of 14a-demethylase using Autodock 3.0.5. For the antifungal assays, the stock solution of compounds was prepared in DMSO at a concentration of 1000–5000 mg/ml. The compounds were diluted in solid and broth media to obtain the final concentration from 0.0625 to 4 mg/ml, using PDA andRPMI 1640 media. The inoculum of the molds and yeasts was prepared from 2- to 7-day mature colonies. Fluconazole and clotrimazole were used as positive, and the solvents of the compounds as negative blanks.
Results: All the compounds had a molecular weight ranging from 139 to 421 and the log p range of the molecules was between 1.4 and 5.3.Trityltriazole derivatives had more negative docking energy in comparison with tritylbenzotriazole derivatives, but alkyl derivatives docked to the active site of the enzyme with the most negative docking energy.There was some correlation between antifungal activity and docking energy. All the compounds showed antifungal activity against *T. rubrum*. The structural activity study showed that antifungal activity is dependent on the heterocyclicmoiety as well as on the nature of the substituents. The maximum inhibition was observed in compound 1 with the lowest MIC (1 mg/ml) against *E. floccosum*. The benzotriazoles compounds 4, 5, and 6 had low antifungal activity. The activity was decreased by the presence of methoxy group on the triazoles and benzotriazolesmoiety (compounds 2, 3, 5, and 6). Compounds 8 and 9 also possessed great inhibitory effect on tested fungus.
Conclusion: In conclusion, 10 new compounds related to Clotrimazole and fluconazole were synthesized and the major products were purified using column chromatography. Then the structures of them were confirmed by 1H NMR, 13C NMR and MS spectroscopies and elemental analysis. These compounds showed similar antifungal activity against some fungi to fluconazole and there was a correlation between docking energy and growth inhibition for some compounds.

Antifungal Effects of Endophytes Fungus Hyphae of Some Medicinal Plants, Native to the Province of Chaharmahal and Bakhtiari

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Objectives: Herbal medicinal plant is a plant that with substances in one or more of its organ that could be used for therapeutic purposes or for the synthesis of useful drugs. Herbs have different medicinal properties, some of which have antimicrobial properties. Endophytes are fungi and bacteria in the leaves and stems of plants that play various roles in the physiology of plants.
Many medicinal compounds produced from medicinal plants are produced by the endophytes in them. Endophytes due to the ability to produce secondary metabolites are useful sources in biotechnology. The aim of the present study was to identify the antifungal effects of hyphae of the endophytic fungus in Rumex pulcher, *Hypericum scabrum* and *Stachys lavandulifolia.*
Methods: The leaves and stems of these plants were disinfected and separately planted in PDA media and temperature 27ºC.Grown mushrooms were transferred to beef Yeb and were placed on a shaker in the ambient temperature. After the growth of, the fungi in these environments, the test tubes were centrifuged 2 times and the supernatant was discarded. Finally, a drop 50 µl of resultant supernatant from the centrifuge was placed at the center of SDA plates containing pieces of indicator mushrooms (*Penecillium* Spp.,*Alternaria* Spp. And *Aspergillus niger*) and plates were placed at the temperature of 30ºC.
Results: Plate investigation showed that the hyphae of fungi isolated from all three plants, At least on one of the three fungi, showed inhibitory effects and prevented fungal growth indicator in the medium.
Conclusion: Endophytes protect their host against infectious agents and adverse conditions by producing secondary metabolites. Endophytes have important physiological and ecological role in the life of their host. These secondary metabolites can also be used to treat diseases in humans and animals. However, today, existence of these microorganisms in different parts of all vascular plants has been proven, but their variety and distribution remains unknown. Therefore, in addition to separation and detection of their antimicrobial effects, their commercialization on a large scale is suggested.

Molecular Characterization of Highly Susceptible *Candida africana* from Vulvovaginal Candidiasis

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Objectives: Phylogenetic studies highlight *Candida africana* as an atypical variant within *Candida albicans* species complex which is dominantly recovered from vaginal specimens. This study aimed to characterize *C. africana* isolates from patients with vulvovaginal candidiasis (VVC) by molecular methods and in vitro susceptibilities.
Methods: 156 (48.44 %) Candida strains were collected from 322 patients diagnosed with VVC. Samples were examined based on 10% KOH, inoculated onto Sabouraud dextrose agar at 37°C for 24–48 hours in dark. Provisional identification was based on macroscopic and microscopic morphology. Identification based on sequencing of the ITS rDNA and D1/D2 was performed and antifungal susceptibility testing was determined according to recommendations stated in the Clinical and Laboratory Standards Institute (CLSI) M27-A3 document.
Results: 114 out of 156 (73.07 %) were germ tube positive and presented green color on the chromogenic medium, thus classified as *C. albicans* species complex. 109 (95.61 %) out of 114 isolates were identified as *C. albicans*, while 5 (4.38 %) isolates were identical with *C. africana* based on hwp1 PCR. *C. africana* appeared to be highly susceptible to the tested antifungals. For all strains of *C. africana*, fluconazole MIC was 2-$\log_2$-dilution steps less active than amphotericin B, which in turn was 2-$\log_2$-dilution steps and 3-$\log_2$-dilution steps less active than other azoles and echinocandin agents, respectively.
Conclusion: In conclusion, among the *C. albicans* species complex, *C. albicans* predominantly and *C. africana* rarely occur in vaginal mucosa. Due to limited information on molecular epidemiology of this novel yeast, more studies using molecular methods are needed to elucidate the inter- and intraspecific genomic variations of *C. africana* isolates.

Role of Aspergillus Fumigatus Allergens in Diagnoses of Aspergillosis in Patient with Asthma

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Objectives: As fungi are very common in the envirment, exposure to these airborne spores in specific conditions can lead to allergic illnesses in atopic and asthmatic individuals. *Aspergillus* species spatially A fumigates cause illness in patient with asthmatic more than other molds. The aim of this study was to isolate *aspergillus* species from sputum of asthmatic patients.
Methods: Among asthmatic patients that were referred to the center of asthma allergy in Tabriz, 26 patients who had positive skin test and their antibodies of IgG, IgE specific *aspergillus* were high in their serum were selected by the clinicians. The sputum specimens of these patients were sent to mycology laboratory for mycological examinations. Positive isolates were identified by slide culture and study of fungi morphology.
Results: From 26 sputum specimens, 4 samples were positive for *Aspergillus fumigates*, (15.35%), by both methods including culture and direct examination *Candida albicans* were also isolated from 2(7.6%) samples.
Conclusion: Among *Aspergillus* species, *A.fumigatus* is the most prevalent species responsible for aspergillosis infections in asthmatic patients due to its high number of antigen/allergens (over 18 antigen/allergen) and its ability to colonize the respiratory tract, As early diagnosis of allergic aspergillosis with aggressive treatment may prevent further lung damage and end –state fibrosis, routine screening of all asthmatic patients with an aspergillus skin testis suggested. Finally, there is a need to update and revise the criteria for diagnosis.

Explain the Principles of Traditional Persian Medicine in Seborrheic Dermatitis and Its Treatment in Comparison with Modern Medicine

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Objectives: Seborrheic dermatitis is a chronic and relapsing disease that occurs in infant and adult with prevalence of 3 percent in normal population. The cause of this disease is unknown, but the researcher believes that it's due to a fungal infection. This disease is named *Hozaz*in Traditional Persian Medicine (TPM). In this study, we explained the disease in modern medicine andTPM.
Methods: This is a review article using sources of TPM, including Tebb-e-Akbari, zakhireh-Kharazmshahi, Alaghraz-altabiat-va-mabahes-alalaniat, Al- ghanoon fi-al-teb. Etc. In addition, modern medicine resources, including electronic, PUBMED, UP TO DATE, MEDLINE, SID, Habif and Rook's dermatology text books were used, as well.
Results: According to this study, the most common causes of Hozaz or seborrheic dermatitis, categorized into mild, moderate, and sever types, are corruption temperament and aggregation of corrupt homoure in the head or whole of the body. However, the dermatologists haves suggested that this disease is a fungal infection as *Malassezia globosa*. These days, the choices of treatment for this disease are topical anti-fungal agents, topical corticosteroids and topical calcineurin inhibitors. TPM suggested detoxification of the whole body from corruption homoure by using foods that produce good homoure, shaving the hair and washing it with beet water and etc. Also administering grape juice mixed with almond oil and rubbing the violet oil into the head skin are very useful in dry variant.
Conclusion: Traditional medicine suggests pieces of advice that can be simply taken by patients. These recommendations are affordable, available, safe and cheap with minimal side effects.

Evaluation of Antifungal Activities of the Essential Oil and Various Extracts Of *Nigella sativa* and Its Main Component, Thymoquinone against Pathogenic Dermatophyte Strains

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Objectives: Plant extracts and plant-derived compounds are valuable sources as folk medicine for the treatment and prevention of a wide range of diseases including infectious diseases. In the present study, the antifungal activities of the essential oil and various extracts *Nigella sativa* and its active principle, thymoquinone against *T. mentagrophytes*, *Microsporum canis* and *Microsporum gypseum* as pathogenic dermatophyte strains were evaluated. In addition, the cytotoxic effects of *N. sativa* against murine macrophage cells were determined.
Methods: In this study, the antifungal activity was studied by disk diffusion method and the minimum inhibitory concentration (MIC) of extracts was detemined using broth macrodilution method. In addition, the cytotoxic activity of *N. sativa* was evaluated by colorimetric assay (MTT). The components of the *N. sativa* essential oil were also identified by gas chromatography/mass spectroscopy (GC/MS) analysis.
Results: The results showed that the essential oil and various extracts of *N. sativa* particularly thymoquinone have potent antifungal effects on *T. mentagrophytes, M. canis* and *M. gypseum* as pathogenic dermatophyte strains. In the assessment of the cytotoxicity activity, it could be observed that *N. sativa* had no significant cytotoxicity in the murine macrophages at low concentrations. However, thymoquinone in comparison with essential oil and various extracts of *N. sativa* showed higher cytotoxicity on murine macrophage cells. In the GC/MS analysis, thymoquinone (42.4%), p-cymene (14.1%), carvacrol (10.3%) and longifolene (6.1%) were found to be the major components of *N. sativa* essential oil.
Conclusion: The findings of this study suggested an attempt in the search of new antiderma-tophytic drugs and might support the use of *N. sativa* seeds in the traditional medicine for the treatment of dermatophytic infections.

Myocutaneous Mucormycosis in a Diabetic Burnt Patient led to Upper Extremity Amputation

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Objectives: Mucormycosis is a rare opportunistic fungal infection that can implicate cranial sinuses, brain, lungs, gastrointestinal tract and skin. Although it can occur in patients with competent and incompetent immunity (such as patients with diabetes mellitus, lymphoma, leukemia, burn and etc). It has an aggressive, malignant and lethal course in patients with incompetent immunity. To enforce the importance of burn in diabetes, we reported a rare case of diabetic burnt patient complicated by right upper extremity myocutaneous mucormycosis.
Case presentation: A 50- year -old woman was introduced to us after several days of medical and surgical care of right upper extremity and trunk split-thickness burn. Due to gross muscle necrosis of right upper extremity and poor general condition of the patient, she was taken to the operating room that led to right upper extremity amputation and several rounds of aggressive debridement to save her life. Pathologic report was indicative of mucormycosis.
Conclusion: We could conclude from this case that the burns, even partial thickness and with little body surface area, should be refered to burn centers and no response to usual medical treatment should make us more sensitive to consider the unusual causes of infections. Suspected dead tissues should be excised aggressively especially if suspiciousness to wound sepsis and fungal infection is present.

Fungal Contamination of Ghadirmale Student Dormitorybeds Isfahan Provincein 1393

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Objectives: Bioaerosols are airborne biological particles that include living organisms such as bacteria, fungi and their associated metabolites such as endotoxin. The effects of bioaerosols such as infectious diseases and respiratory, acute toxic effects, allergies and cancer in recent years are considered. The aim of this study was to evaluate the concentration of bioaerosols such as bacteria and fungi in indoor environments (residential, office, educational and accommodation).
Methods: This cross-sectional study was done on the 40- bed male dormitory named Ghadir Institute of higher education to study fungal infection rate. The sampling was done by sterile wet swab and carpeting. The samples were cultured on sabouraud agar containing chloramphenicol (sc) and sabouraud agar containing chloramphenicol and cycloheximide at 37° C for48-24hours. The isolated colonies were identified by morphological methods (colony microscopic and macroscopic morphology). The isolated yeasts were identified by physiological methods and color formation on CHROM agar candida medium.
Results: Out of the 40 samples taken from the beds of the dormitory 38 samples (95%) were positive in terms of growth of at least one fungus colonies. 45 isolates positively identified were: *C. glabrata*, 15 (33%), *Aspergillus fumigatus*, 14 (31%), *Penicillium*, 5 (11%), *Candida cruise* aand *Mucor* 3 (7%) and *Aspergillus niger* 2 (4%). The most common species isolated from the students' beds, *C. glabrata* (33%) and *Aspergillus niger* were the most and the least isolates (4%), respectively.
Conclusion: Based on the findings with regard to contamination of beds at the dormitory by saprophyte, the application process and more prevention and regular periods in the environment, including regular washing and setting principles for beds, and the removal of the contamination of fungal with disinfectant would be very effective to reduce pollution and . Also personal and environmental hygiene, can be timely and effective in eliminating fungal infections.

Detection of *Sub3, Sub6* and *Mcpa* Genes in Dermatophytes with Morphological Alterations (Mycelial And Arthroconidial) in Clinical Scrapings

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Objectives: Dermatophytes are a group of fungi that infect keratinized tissues such as hair, skin, and nail. The virulence factors include proteases and subtilisins involved in the pathogenesis of dermatophytes and play a role during infection. The aim of this study was direct detection of *sub3, sub6* and *mcpa* genes in skin and nail scrapings of dermatophytosis due of *Trichophyton rubrum*, *Trichophyton interdigital* and *Epidermophyton floccosum* with morphological alterations (Mycelial and Arthroconidial).
Methods: In this study, 173 skin and nail scrapings from patients with dermatophytosis were collected, the presence of morphological forms include mycelium, arthroconidia and both form using 10-20% KOH were studied. All samples were identified by molecular methods using of designed specific primers. *sub3, sub6* and *mcpa* genes by specific primers were detected, also these genes through sequencing and phylogenetic tree drawn in samples with different morphological forms include mycelium, arthroconidia and both were studied.
Results: Tinea cruris (31.2%) was the most prevalent type of infection, also *Trichophyton interdigitale* was the most common isolate (37.6%). Mycelial form (60/1%) was the most common form at direct microscopic. *Trichophyton interdigitale* was the most common isolate related to mycelial and both forms, also arthroconidia form in three species was not significant. The *sub6* gene (51.4%) was the most common gene that detected.
Conclusion: This is the first study that showed relationship of morphological forms of dermatophytes in clinical scrapings with type of infection, dermatophyte species and virulence factors.

Detection of FTR1 and cotH3 Genes in Clinical and Environmental Strains of Mucorales Species Isolated from Iran by PCR

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Objectives: *Rhizopus oryzae* is the most common cause of mucormycosis. Mucorales have a gene called FTR1 that are involved in the absorption of iron. hyperglycemia and increased expression of GRP78 as the receiver and the interaction of these receptors, because of the proximity structure cotH3 gene, cause the fungus to attach to host endothelial cells and harm the tissue. The aim of this study was the detection of FTR1 and cotH3 genes in clinical and environmental strains of Mucorales by PCR in in Tehran.
Methods: In this study, 100 isolates of Mucorales, including 10 clinical and 90 environmental strains, were collected. All isolates were identified by microscopic characteristics; they were also characterized by molecular methods using *R. oryzae* designed specific primers. The isolates were studied by PCR with specific primers of FTR1 and cotH3 genes.
Results: In total, *R. oryzae* were predominant species in both environmental (80%) and all clinical isolates (100%). FTR1 gene was detected in all isolates, cotH3 gene was detected in all clinical *R. oryzae* isolates (100%). 11 (%12.2) *R. oryzae* environmental strains were also detected.
Conclusion: In this study, *R. oryzae* was the predominant species. The presence of cotH3 gene in all clinical *R. oryzae* and some of its environmental strains revealed that cotH3 gene cannot be used for detecting invasive isolates, and, therefore, more research is needed.

Abdominal Mass Presentation of Zygomycosis in Immunocompetent Patients in Iran

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Objective: The class of Zygomycetes is divided into two orders, Mucorales and Entomophthorales. Members of these two orders produce dramatically different infections. The fungi in Entomophthorales which encompass 2 genera: *Conidiobolus and Basidiobolus* are uncommon pathogens causing chronic cutaneous and subcutaneous infections in immunocompetent patients and rarely disseminate to internal organs and are typically restricted to the tropical and subtropical regions.
Methods: A 5-year-old male child presented with anorexia, nausea, vomiting, abdominal pain and intermitent diarrhea with a progressive course for 3 months without fever and weight loss. Physical examination was unremarkable**.**
Results: He had (Hb = 11, 5 gr/dl) and normal leukocyte count (6500/ml) with 10% eosinophils. ESR and CRP were 22 mm/hr and 6 mg/dl, respectively. Blood glucose level was normal. Microscopic stool exam revealed moderate puss cells and stool culture was negative. Immunologic work-ups such as serum immunoglobulins, nitroblue-tetrazolium test, CH50, and flowcytometry were in normal range.
Abdominal CT scan and ultrasonography showed some masses in the colon with the largest size being, (65 x 55 mm). Then biopsy was done for him and histopathological examinations revealed intact and ulcerated mucosa, beneath which there were numerous granulomas with necrotizing centers, as well as severe infiltration of eosinophils and areas of Splendore-Hoeppli phenomenon

containing some broad sparsely septate hyphae which were in favor of zygomycosis, so after subtotal colectomy, anti fungal therapy was started and the patient was symptom-free with no complications in long term follow up.
Conclusion: In immunocompetent patients who present with eosinophilia and abdominal mass in tropical and subtropical area, obtaining specimens for fungal culture and histopathologic examination with special fungal stains seem crucial.

Fungal Contamination of Water from Indoor Public Swimming Pools, Shiraz, Iran, 1394

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Objectives: Swimming is a fun and healthy activity during different seasons. However, using public swimming pools and their water could be responsible for the transmission of fungal diseases. This study was conducted to detect the physical and chemical parameters and mycological status of swimming pool waters in Shiraz, Iran.
Methods: Five indoor swimming pools of Shiraz were investigated during spring of 1394. Four liters of each water specimen of the pools were collected from the depth of 64 cm and filtered by filter paper No 0.22. All filter papers were cultured in triplicate in sabouroad dextrose agar culture media. Fungal isolates were identified by macroscopic and microscopic examinations. Chloride concentration was evaluated by POOLTester PH-CL and also water temperature, PH, and turbidity were measured on site in the pools.
Results: The mean of chloride concentration, PH and temperature of water pools were 1.4 (0.1-2) mg/L, 7.6 (7.2-7.8), and 32.8° (31°-34°), respectively. No turbidity was seen. Fungal isolates from pools No.1, 2, and 5 were *Aspergillus niger* and *Aspergillus flavus*; *Cladosporium* sp. ; and *Aspergillus* sp. and *Epidermaphyton flucosum*, respectively.
Conclusion: Existence of fungi in pool water is indicative of their resistance to routine disinfectant agents. Our data showed a significant association of water contamination with residual chloride and water temperature. Attention to level of chlorine and cleaning the pool environment can help promote the public health and cleanliness.

Susceptibility to Seven Antifungal Agents of *Candida albicans* Isolated in Iran by Clinical Laboratory Standards Institute Broth Microdilution

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Objectives: *Candida albicans* is the most common *Candida* species, found as a flora and asymptomatic part of the mucosal sites of healthy individuals. This study was conducted at university hospitals located in Iran to determine the frequency of antifungal resistance of *Candida albicans* isolates from patients.
Methods: Clinical samples from mouth, throat, rectal, nose and urine were cultured on sabouraud dextrose agar and incubated at room temperature for 7 days. Species identification was based on colony morphology and RFLP and antifungal susceptibility testing for seven antifungal was performed by the Clinical and Laboratory Standards Institute (CLSI) method, at Prof. Alborzi Clinical Microbiology Research center, Shiraz, Iran.
Results: Overall, 483 *Candida albicans* were isolated from 370 patients admitted to ten university hospitals in Iran. The minimal inhibitory concentrations (MIC_{90}) of the isolates to amphotericin B, caspofungin, voriconazole, fluconazole, posaconazole, itraconazole and ketoconazole were 0.25, 0.125,0.125,1, 0.064, 0.5, and 0.125, and rates of resistance were 4.5%, 0.5%, 7.8%, 12.3%, 2.8%, 8.6% and 1.5%, respectively.
Conclusion: Our results demonstrated that resistance to some antifungal agents, especially in azole family, and variability in MIC_{90} values were seen among *Candida albicans* isolates.

Fungal Airborne Contamination in a Chipboard Factory in Golestan Province, Iran, 2015

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Objectives: Exposure to bioaerosols in the occupational environment could be associated with a wide range of health outcomes, in particular respiratory impairment, allergy and organic dust toxic syndrome. The aim of this study was to determine and compare workers' exposure to airborne cultivable fungi in several sectors of chipboard manufacturing industry.
Methods: Occupational exposure of 68 workers from 17 sectors to airborne fungal contamination in various locations of a chipboard manufacturing plant was monitored by a microbial sampler in the close vicinity of their breathing zone. This sampler drew air at a flow rate of 10 liters/minute and for a 10 minute period and blew it at a high speed through a narrow slit over a solid nutrient containing White Chloramphenicol(SC) plate. Immediately after sampling, the plates were incubated aerobically for 3-5 days at 25^0C and routine mycological techniques were applied to identify fungal colonies.
Results: Total concentrations of viable airborne microorganisms ranged from 1-420 CFU/m^3. Percentage of isolated fungal contaminations were: *Penicillium* (81.95%), *Aspergillus niger* (6.56%), *Aspergillus ochraseus* (2.99%), *Aspergillus flavus*(3.35%), *Terichoderma spp.* (3.35%), *Rhizopus spp.* (0.44%), *Aspergillus spp.* (0.29%), *Cladospourium spp.*(0.24%), *Mucor spp.*(0.13%), *Rhizomucor* spp.(0.20%), Unknown fungi (0.39%), *Syncephalastrum spp.(0.04%), Paecilomyces spp*. and *Geliocladium spp.* (0.02%). The exposure of Iranian workers were higher than their colleagues from other countries.
Conclusion: Our results demonstrated *Penicillium spp*. and *Aspergillus niger* as the predominant fungal airborne contamination in chipboard manufacturing factory. Despite lack of both occupational exposure limit values, high exposure of Iranian workers to airborne fungal contamination could lead to respiratory rhinitis

Molecular Identification and Antifungal Susceptibility Patterns of *Candida* spp. Recovered from Endotracheal Tube Biofilms in Intensive Care Unit Patients

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Objectives: Device-related infections in most nosocomial diseases can be traced to the formation of biofilms by pathogens on the

surfaces of these devices. Candida species are the most common fungi isolated from these infections, and biofilms formed by these fungal organisms are associated with drastically enhanced resistance against most antimicrobial agents. The aim of this study was to identify and determine the antifungal susceptibility pattern of Candida spp. isolated from endotracheal tubes from ICU patients.
Methods: From the central region of each endotracheal tube, 1cm section was cut and processed for quantitative microbial culture. Samples were cultured on Sabouraud Dextrose agar and DNA extraction was performed by glass beads. ITS1-5.8S-ITS2 region was amplified by PCR and was digested by the restriction enzyme *MspI*. Antifungal susceptibility testing was determined according to the recommendations stated in the Clinical and Laboratory Standards Institute (CLSI) M27-A3 document.
Results: Ninety isolates were evaluated from samples among which *C. albicans* (42.3%) was the most frequently isolated species followed by other species of Candida includ *C. glabrata* (25%), *C. tropicalis* (21.7%), and *C. krusei* (10.8%). The resulting MIC_{90} for all *candida* species were in increasing order, as follows: caspofungin (0.5µg/ml); voriconazole (8.8µg/ml); amphotericin B (2 µg/ml); itraconazole (16 µg/ml); and fluconazole (64 µg/ml).
Conclusion: The results showed that yeast biofilms can form on the surface of endotracheal tubes. Candida species are the yeasts which were isolated from these surfaces of infectious patients. Knowledge about the susceptibility patterns of colonized Candida spp. can be helpful for clinicians to manage intensive care unit patients.

Antifungal Activity of Silver Nanoparticles Synthesized by Using Salvadora Persica Leaf Extract

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Objectives: In this study,through Green synthesis method, silver nano-particles were produced from the ethanolic extract of leaves of Salvadora persica. The antifungal properties of silver nanoparticles were also investigated. We tested silver nanoparticles, silver nitrate and Salvadora persica leaf extract against *Aspergillus niger and Penicillum digitatum,* using Co-trimoxazol as control.
Methods: In this research, the possibility of producing silver nano-particles from silver nitrate solution was studied. The ethanolic extract of leaves of Salvadora persica was used as a the stabilizer and an agent to reduce silver ions to metallic silver. The principles of green synthesis were followed. UV-vis spectroscopy and PSA machine confirmed the size and formation of silver nanoparticles. In addition, the antifungal activity of these particles against 2 fungal species was investigated by using disk diffusion method.
Results: The results revealed that the produced nano-particles had an average diameter of 6.2 nm and in the 430 nm peak observed. The results showed that Silver nano-particles had a significant effect on the *Aspergillus niger* and *Penicillum digitatum.*
Conclusion: We can use plant extracts for the synthesis of silver nano-particles. This method is very easy and cheap. This Silver nano-particle has unique biological properties. We can use this silver nanoparticle for Pharmaceutical industry.

Green Synthesis of Silver Nanoparticles by Zygophyllum Qatarense Hadidi Leaf Extract and Evaluation of Their Antifungal Activities

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Objectives: In this study, silver nanoparticles were produced through Green synthesis method by methanolic extract of leaves of Zygophyllum Qatarense Hadidi. The antifungal properties of obtained silver nanoparticles were also investigated. In the present study, we tested silver nanoparticles against *Aspergillus niger* and *Penicillum digitatum*.
Methods: In the present study, the possibility of producing silver nanoparticles from silver nitrate solution was studied. The methanolic extract of leaves of Zygophyllum Qatarense Hadidi was used as the stabilizer and reagent to reduce silver ions to metallic silver. The principles of green synthesis were followed. UV-vis spectroscopy and SEM imaging confirmed size, shape, and formation of silver nanoparticles. In addition, the antifungal activity of obtained silver nano particles against two types of fungal was investigated by using Diffusion disk, MIC and MFC methods.
Results: The results revealed that obtained nanoparticles had an average diameter of 47 nm. They also showed that Silver nanoparticles had a significant effect against *Aspergillus niger* and *Penicillum digitatum*.
Conclusion: Our results showed that Zygophyllum Qatarense Hadidi leaf extract can be used for the synthesis of silver nanoparticles as an efficient green reagent with no need for chemical compounds. This method is very easy and cheap. This Silver nanoparticle has unique biological properties and can be used in Pharmaceutical industries.

Molecular Identification of *Aspergillus* Species Isolated from Corn in Marvdasht and Shiraz

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Objectives: *Aspergillus* is a large genus whose morphological identification is not easily achievable. This genus is composed of more than 180 accepted anamorphic species, with teleomorphs described in nine different genera. The genus is subdivided into 7 subgenera, which in turn are further divided into Sections. *Aspergillus* species are considered as a cosmopolitan fungus that can occasionally produce plant or animal diseases, infect stored products and silos, and secrete toxins. Here we tried to see if there was a positive correlation between morphological and molecular identification of this fungus.
Methods: A survey was conducted to identify major *Aspergillus* species infecting silage maize in Shiraz and Marvdasht, the major forage maize producing centers in Fars province, Iran. Samples were cut into small pieces and directly placed on PDA and WA and incubated at 25°C. All of the *Aspergillus* isolates were identified by macroscopic and microscopic examinations. In the molecular assay, we extracted DNA manually using grinder method, followed by PCR amplification. Isolates of *Aspergillus* spp. were identified at the species level, by sequencing the internal transcribed spacer (ITS1 / ITS4) of ribosomal DNA (rDNA), and β-tubulin and compared with non-reference strain sequences in GenBank.
Results The results showed that contaminant species are *A. flavus, A. oryzae, A. fumigatus, A. sydowii, A. ochraceus, A. niger, A. versicolor, A. nidulans,* and *Emericella quadrilineata*.
Conclusion: It was found that the sequence of β-tubulin region is more correlated to morphological identification and, therefore, is more reliable in identifying *Aspergillus* species than the sequence of ITS region. According to the results of this study, ITS gene sequences, in most species cannot be separated from each other, but β-tubulin gene can separate this species. Because of the demonstrated potential of *Aspergillus* species to produce mycotoxins, it is important to properly construct and manage silos to prevent their contamination with *Aspergillus* species.

Effects of Milkweed (*Calotropis procera*) Extracts on *Macrophomina phaseolina* Causing Bean Charcoal Rot

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Objectives: Bean charcoal rot is one of the most important causes of fungal pathogenicity with a wide range of hosting.
Methods: The effects of the aqueous and alcoholic extracts of the plant milkweed (*Calotropis procera*) with concentrations of 3%, 4% and 5% on *Macrophomina phaseolina*, bean charcoal rot agent were studied. Comparisons of these treatments with benomyl fungicides with the concentration of two per thousand in *vitro* conditions in three periods of 24, 48 and 72hr, by mixing the extract with medium in completely randomized block design with 8 treatments and three replications.
Results: The comparison of the average diameter of fungal growth based on Duncan's test at level 0.5 (α) after 72hs showed that the increase in the extract concentrations decreases the diameter of fungal growth except 3% and 4% of alcohol extract. The results

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of the mean percentage of inhibition after 72hs showed that 5% aqueous extract of the milkweed with 23.68% had the highest percentage of inhibition against *Macrophomina phaseolina*. The effect of 5% aqueous extract and dry powder as well as their comparisons with benomyl fungicide were also studied in completely randomized block designs including 9 treatments and three replications in *vivo* condition. The *vivo* experiments indicated that the extract treatments before and after planting the seeds, and dried powder before planting the seeds have inhibitory effects on bean charcoal rot.
Conclusion: Among these 3 treatments, the 5% aqueous extract before sowing the seeds of bean had, in total, more inhibitory effects on *M.Phaseolina*.

Antifungal Effect of Griseofulvin and Silver Nanoparticles on *Trichophyton mentagrophytes:* In Vitro

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Objectives: Dermatophytosis is the most common skin infection caused by dermatophytic fungi such as *Trichophyton spp***.** Invasive fungal disease represents a major threat to life in immunocompromised patients and is now one of the most common causes of infection in this group. There is a limited range of antifungal agents available to treat disease, caused by trichophytones including the polyenes, Griseofulvin, azoles and more recently the echinocandins. Therefore, it is necessary to find new ways of treatment for *Trichophyton mentagrophytes*. The purpose of this study was to investigate the antifungal effects of Grizeofulvin and silver nanoparticles on *T.mentagrophytes* in vitro.
Methods: different concentrations of Griseofulvin and silver nanoparticles were prepared. Antifungal effects of Griseofulvin and silver nanoparticles against *T.mentagrophytes* were investigated by agar dilution method. Then minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) were determined by the broth micro dilution method.
Results: The results of the agar dilution showed that silver nanoparticles at 160 ppm and drug at 125µ*g/ml* can inhibit the growth of *T.mentagrophytes*. In the broth microdilution method MIC and MFC for the silver nanoparticles 7.8 ppm and 15.62 ppm were obtained, And for Griseofulvin MIC was equal to 7.8 µ*g/ml* and MFC was 15.62 *µg/ml.* So silver nanoparticles can control *T.mentagrophytes*.
Conclusion: Effects of Silver Nanoparticles according to their size were almost the same with Griseofulvin, but because of treatment failure with chemical drugs, numerous side effects and drug resistance led to the discovery of new therapeutic regimens. Based on this study and other studies in the field of silver nanoparticles, due to strong germicidal effects and low toxicity to human cells in the body and high stability is a good candidate for treatment.

Antifungal Effect of Silver Nanoparticles and Amphotericin B against *Aspergillus flavus*

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Objectives: Invasive fungal disease represents a major threat to life in immunocompromised patients and is now one of the most common causes of infection in this group. There is a limited range of antifungal agents available to treat disease caused by *Aspergillus* including the polyenes, flucytosine, azoles and more recently the echinocandins. There for, it is necessary to find new ways for destroying *Aspergillus flavus.* The purpose of this study was to investigate the antifungal effects of Amphotericin B and silver nanoparticles on *A. flavus* in vitro.
Methods: Different concentrations of Amphotericin B and silver nanoparticles were prepared. Antifungal effects of AmB and SNPs against *A. flavus* were investigated by agar dilution method. Then, minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) were determined by the broth microdilution method.
Result: The results of the agar dilution showed that silver nanoparticles at 640 ppm and drug at 80 ppm can inhibit the growth of *Aspergillus flavus*. In the broth microdilution method MIC and MFC for the silver nanoparticles 31/25 ppm were obtained. For amphotericin B MIC was equal to 1.9 ppm and MFC was 7.9 ppm, so silver nanoparticles can control *Aspergillus flavus*.
Conclusion: Effects of Silver Nanoparticles, according to their size, was less than the amphotericin B, but anti-fungal medication side effects on the body's cells and drug resistance reported from around the world shows the need to find an alternative for the treatment of aspergillosis. According to this study and other studies in the field of silver nanoparticles, SNPs can be more clinical trials to be an effective drug without side effects and drug resistance in the treatment of aspergillosis introduced.

The Antifungal Effects of Alcoholic Extract of *Ganoderma lucidum* on Clinically Isolated *Candida* species

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Objectives: Candidiasis is a common fungal infection caused by various species of the *Candida.*
Candida albicans is the most important etiologic agent of candidiasis which includes about 60% -75% of this disease. The extent of fungal opportunistic infections in susceptible individuals on one hand and increasing drug resistance on the other hand, leads to the importance of antifungal effects of traditional plant products. One of the edible mushrooms, known as the best medicinal fungi with many health benefits and various therapeutic properties, is named *Ganoderma lucidum*. In previous studies, the therapeutic importance of this mushroom and its antifungal and antibacterial properties were shown. In the present research, antifungal activity of the ethanolic extract of this fangus against *Candida* species was determined.
Methods: This study was carried out on patients with candidemia admitted to some specialized hospitals in Tehran. To identify the *C.albicans* specie, out of 2150 blood cultures, 43 cases were identified as candidiasis, by using phenotypic and molecular methods, in vitro. Then Microdilution methods were used to prepare different concentrations of *G. lucidum* ethanol extract to determine MIC (Minimum Inhibitory Concentration) and MFC (Minimum Fungicidal Concentration) for each *C.albicans* isolated species.
Result: The results showed that out of 43 candidiasis, the frequency of candida isolates were as follows: *C.albicans* 22 (52%), *C.parapsilosis* 10 (23%), *C.glabrata* 8 (18%) and *C.tropicalis* 3 (7%), respectively. By Microdilution method, the concentration of 5.2 mg/ml inhibited the most species. The MIC was 3.1 mg/ml and the maximum concentration was 10.4 mg/ml. The MFC was 5.2 mg/ml and the maximum concentration was 20.8 mg/ml.
Conclusion: According to the results of this study, the *G.lucidum* ethanol extract can be used as an antifungal product in the future studies to lead for better control and treatment of candidiasis.

Identification of Proteasome Pattern of *Fusarium verticillioides* Isolates from Maize by SDS-PAGE.

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Objectives: The *Fusarium* species are the most important toxigenic and allergenic fungi, some of which possess high allergenic components and some produce various toxins such as fumonisins and T2-toxins. *Fusarium solani* is of special importance among allergenic *Fusarium* species and *Fusarium verticillioides* (*Gibberella moniliformis*) is intensely toxigen. This fungus produces B1, B2 fumonisins on the crops such as maize, rice, cane, etc. The purpose of this study was the identification of proteasome pattern of Iranian *Fusarium verticillioides* isolates from maize by SDS-PAGE.
Methods: In this study, 20 isolates of this species were analyzed. These isolates had been previously identified and confirmed in South Africa mycology center. Using Bradford method, protein range of each isolate was measured, and its' molecular weight was obtained by SDS-PAGE.
Results: The proteasome pattern of each isolates indicated total 50 protein bands with molecular weight ranging from 7 to 157 KD. Maximum protein bands were related to F4 and F10-c isolates with moderate toxigenicity. Minimum protein bands were related to M2-a, K6 and A7-b isolates with Low, moderate and high toxigenicities, respectively.
Conclusion: The comparison of proteasome pattern of isolates with grouping, based on toxigenicity, did not show any correlation between them. It means that with this pattern, we cannot classify these fungi based on their toxigenicity.

Antifungal Treatment of Leucorrhoea in Traditional Persian Medicine (TPM)

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Objectives: Leucorrhoea is one of the most common chief complaints in the field of gynecology accounted as a major problem among women in child-bearing age. It refers to a persistent excessive thick, whitish, and highly acidic (pH: 4.2-4.8) discharge from vagina. Its etiology is complex and not well understood; however, fungal infections are among the most common causes of the disease. Besides available treatments, herbal medicine still remains a popular remedy all around the world. In this study, we aimed to introduce the treatments suggested by the school of Traditional Persian Medicine (TPM) for leucorrhoea.
Methods: We reviewed the chapter of *Sayalan-e-Rahem* (leucorrhoea) and its remedies in some of the main books of TPM including: "*Teb-e-Akbari*", "*Exir-e-A'zam*", and "*Makhzan-al-Advieh*". The suggested treatments were then searched in PubMed and Google Scholar databases for possible evidences of their efficacy.
Results: This study revealed that *Glycyrrhiza glabra* (liquorice) and *Marrubium vulgare* (horehound) has been mentioned in TPM for the treatment of leucorrhoea. Their effectiveness as anti-inflammatory and anti-fungal agents has been approved in different studies.
Conclusion: Regarding the uncertain etiology of the disease, the current treatment of leucorrhoea is not satisfactory enough. In this situation, treatment regimens of TPM physicians, which are in accordance with the current evidences, could be beneficial. More rigorous investigations and clinical trials should be conducted to evaluate these treatment options.

Highly Cadmium Tolerant Fungi: Their Tolerance and Removal Potential

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Objectives: Since the soil of lead and zinc industries is rich in high concentration of cadmium, the present study was conducted to isolate tolerant fungal strains from cadmium -polluted sites in Zanjan province, Iran.
Methods: Cadmium tolerance and bioremediation capacity of seven isolates including *Aspergillus versicolor, Aspergillus fumigatus, Paecilomyces* spp.*, Paecilomyces* spp.*, Trichoderma* spp.*, Microsporum* spp.*, and Cladosporium* spp. were determined**.**
Results: Minimum inhibitory concentration values among 1000-4000 mg l^{-1}proved great ability of isolated strains to survive in cadmium- polluted environments. The most tolerant fungi, *A. versicolor*, showed tolerance index of 0.8 in 100 mg l^{-1} cadmium agar media. Fungal resistance against cadmium directly depends on the strain's biological function. *A. versicolor* was found to bioaccumulate over 7 mg of cadmium per 1 g of mycelium, followed by 5.878, 5.243, and 5.075, 4.557 by *Paecilomyces* spp*, A.fumigatus, Microsporum* spp. *and Trichoderma* spp., respectively.
Conclusion: It can be noted that the tolerance of the strains appears to be independent from bioaccumulation capacity. Finally, the results indicated that *A. versicolor* could be a prospective candidate for bioremediation processes.

Prevalence of cutaneous fungal infections and antifungal drug susceptibility of the isolates in patients with diabetes mellitus.

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Objectives: High levels of glucose in the blood and tissues and low levels of lactate on skin، provide conditions for yeasts and saprophytic molds colonization. Therefore, screening and early detection of fungal infections in high-risk individuals is critical for the prevention of grave complications like foot amputation. The main objective of this study was to find the prevalence of fungal infections among cutaneous lesions of diabetic patients and to investigate antifungal drug susceptibility of the isolates.
Methods: In this study, 122 diabetic patients comprising 47 cases with diabetic foot ulcers and 78 with skin and nail lesions were studied. Fungal infection was confirmed by direct examination and culture methods. Determining the MICs of fluconazole and itraconazole on fungal isolates was carried out by broth microdilution method, using CLSI protocols.
Results: Out of 122 Diabetic patients, 47(38.5%) had foot ulcers. Prevalence of fungal infections was 19% in patients with diabetic foot ulcer and 28% in patients with skin and nail lesions. The most common fungal pathogen isolated from patients were the genus *Candida* followed by *Aspergillus* species. Among the *Candida* isolates, 66.6% were resistant to Fluconazole (MIC ≥ 64μg / ml). The MICs of itraconazole on total 10 *Aspergillus* isolates were as follows: 4 (MIC ≥ 8μg / ml), 4 (MIC= 2-4 μg / ml) and 2 isolate (MIC≤2 μg / ml).
Conclusion: Our data expanded current knowledge about the prevalence of fungal infections in diabetic patients. We noted the high prevalence of Fluconazole-resistant *Candida spp*. particularly in diabetic foot ulcers. More attention is necessary to be paid in diabetic centers to this neglected issue.

Molecular Investigation of *Aspergillus* Infections in an Iranian Training Hospital Using RAPD-PCR

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Objectives: Aspergillosis is known to be an airborne infection The nosocomial infections are associated with constructions and increased dust loads in hospital indoors. Our main object was to find the environmental sources of *Aspergillus* species causing hospital acquired infections.
Methods: The clinical and environmental samplings were performed during 18 months from spring 2010 to summer 2011 in a large educational hospital. A morphological diagnosis was used including media culture for the first identification of all isolated *Aspergillus* species. For the RAPD assay, extraction of DNA was performed using manual phenol-chloroform method followed by

PCR with six random primers. The results of RAPD were compared to the clinical *Aspergillus* isolates and hospital indoor isolates.
Results: Use of RAPD method showed various differential patterns so that some *Aspergillus* isolates from the clinical and hospital indoor including the pairs 32 and 45 among 51 *Aspergillus* pairs, were completely matched. Some other *Aspergillus* pairs: 16, 31 and 237 were not matched. The *Aspergillus* isolate of pair 32 was obtained from both bronco alveolar lavage and air conditioner as the same RAPD type of *A. niger*. Also, the same RAPD type of *A. flavus* was isolated from sinus discharge as well as the walls surface.
Conclusion: The hospital sources for the *Aspergillus* clinical isolates included air conditioners and rooms walls and RAPD-PCR analysis can play a trivial role in finding the hospital sources of *Aspergillus* clinical isolates.

Identification and Determination of Drug Resistant *Candida* Species Isolated from Cases with Hospital Acquired Infections

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Objectives: Nowadays, use of antifungal drugs group Azoles is crescent as well as the number of drug resistant yeast and also frequency of *Candida* infections. The aim of this study was isolation and identification of *Candida* species causing hospital acquired infections and study of antifungal resistance.
Methods: Specimens were collected from patients with approved nosocomial infections in the Urmia educational hospital, Urmia, Iran. Primary tests including direct examination and culture were performed. Differential cultures and molecular test: A molecular diagnostic method was used for differentiation and identification. Antifungal sensitivities were studied by using the Disk diffusion and Micro dilution methods. For the analysis of *Candida* drug resistance, we focused on ERG3 gene. PCR, Cloning of ERG3 gene in *E. coli* DH5a and sequencing of isolated gene were performed.
Results: A total of 60 isolates (23.4%) were obtained including *Candida albicans* 37 (61.6%), *C. krusei* and *C. glabrata* 7 (11.6%) each, *C. dubliniensis* 5 (8.3%) and *C. tropicalis* 4 (6.6%). Antifungal sensitivity analysis showed *C. albicans* was not considerably resistant to azoles compared other *Candida* species in disk diffusion method. Our findings of Micro dilution method confirmed the above results. Most of the proven resistant *C. albicans* isolates have been found with ERG3 gene so that it could not be detected in some drug sensitive ones.
Conclusion: In spite of our findings that showed there is no considerable drug resistance in *Candida* isolates, monitoring of antifungal resistant *Candida* species causing hospital acquired infections can be important.

Isolation of Dermatophyte Fungi from Equipments Used in Ladies and Gentleman Barbers in Arak City

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Objectives: Barbers, are public places and people with different economical, cultural, and health conditions refer to these places, so the public health care, could be very important. The purpose of this study was to isolate of dermatophyte species from the barbers' tools in Arak city.
Methods: A total of 405 samples from tools and surfaces of 135 barber shops were collected by sterile carpet. All samples were cultured on mycobiotic agar medium and the isolated dermatophytes were identified, using morphological and physiological characteristics.
Results: 8 (5.9%) of 135 barbers were positive for dermatophyte. From the combs and hairbrushes, *Trichophyton tonsurans* (3), *Trichophyton rubrum* (1); from the headrest of barber chairs, *T. rubrum* (2), *T. tonsurans* (1); from the surface of barber desks, *T. intrerdigitale* (1) were isolated.
Conclusion: The results of our study showed that shared tools and contacted surfaces in barbershops can be sources for dermatophyte colonization and may play an important role in spreading dermatophyte infections among people.

Identification of *Malassezia* Species Isolated from Patients with *Malassezia* folliculitis in Arak City

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Objectives: Lipophilic *Malassezia* yeasts are causing agents of skin diseases such as tinea versicolor and folliculitis. Because of the lack of research in this area in Arak city and few studies in the country, this study aimed to determine the prevalence of *Malassezia* acne and identification of *Malassezia* species were performed.
Methods: 60 patients (32 women and 28 men) suspected of folliculitis were sampled. Direct examination was performed with gram stain and methylene blue. Dixon medium was used to culture samples. The isolated species were identified using morphological and physiological characteristics.
Results: In direct examination, 7 samples (11.7%) were positive for *Malassezia* yeast cells and all the 7 samples were grown in culture medium. The most common isolated species included *Malassezia furfur* (57.2%), *Malassezia globosa* (28.6%) and *Malassezia restricta* (14.2%) respectively.
Conclusion: Our results showed that 11.7% of the causing agents of acne were *Malassezia* yeasts, and *Malassezia furfur* was the most common isolated species from patients with *Malassezia* folliculitis. So differentiating between bacterial and *Malassezia* folliculitis can help better diagnosis and treatment by dermatologists.

Isolation and Molecular Identification of Keratinophilic Fungi from Parks Soil in Arak, Iran

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Objectives: Keratinophilic fungi are an important group of fungi which could be found in soil. These fungi can degrade the hard keratin tissue and cause cutaneous fungal infections. Park's soil is suitable places for growth of these fungi and could be considered as a reservoir for human infection. Thus, the present study aimed to isolate and identify keratinophilic fungi from soil of the popular parks in Arak city by molecular and morphological analysis.
Methods: Sixty soil samples from different parks were examined for the presence of geophilic keratinophilic fungi. Fungi were isolated from the samples by the method of hair baiting.
Sixty soil samples from 20 parks were examined for the presence of geophilic keratinophilic fungi. Fungi were isolated from the samples by hair bait technique. Isolates were identified by colony morphology, slide cultures, and molecular method, using DNA sequence analysis. ITS region of ribosomal DNA was amplified and the PCR products were sequenced.
Results: A total of 188 isolates from 14 genera were identified. The most common keratinophilic fungus was *Chrysosporium* (21%). Other important isolates were *Fusarium* (16.5%), *Acremonium* (12.5%), *Aspergillus niger* (19%), *Penicillium* (8.5%), *Aspergillus fumigatus* (6%), *Mucur spp*. (5.5%), *Aspergillus flavus* (2.5%) and *Microsporum gypseum* (2%).
Conclusion: The results of our study demonstrated that park soil, as main reservoir of keratinophilic fungi, is important for public health and can be a source of infection for humans and animals.

Comparison of In vitro Antifungal Susceptibility of Three Species of Dermatophytes and Their Relevance with Morphological Alterations (Mycelial and Arthroconidial) in Clinical Scrapings

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Objectives: In recent years, the incidence of infections caused by dermatophytes has increased. These fungal infections cause an important public health problem due to prolonged treatment of the disease and its refractivity to therapy. The aim of this study was the comparison of the in vitro activities of fluconazole, itraconazole and terbinafine against clinical isolates of three species of dermatophytes (*Trichophyton rubrum*, *Trichophyton interdigital,* and *Epidermophyton Floccosum*) and their relevance with morphological alterations at skin and nail scrapings.
Methods: In this study, 74 skin and nail scrapings from patients with dermatophytosis were collected. The presence of morphological forms including mycelium, arthroconidia and both form using 10-20% KOH were studied. All isolates were identified by typical colony and microscopic characteristics. They were also characterized by molecular methods using designed specific primers. Antifungal susceptibility testing was determined according to recommendations stated in the Clinical and Laboratory Standards Institute (CLSI) M38-A2 document.
Results: In total 74 clinical isolates including 30 *T. rubrum*, 23 *T. intrerdigitale*, 17 *E. floccosum,* and 4 other dermatophytes were identified. Terbinafine was found to be the most effective antifungal drug against all tested dermatophyte isolates. *T. intrerdigitale* species have the highest resistance to itraconazole.
Conclusion: This is the first study that showed relationship of morphological forms of dermatophytes in clinical scrapings with drug resistance. The current study results showed that more mycelial form was seen in *T. rubrum* and *T .intrerdigitale.* These two species were more resistance to examined drugs than *E. floccosum*.

Specific Identification of *Candida Glabrata* by Colorimetric Assay Based on Gold Nanoparticle

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Objectives: *Candida glabrata* is one of the most common Candida species which is able to get resistant to antifungals. So, its rapid identification, seems to be necessary for early treatment of infections. The conventional methods for detection of Candida species are time-consuming and difficult. Today, using nanoparticles with unique properties has been expanded. The purpose of this study was rapid identification of *Candida glabrata* using colorimetric assay based on gold nanoparticles.
Methods: *Candida glabrata* was cultured in yeast extract peptone dextrose broth medium and DNA was extracted. The specific gene (CAGL0M05005g) sequence was determined from the Candida genetic information bank. For polymerase chain reaction (PCR), the primers and probe were designed via Oligo 7 software. The PCR product and probe were affected by denaturation and optimized binding temperatures. The gold nanoparticles were added and the color change was visually observed. The result was studied by using ultraviolet-visible (UV-vis) spectrophotometer and transmission electron microscopy (TEM).
To evaluate the sensitivity of new method, different concentrations of PCR product were used and the results were analyzed using gel electrophoresis.
Results: The optimum temperatures of the primer annealing to DNA templete and the probe hybridization to the PCR product were detected. After the addition of gold nanoparticles, the mixture solution color changed from red to purple. The results were confirmed by UV-vis spectroscopy and TEM.
Conclusion: The results indicated that in detection of *Candida glabrata*, the new method is faster than conventional methods and more sensitive than gel electrophoresis.

Identification of *Aspergillus* Species with PCR-RFLP

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Objectives: *Aspergillus* species are the most common invasive filamentous fungi and cause morbidity and mortality in immunosuppressed patients. *Aspergillus* conidia are widespread in the nature. These conidia enter the lungs by inhalation. The most common *Aspergillus* species are *A. fumigatus, A. flavus, A. niger* and *A .terreus*.
Methods: In this study, 33 isolates of *Aspergillus*, including *A. fumigates* (11), *A. flavus (12), A. niger (5)* and *A. terreus* (4) were tested for molecular detection. The ITS region was the target gene for this study. This region was searched from database and BglI restriction enzyme was recognized as the best enzyme for the diagnosis of the *Aspergillus* species. The PCR method with primers ITS1 and ITS 4 was applied for obtaining the 600 bp from ITS gene, and then the PCR product was digested with *Bgl*I.
Results: *Bgl*I enzyme digested 600 bp bands with different patterns for all *Aspergillus* species. These bands for different species were as follows: *A.fumigatus*, 315,146 and 68 bp; *A. flavus*, 433, 99 bp ; *A. niger*, 300,164,122 bp ; *and A. terreus*, 328,122, 68 bp.
Conclusion: *Bgl*I was a suitable enzyme for the identification of *Aspergillus* species. To the best of our knowledge, this is the first report on molecular diagnosis of Aspergillus species with *Bgl*I enzyme.

Molecular Analysis of *Aspergillus flavus* Isolates Using *afl*R-PCR

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Objectives: *Aspergillus flavus* is a saprophytic filamentous fungus in the section of *flavi* that is able to be an opportunistic pathogen for a wide range of hosts. This fungus is also important regarding aflatoxin production. *afl*R gene is one the most important regulatory genes in aflatoxin production in *A. flavus*. Detection of *Aspergillus* species with traditional methods is time-consuming and does not lead to differentiation of many species, but molecular methods are able to differentiate between closely related species with higher accuracy. The purpose of this study was the use of *afl*R-PCR technique for the detection of differentiation in aflatoxin-producing *A. flavus* isolates.
Methods: Forty-two *A. flavus* isolates including 10 standard, 25 clinical and 7 environmental isolates were collected. To ensure the purity of all clinical and environmental samples, they were sub -cultured in the SDA medium. The *A. flavus* cultures were confirmed using a morphologic and taxonomic key. *Afl*R-PCR Molecular technique was performed by *afl*R1and *afl*R2 primers.
Results: PCR amplification produced approximately 800 bp band for 35 samples. However, in three clinical and three environmental strains, no band was observed. Target gene doesn't probably exist in these isolates. Also additional bands were observed in two standard strains, two clinical strains and three environmental isolates. PCR products of these isolates were sequenced by BIONEER South Korea. The target sequences showed 100% similarity with *afl*R genes of *A. flavus* after examining in NCBI. Sequences were analyzed using the MEGA5 software.
Conclusion: Isolates analysis according to the source showed that 100% of standard samples and 84% of clinical samples produced the target band while it was only 57.14% of environmental samples. The PCR of *afl*R gene produced an 800 bp band for about 83.33 % tested isolates. It was concluded that 16.66 % of isolates probably has not the related gene. This study showed that *afl*R-PCR method is a useful method for rapid detection of *A. flavus* species and its

ability to produce aflatoxin.

The Safety and Efficacy of Anidulafungin versus Amphotericin B and Azoles for the Treatment of Invasive Candidiasis

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Objectives: Anidulafungin is one of the newest Echinocandin antifungal, a relatively new class of antifungal drugs that act by inhibition of a key enzyme vital for the fungal cell wall integration. It is used in the treatment of invasive candidiasis. Fluconazole and Echinocandin are proposed as the first-line therapy for candidemia and invasive candidiasis (C/IC) caused by *Candida Albicans*.
Methods: We compared the safety and efficacy of Anidulafungin as a new Echinocandin drug with older antifungals such as Amphotericin B and Azoles in this review article.
Results: Many clinical studies demonstrate the equal and even better efficacy of Anidulafungin than other antifungal agents for the treatment of invasive candidiasis.
The limited toxicity profile, minimal drug-drug interactions and the hepatic or renal damages, established this Echinocandin more effective than Amphotericin B and Azoles for the treatment of invasive fungal infections and Anidulafungin have higher response rates as compared with fluconazole in patients with invasive candidiasis. Despite non-hepatic metabolized pathway, decreased clearance of Anidulafungin and increased drug costs, it's a very attractive drug for the treatment of invasive candidiasis in contrast, Amphotericin B and Azoles have many side effects such as hepatotoxicity, drug-drug interaction and skin rashes.
Conclusion: As a result, Echinocandin, especially Anidulafungin, have decreased liver or kidney damages and show more efficacy than older antifungals such as Amphotericin B and Azoles. However, some studies recommend Amphotericin B as first-line therapy and most safety antifungal drug.

In Vitro Antifungal Susceptibility Testing of Four Antifungal Drugs Against *Candida* Species

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Objectives: In recent decades, the incidence of invasive *Candida* infections has increased dramatically due to the increasing incidence of cancer, hematopoietic stem cell and solid organ transplantation. Azoles are a widely applied class of antifungal agents, and fluconazole has been shown to be as the drug of choice. Azoles and echinocandin resistant in *Candida* species is now becoming a serious clinical problem. Therefore, in the present investigation, we evaluated the *in vitro* antifungal susceptibilities of four antifungal drugs against clinically important *Candida* species.
Methods: A total of 41 clinically important *Candida* species (*C. albicans, C. dubliniensis, C. africana, C. glabrata, C. parapsilosis, C. tropicalis* and *C. krusei)* were involved, previously isolated from cystic fibroses, vulvovaginitis and onychomycosis infected patient at Mazandaran, Sari. MICs (minimum inhibitory concentration) for amphotericin B, itraconazole and fluconazole and MECs (minimum effective concentration) for caspofungin only were determined according to recommendations stated in the Clinical and Laboratory Standards Institute (CLSI) M27-A3 and M27-S4 documents.
Result: Susceptibility testing methodology reveals that MICs of all isolates against amphotericin B was low, ranging between 0.016 – 0.25 µg/ml. We found the widest range and the highest MICs with respect to fluconazole range 0.016 – 64 µg/ml. Itraconazole showed 0.031– 4 µg/ml, against all *Candida* species. However, echinocandin drugs, caspofungin, were more active than triazole by 2 $\log_2$ dilution step.
Conclusion: The variability of the *Candida* species distribution from different anatomical sites highlights the significance of local epidemiology in disease management and selection of antifungal agents. Our results also contribute to a future improvement of the standard methods access the drug efficacy currently applied to *Candida* species. However, in vivo efficacy remains to be determined.

Developing New Oxime Ether Derivatives of Azoles as Antifungal Agents: Design, Synthesis, Molecular Docking and Biological Evaluation.

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Objectives: Azole antifungal agents are the largest class of synthetic antimycotics, About 20 agents on the market today. In the other hand, many famous drugs contain an oxime or oxime ether moiety in their structure. Due to the importance of oxime ether derivatives in medicinal chemistry and pharmaceutical industries we were encouraged to design and synthesis and characterizations of some novel oxime ether derivatives of imidizole and benzimidazole. to find the structural requirements for ligand binding, a docking study procedure has been applied exploiting different conformational of Lanosterol 14 α-demethylase enzyme (CYP51), which is responsible for an essential step in the biosynthesis of sterols in Fungi.
Methods: In the present study, we designed some novel oxime ether derivatives of different azoles and the development of new method for synthesisalso have been studied (MCRs). The Docking analysis of synthesized compounds was carried out using CYP51 receptor by AutoDock 4.2 (PDB:1EA1) and the antifungal activity of compound was evaluated.
Results: To prevent instability of reaction's intermediates we use Multi component Reaction (MCRs) and mixed three main reagents (oximes, *N*-heterocycles and methylene iodide) simultaneously in order to give favorite product. By this method, we not only decrease the time, cost and steps but also increase the yield of reaction. The first step of this synthetic approach consisted of finding out the optimized reaction conditions. Evaluating antifungal activities of showed the compound (1a), has more activity against some fungi species even more than Fluconazole as a positive control.
Conclusion: Since of the wide application of oxime ether derivatives of nitrogen compounds in medicinal studies, we report clean, simple and efficient method for preparation of these Azole derivatives by using multicomponent reactions (MCRs) method. The Docking analysis of synthesized compounds was satisfying and the antifungal activity had a good result.

A Safe and Cost-Effective gDNA Extraction Method Used for Medically Important Fungi Using Sea Sand

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Objectives: A fundamental task in any molecular genetics laboratory is the extraction of genomic DNA. DNA extraction from different fungal species (i.e., filamentous fungi, yeasts and yeast like fungi) has been described to be rather complicated due to the structure and composition of the fungal cell wall. The objective of this study was the development of a cost-effective and safe technique of DNA extraction by using sea sand without the additional use of phenol or chloroform.
Methods: A total of 47 fungal species, including *Candida* spp., *Cryptococcus* spp., *Aspergillus* spp., *Exophiala* spp., *Microsporum* spp., and *Trichophyton* spp. ,were used which were previously

identified and deposited to the reference culture collection at Invasive Fungi Research Center (IFRC). All species were grown at Malt Extract Agar (MEA), and a small amount of the colony was suspended in lysis buffer, then 3 g sea sand was added and vortexed for 20min.This mixture was incubated at 100°C for 15 min. Potassium acetate was added and mixed again, incubated on ice water for 60 min, and the supernatant was transferred to a new tube. DNA was precipitated with an equal volume of isopropanol, washed with ethanol, dried and resuspended in TE buffer prior to use.

Results: For all tested fungal species, nucleic acid purity was confirmed by an absorbance ratio (A260/ A280) which was between 1.8 and 2.0ng/µl. The integrity and quality of fungal gDNA obtained by using sea sand procedure were validated by PCR and confirmed by sequencing of the ITS rDNA regions.

Conclusion: Filamentous fungi have strong cell walls which are often resistant to conventional DNA extraction procedures; however, fungal polysaccharides and pigments also contribute to difficulties in isolating gDNA. In addition, the use of toxic chemical compounds such as phenol or chloroform further limits the use of conventional DNA extraction procedures in clinical laboratories. We concluded that mechanical disruption of fungal cells by using sea sand is a safe, rapid, and efficient procedure for extracting gDNA from medically important fungi.

In Vitro Susceptibility Testing of Five Antifungal Drugs against *Exophiala* Species

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Objectives: The fungal genus *Exophiala*, comprising black yeast anamorphs affiliated to the ascomycete order *Chaetothyriales*, exhibits a significant human-pathogenic potential with frequent infections ranging from mild cutaneous infection to brain encephalitis in otherwise healthy individuals. Despite worrying clinical pictures associated with *Exophial* species, there is little information regarding its susceptibility patterns against currently available antifungal agents. In the present investigation, we evaluated the in vitro antifungal susceptibilities offive antifungal drugs against different genotypes of *Exophiala* species.

Methods: A total of 45strains of *Exoophioala* species (*E. dermatitidis*, *E. xenobiotica* and *E. phaeomuriformis)* were obtained from soil polluted with monoaromatic compounds in Mazandaran, Sari. MICs (minimum inhibitory concentration) of amphotericin B, itraconazole, voriconazole, fluconazole and MECs of caspofungin were determined according to recommendations stated in the Clinical and Laboratory Standards Institute (CLSI) M38-A2 document.

Results: MICs of all isolates against amphotericin B was low, ranging between 0.125 – 0.5 µg/ml. The results revealed that the widest range and the highest MICs with respect to fluconazole were 2 – 32 µg/ml. Itraconazole and voriconazolehad potent activity against all *Exophiala* isolates. caspofungin MIC was high (2-16µg/ml).

Conclusion: In this study, Itraconazole and voriconazole exhibited potent in vitro antifungal activity against *Exophiala* isolates. In conclusion, we found that not only Itraconazole but also new generations of azoles voriconazole showed potent activity in vitro, although the relevance of these in vitro findings for clinical efficacy has not been established and remains to be determined.

Comparative of Tissue Burden and Survival Studies of Three Species of *Exophiala* in Murine Model

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Objectives: *Exophiala* is a genus of black yeast-like fungi causing human infections ranging from mild cutaneous lesions to fatal brain encephalitis in otherwise healthy individuals. Since they have been described recently, there is limited information on the appropriate experimental models on tissue burden and survival studies. In addition, it is not known if these recently described species are different in their pathogenicity from *E. dermatitidis* which has been, up to now, considered as the most virulent species. The aim of our study was to compare the virulence of *E. dermatitidis, E. xenobiotica, and E. phaeomuriformis* in murine model.

Methods: Three environmental isolates of *E. dermatitidis, E.xenobiotica* and *E. phaeomuriformis* were used which has previously been isolated from soil polluted with monoaromatic comounds at Mazandaran, Sari. Male mice with a mean weight of 30 g were used and immunosuppressed using cyclophosphamide and 5-fluorouracil one day prior to infection. To design this investigation, we used Two groups of 10 mice randomly established for each strain with one group used for survival studies and one for tissue burden and histopathological analyses.

Results: Results of the survival study showed that *E. dermatitidis* caused a higher rate of mortality, which were significantly more virulent than *E. xenobiotica*, and *E. phaeomuriformis*. Tissue burden and numbers of CFU/ml results revealed that fungal load in all organs especially in brain and kidney of mice infected with *E. dermatitidis* was significantly higher than mice inoculated with the other two species.

Conclusion: In the present study, we developed a murine model of disseminated infection to compare the virulence of three common *Exophiala* species. Our results agree with other murine experimental studies in which *E. dermatitidis* showed a high virulence and neurotropism. In conclusion, our results suggest a higher virulence of *E. dermatitidis*, being the species that produced the highest fungal load in brain. This recently described species warrants further studies to assess its real pathogenicity**.**

Virulence of *Cryptococcus neoformans* Variety *grubii* Genotype AFLP1/VNI in a Murine Model

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Objectives: *Cryptococcus* species is a common pathogen and the incidence of human cryptococcosis has increased with the HIV pandemic and in particular, corticosteroid therapy is a principal predisposing factor for this infection in non-HIV infected patients. Several studies demonstrate that cryptococcosis may have a different host preference based on the immunological status of the patient; moreover, host immunity in counteract with *Cryptococcus* spp remains unclear. To understand the relationships between the immunological status of the host and susceptibility to systemic disease due to *C. neoformans*, we have evaluated the virulence of *C. neoformans* variety *grubii* genotype AFLP1/VNI, using an experimental model of disseminated infection in healthy and immunocompromised mice.

Methods: A clinical isolate of *C. neoformans* variety *grubii* was used which has been previously isolated from a HIV-positive patient. Male mice with a mean weight of 30 g were used in the tests and were immunosuppressed one day prior to infection. To design this investigation, we used two groups of mice (n=5) randomly established for survival and tissue burden analyses, respectively.

Results: Comparative survivals of healthy and immunocompromised mice showed that *C. neoformans* variety *grubii* caused highly mortality in deficient animals rather than healthy mice. Also in tissue burden study the organism was recovered from lung, kidney, spleen, liver and brain. The highest numbers of CFU/ml immediately after challenge were isolated from the brain and the lowest counts were found in spleen. Tissue burden and histopathology studies demonstrated that brain was the organ most affected.

Conclusion: Overall, the results of our study indicate that *C. neoformans* variety *grubii* is virulent in both tested mice. Virulence appears to be strain dependent, as well as host dependent. As epidemiologic observations, our results demonstrate that *C. neoformans* variety *grubii* infection of immunosuppressed over

immunocompetent hosts; immunosuppression increased the risk of severe cryptococcosis. These models could be useful for testing new therapies against *Cryptococcus* spp.

Molecular Typing of *Aspergillus fumigatus* Isolates Based on Cell Surface Protein (CSP) Gene

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Objectives: Molecular typing methods have been developed and employed in order to investigate the mechanisms of nosocomial outbreaks and to understand genetic diversity, relationships between clinical and environmental isolates, and patterns of colonization and invasive infection in patients. However, to date little information isavailable regarding these aspects of the Iranian *A. fumigatus* population as well as the similarities and differences between those isolates. Understanding pathogen dispersion and relatedness is essential for determining the epidemiology of nosocomial infections and for aiding in the design of rational methods for pathogen control. Therefore, in the current study, we applied the CSP typing technique for the first time to Iranian clinical and environmental *A. fumigatus* isolates to determine the extent of genetic diversity and to compare it to previously CSP type from different continents.
Methods: A total of 74 isolates of *A. fumigatus* were collected and molecularly characterized by PCR and sequencing of the beta tubulin gene. The CSP locus was amplified and genotypic diversity of *A. fumigatus* isolates was calculated by Simpson's index of diversity.
Results: A total of 11 CSP variants were observed without any novel type. The Simpson's index of diversity (D) was calculated at 0.78. The most commonly CSP variants were t04A, t01, t03 and t02, whilet06B , t08 , t18A, t18B and t22 were less frequent**.** Significant differences in the prevalence of CSP variants between clinical and environmental isolates were not observed**.** However, phylogenetic analysis showed that differences may exist between the Iranian and the previously studied Chinese, Australian, European, and North American *A. fumigatus* populations.
Conclusion: Not only CSP typing is a highly reproducible and powerful technique, but also its discriminatory power is intermediate to MLST and STR *Af* typing. This study represented the first molecular typing investigation of *A. fumigatus* isolates from Iran. We confirmed and validated the utility of CSP typing in an Iranian examined population.

Molecular Assays for TR34/L98H Mutations in the *cyp51A* Gene for Detection of Azole Resistant *Aspergillus fumigatus* Isolates

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Objectives: Triazole antifungal drugs are the mainstays of therapy in the management and prophylaxis of invasive aspergillosis. However, clinical failures are frequently reported, and the frequency of isolation of azole resistant *A. fumigatus* isolates has increased in several countries and is usually related by a 34 bp tandem repeat in the promoter region (TR34) together with an L98H substitution in the *cyp51A* gene. In this study, we used a rapid and simple PCR assays for rapid detection of TR34/L98H mutations in the *cyp51A* gene.
Methods: A total of 40 clinical and environmental *A. fumigatus* isolates had been previously isolated. Antifungal susceptibility testing was performed according to the CLSI method (M38-A2). Azole resistant *A. fumigatus* isolates were screened, and DNA extraction was performed. The presence or absence of TR34 in the promoter region was determined by PCR amplification using AFCYPPF and AFCYPPR primers and detected by using 2%agarose gels. *A. fumigatus* isolates containing TR34 in the cyp51A promoter region should yield an amplicon of 139 bp, while isolates containing the wildtype sequence (no tandem repeat) should yield an amplicon of 105 bp.
Results: Fourteen strains of *A. fumigatus* (35%) showed high itraconazole MIC (16 mg/L) and were resistant to azoles. Of these isolates, eight contained TR34/L98H mutation and six were resistant with other resistance mechanisms.
Conclusion: The majority of methods for the detection of TR34/L98H mutations in the cyp51A gene are either technically demanding or require expensive and sophisticated instruments/ probes. The PCR-based methods developed for rapid identification of TR34/L98H mutations are simple, sensitive, robust, inexpensive and readily available in most laboratories. However, it is only for the detection of TR34/L98H mutations, triazole-resistant *A. fumigatus* isolates harboring other mutations in the *cyp51A* gene will not be excluded.

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Profiles of Airborne Fungi in Ahvaz (Khuzestan)

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Objectives: Nowadays, airborne particles such as molds pores and hyphae are among of the biggest problems of air pollution everywhere. Information obtained from fungal air samples can assist in medical evaluations and the assessment of health hazards. It can also be useful in monitoring indoor air quality. Qualitative and quantitative assessments of fungi in indoor air are valuable since they may cause allergy in individual.

Methods: The air samples were collected during the spring season (March-May) from seven different areas (five locations in each area in duplicate) of Ahvaz by Quick Take-30(SKC, USA) apparatus on Sabouraud dextrose agar with chloramphenicol and chloran. Grown Colonies were evaluated and recognized on macroscopic and microscopic methods. Sampling Places from each area were classified into four types; namely, green surroundings, industrial, crowded and wet.
Results: Of all 319 grown colonies, the most common fungus was *Cladosporium* followed by *Alternaria, A.niger, Penicillium, Stemphylium, Mucor, Fusarium, A.fumigatus, Nigrospora, and Curvularia,* respectively. Overall, 19 types of fungi were identified. Most colonies were isolated from overcrowded places, Green surroundings, industrial and wet places.
Conclusion: The results of this study indicated a high frequency of fungal
contamination in the metropolis particularly in the public sites. Based on the high frequency of saprophytic fungi in the environment, it is recommended that allergic patients avoid such places and green surroundings.

In Vitro Activity of Fluconazole against Isolates of *Candida glabrata* from Patients

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Objectives: Fluconazole is a triazole antifungal agent that has been available since 1990 for the treatment of infections due to *Candida*, *Cryptococcus*, and other opportunistic yeasts. It is available orally and injectable. *C. glabrata* is inherently more resistant to fluconazole than *C. albicans* and seems to increase resistance rapidly .We evaluated the activity of fluconazole against 30 *C. glabrata* isolates from different patients in west south of Iran (Khuzestan). The aim of this study was to survey drug susceptibility of *C.glabrata* to fluconazole and compare to previous studies.
Methods: 30 isolates of *C. glabrata* were identified from various patients. Fluconazole was solved in water and then diluted with RPMI1640 medium. The final concentration of drug was 0.125 to 64 µg/ml in each rows of 96 wells plate. MICs were determined after 48 h at 405 nm Wavelength. Broth microdilution was done according to European Committee on Antimicrobial Susceptibility Testing (EUCAST) method and MIC endpoint was considered at 50% growth inhibition.
Results: The MIC_{50} for isolates was 16 µg/ml and Mic_{90} was 64 µg/ml. 2 µg/ml was the fluconazole MICs for 7.1% of the isolates tested. The lowest concentration of fluconazole that would cause a 50% reduction in the growth of *C. glabrata* was 2µg/ml. 7.1% of the isolates tested had MIC>64 µg/ml.
Conclusion: It was concluded that resistance to fluconazole is increasing (R= 15.4%, MIC ≥ 64 µg/ml) while studies have reported less than it in our area. Fluconazole should not be used for treatment and prevention for treatment and prophylaxis too.

Epidemiological Pattern of Cutaneous Fungal Infections in Patients Referred to Razi Hospital in Tehran City in 2014

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Objectives: Cutaneous mycoses are common infections that involve keratinized tissues (skin, hair and nail). Dermatophyte species are important agents of cutaneous infections. The aims of this study were the evaluation of dermatophytosis prevalence and the epidemiology of dermatophyte species in Tehran province to identify infections and the effective treatments.
Methods: 508 patients suspected to cutaneous infections were referred to the mycology laboratory of Razi hospital in Tehran city for definite identification of dermatophytosis. The causative agents of disease were determined using direct examination, slide culture technique, and molecular methods.
Results: Of the 161 positive samples, 73 (45.3%) and 88 (54.7%) were obtained from female and male, respectively. The most and the least common types of infections were tinea pedis (44.1%) and tinea faciei (0.6%), respectively. Trichophyton mentagrophytes was the predominant species isolated from total samples and the less frequent isolate was Microsporum ferrugineum.
Conclusion: Dermatophyte infections in different parts of the body, especially the foot and groin, are considered as an important health concerns in Tehran city. It seems that design and implementation of training programs, especially for age group over 20 years, are necessary for primary and secondary prevention to reduce the incidence of dermatophytosis.

Identification and Sequencing of *Candida krusei* Aconitate Hydratase Gene Using Rapid Amplification of cDNA ends (RACE) Method and Phylogenetic Analysis

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Objectives: The production and development of an effective fungicidal drug require the identification of an essential fungal protein as a drug target. Aconitase (ACO) is a mitochondrial protein that plays a vital role in tricarboxylic acid (TCA) cycle and, thus, in the production of energy within the cell. In this study, Candida krusei ACO gene was sequenced for the first time, and then any amino acid residue differences between human and fungal aconitases were determined to obtain selective inhibition.
Methods: *C. krusei* (ATCC: 6258) aconitase gene was determined by 5′RACE method and degenerate PCR and was analyzed using bioinformatics softwares.
Results: 1419 nucleotide of C. krusei aconitase gene were clarified and submitted in Genbank as a partial sequence and then taxonomic location of Candida krusei was determined by nucleotide and amino acid sequences of this gene. It was indicated that there were no significant differences between C. krusei and human aconitases within the active site amino acid residues.
Conclusion: The results of the current study indicated that aconitase is not a suitable target to design new anti-fungal drugs that selectively block this enzyme.

Identification of Azole Resistance Markers in Clinical Isolates of *Candida tropicalis* Using Cdna-AFLP Method

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Objectives: Global reports have highlighted the increasing prevalence of *Candida tropicalis* infections as well as organism's drug resistance. This study aimed at identifying azole resistance markers in clinical isolates of *C. tropicalis* which will be a great resource for developing new drugs.
Methods: Two susceptible and resistant isolates of *C. tropicalis* were recovered from an epidemiological investigation of candidiasis in immunocompromised patients. *C. tropicalis* ATCC

750 was used as reference strain. Anti-fungal susceptibility to fluconazole and itraconazole was determined using Clinical and Laboratory Standards Institute (CLSI) method. Complementary DNA- Amplified Fragment Length Polymorphism (cDNA-AFLP) technology and real time RT-PCR were used for identification of potential genes involved in azole resistance of *C. tropicalis* clinical isolates.
Results: Five genes encoded the following enzymes including superoxide dismutase (SOD) implicated in antioxidant defense, ornithine aminotransferase (OAT), acetyl ornithine aminotransferase (ACOAT), adenosylmethionine-8-amino-7-oxononanoate aminotransferase (DAPA AT) and 4-aminobutyrate aminotransferase (ABAT) (belonging to pyridoxal phosphate (PLP) dependent enzymes) that have important physiological role in many fungal cell cycles. Real-time RT-PCR confirmed mRNA level of aforementioned genes.
Conclusion: Our findings showed that factors such as PLP-dependent enzymes and SOD might be implicated in drug resistance in *C. tropicalis* clinical isolate. Therefore, further studies are required to explore the accurate biological functions of the mentioned genes which would be helpful for effective drug development.

Evaluation of mRNA Expression Levels of *cyp51A* and *mdr1*, Candidate Genes for Voriconazole Resistance in *Aspergillus flavus*

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Objectives: Voriconazole resistance (VRC-R) in *Aspergillus flavus* isolates impacts on the management of aspergillosis since azoles are the first choice for prophylaxis and therapy. However, to the best of our knowledge, mechanisms underlying voriconazole resistance are poorly understood. The present study was designed to evaluate the mRNA expression levels of *cyp51A* and *mdr1* genes in voriconazole resistant *A. flavus* by a real-time RT-PCR technique.
Methods: To fulfill the objective, five *A. flavus* isolates with resistance to VRC were examined by a real-time RT-PCR approach.
Results: Four out of five isolates revealed *cyp51A* and *mdr1* mRNA overexpression. Interestingly, the isolate which was negative for *cyp51A* and *mdr1* mRNA expression showed a high voriconazole MIC. Furthermore, a computation- based analysis predicted that voriconazole resistance could be mediated through cooperation with a network protein interaction.
Conclusions: Our experimental and *in silico* findings may provide a new insight into the complex molecular pathways in drug resistance and also could assist to design an efficient therapeutic strategy for aspergillosis treatment.

Study of Aflatoxin Contamination in Dried Bread Consumption in Cattle Farms in Kazerun City.

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Objectives: Aflatoxins are a group of mycotoxins that can cause complications such as infection of the lung syndrome, esophageal cancer, weakened immune system, liver cancer, and hemagglutination inhibitor of RNA and protein in humans. Aflatoxin contamination with different diagnoses in reproductive, digestive, respiratory, tumor genesis, and intoxication are causing various side effects in animals. This study aimed to determine the amount and frequency of aflatoxin contamination of bread wastes in dairy farms in Kazerun city.
Methods: A cross sectional study of 15 farms was done in 1394 using traditional and laboratory field sampling in Kazerun city. Hundreds of dry bread waste were collected and aflatoxin contamination was detected using HPLC fluorescence. Data analysis was performed using software SPSS17 and the significance level was set at 0.05.
Results: The average amount of aflatoxin G2, G1, B2, B1 and total aflatoxin in bread wastes assessed at the level of city farms were 0.22, 0.34, 3.64, 15.1, and 19.3.µg / kg, respectively.. Aflatoxin B1 and G2 were the highest and lowest infection rate, respectively. Also aflatoxin B1 was found in 11 samples out of 100 samples, and the sum of aflatoxin toxin standard over 2 livestock farms were too much is standard rate
Conclusion: The results of the study showed that milk cows eat dry bread with large amounts of aflatoxin metabolites. It is, therefore, possible to use dry bread in animal nutrition refused

Management of Dermatophytosis and Natural Therapies from the Perspective of Iranian Traditional Medicine.

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Objectives: Dermatophytosis is the most common fungal disease in children, and the use of antifungal drugs is the most common treatments for this disease. Due to antifungal drug resistance and increasing willingness of people to use herbs, making use of traditional medicine philosophies' experience can be a good alternative for the current conventional treatments.
Methods: This study was a review of major sources of Iranian Traditional Medicine(ITM) such as Cannon as medicine. Due to the similarity of "*Saafeh Ratb*" symptoms to tinea capitis, it was discussed. First, the definition and symptoms of illness and treatments include nutrition modification. Topical and oral medications were extracted from ITM texts. Then antifungal effects of these herbs were searched in Pubmed and Scopus.
Results: "*Saafeh*" is a wound that occurs in the head and face in hair growth areas. It appears as low, dispersed and fortified rashes, initially. Then it becomes pussy along with the curdling, from which thin pus is secreted.In this stage it is named*" Saafeh Ratb".* By comparing the clinical signs listed in traditional medicine, probably*" Saafeh Ratb"* can be equal to the tinea. The first treatment was venesection of the cephalic vein, cupping or leeches. After that decoction of Myrobalan and Fumaria was prescribed. Locally, turmeric, bitter almond, Gulnar (pomegranate flower), oak and myrtle leaves, lily root with vinegar and oil were used. In laboratory and animal studies, the antifungal effects of some of these plants have been proven.
Conclusion: Due to the fact that most plants that are prescribed in the treatment of tinea in the context of traditional medicine,have antifungal activity in recent studies, making use of the experiences of traditional medicine philosophers in the treatment of other skin diseases seems useful.

Detoxification of Aflatoxins in Pistachios Using Ozone

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Objectives: Pistachios have numerous pests, the most important of which being Aspergillus infection. In some cases, before ripening of pistachio, the soft skin on it is opened by its hard skin. The Split Early pistachios are a group of pistachios green skin cracks one month prior to ripening.This gap allows aerobic fungal spores, insects and small creatures to penetrate into thecore of pistachio. One of these molds is Aspergillus felavus which can be the source of Aflatoxin contamination which is It a dangerous and carcinogenic toxin . The infection in these pistachios is 50 times as much as that of healthy pistachios.

Methods: In this research, a variety of methods such as physical methods including heat, Microwave, gamma and UV rays; chemical methods including the use of chlorine, Hydrogen peroxide, sodium dioxide, ammonia, ozone, bases, iodine and biological agents and mechanical methods. were investigated to remove and reduce Aflatoxin.
Results: Ozone is a substance with strong oxidant material and high reactivity properties caused by its unsaturated C=C band. Some researchers have reported that ozone reduces Aflatoxin in cotton seeds and coconuts. Research has also shown that B1G1 Aflatoxin is sensitive to ozone and that mutagenic properties of this toxin turns inactive simply by applying 1.1 milligrams per liter of ozone for 5 minutes at room temperature. Ozone in the double transplant 9, 8 eruption loop reacts with Aflatoxin molecule,but B2G2 Aflatoxins are highly resistant to ozone.
Conclusion: Foods that are processed with ozone are safe and not toxic and have no carcinogenic effects. This method is suitable for the purification of many products, but its cost is high. In order to guarantee the quality and preserving pistachio trade in global markets, it is necessary to achieve a method which is appropriate for a variety of Iranian pistachio.

Study of Hemolysin Gene "*Asphs*" and Its Phenotype in *Aspergillus fumigatus* Isolates

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Objectives: *Aspergillus fumigatus* is the most pathogenic species among the *Aspergillus* genus. This fungus is mainly responsible for the increased incidence of invasive aspergillosis (IA) in the immunocompromised patients. Asp- hemolysin is a cytolytic toxin which is produced by *Aspergillus fumigatus* during infections. In this study the aspHS gene was investigated as a target for various *A. fumigatus* isolates.
Methods: Fifty-three *Apergillus fumigatus*isolates including reference, clinical and environmental isolates were tested. A spot of spore suspension was inoculated on sheep blood agar, and the Petri dishes were incubated aerobically at 37°C for 3days. Zone of clearance showed the hemolytic activity by hemolytic enzyme. Molecular detection was performed by PCR.
Results: A 180 –bp fragment was amplified with PCR. The blast search confirmed that amplified fragments have 100% identity with aspHS gene. This work is continuing and in next step the restriction enzyme will be used for discrimination of isolates.
Conclusion: aspHS gene of *A. fumigatus* seems a good target for discrimination of different isolates.

A case report of Tinea corporis by Microsporum Audoinii in Adult Woman in Iran

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Microsporum audouinii is an anthropophilic fungus causing non-inflammatory infections of scalp and skin especially in children. Once the cause of epidemics of tinea capitis in Europe and North America, it is now becoming less frequent. This species has not been documented from Iran, nor was it found in the present survey. Invaded hairs show an ectothrix infection and bright greenish-yellow fluorescent under Wood's ultra-violet light. We reported the case of a 21 –year- old girl with an annular lesion caused by *M.audouinii* and successfully treated her with oral ketoconazole. The identification was done by morphological features and molecular (genotypic) characteristics.

In vitro Activity of Caspofungin against Otomycosis Agents

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Objectives: Otomycosis is one of the most common superficial fungal infection among predisposed individuals in the tropical and subtropical areas. Although, several topical antifungal agents are currently used for the treatment of disease, recurrence and failure to treatment are usually observed in some patients. This study aimed to determine the effect of caspofungin, a new antifungal, against otomycosis agents *in vitro*.
Methods: In the present study 48 otomycosis agents (*Aspergillus niger*, *A. flavus, A. nidulans,* and *Paecilomyces* species) were examined against caspofungin. Microdilution was method was used for antifungal evaluation. For this purpose, a seiral dillution of caspofungin was prepared from 8-0.0625µg/mL in microplates and a standard suspension of each isolates (24-48h cultures) was added to each microplates well.
Results: Our results showed that 70.8% and 64.6% of tested isolates were sensitive to caspofungin after 24 and 48 hs incubation at room temperature, respectively. The resistance to caspofungin was more common among *A. flavus* than *A. niger* isolates. In addition, only one isolate of *A. nidulans* was resistant to caspofungin at 8 µg/mL.
Conclusion: Our results indicated that caspofungin has a considerable affect against otomycosis agents and could be used as the second-line treatment.

Identification of Non- *Cryptococcus* Yeasts Associate with *Eucalyptus* Trees.

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Objectives: Plant surfaces provide physical and environmental conditions suitable for the growth and reproduction of the yeasts. The role of yeasts and yeast-like fungi in decaying wood inside tree trunk hollows, barks, leaves and other plant materials is of clinical interest, and has frequently been reported. *Eucalyptus* trees used to be planted in many cities with the purpose of fighting against malaria mosquitoes. These kinds of trees are habitats of pathogenic and non- pathogenic yeast types. Although *Cryptococcus* species are the most important pathogenic yeast associated with *Eucalyptus* trees, there are many other hazardous yeasts living on trees threatening humans health. In the present study, we aimed to identify non- *Cryptococcus* yeast species isolated from *Eucalyptus* trees in Shiraz, Iran.
Methods: 120 non- *Cryptococcus* yeast isolates from *Eucalyptus* trees were identified by molecular and conventional methods. Genomic DNA was extracted by boiling method, and ITS gene region of rDNA was amplified by PCR method. The PCR products were sequenced and the data was compared with those of databases of national center for biotechnology information (NCBI) website.
Results: Yeast strains belonged to13 genera and 28 species of both *Ascomycetous* and *Basidiomycetous* phylum. The most frequent species were: *Rhodotorul amucilaginosa*, *Candida tropicalis*, *Aureobasidium pullulans*, and *Meyerozyma guilliermondii*. Other species belonged to genus *Trichosporon*, *Torulaspora*, *Pichia*, *Hanseniospora*, *Metschinekowia,* and *Rodosporidium*.
Conclusion: In this study, it was shown that most of the yeast isolates such as *Candida*, *Trichosporon*, and *Rodotorula* contribute to human diseases. *Eucalyptus* trees could be considered as a reservoir for pathogenic yeast and play major roles in human and public health.

Identification of the Etiological Agents of Onychomycosis in Tehran

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Objectives: Onychomycosis comprising 30-50 % of nail diseases, which is caused by yeasts, dermatophytes, and saprophytic mold, is one of the most common causes of dystrophycation of nails. The aim of this study was to investigate the frequency of fungal agents in dystrophic nails of patients referring to mycology laboratory of Razi hospital in Tehran.
Methods: This cross sectional study was performed on 700 patients with dystrophic nails. Specimens were investigated by direct microscopic observation, culturing and complementary examinations, if necessary. The relationship between variations was deliberated by chi-square and fisher exact tests.
Results: Out of 700 individuals introduced with dystrophic nails, 183 had contracted onychomycosis, incliding 104(56.8%) female and 79 (43.1%) males and most of them (31.1%) in the range of 50-59 of age. Most of the afflicted individuals were house-holding women with distal subungual onychomycosis form (60.4 %). There were 110 cases identified with yeasts (55.8%) among which *Candida albicans* (42.7 %) were the most common etiologic agents of onychomycosis that were more often isolated from finger nails. Dermatophytes were isolated from 53 cases (26.9%) and were more often isolated from toe nails. *Trichophyton interdigital* with 39.6 % was the most common isolated dermatophyte. 34 cases (17.3%) of saprophytic moulds, more often from toe nails, were isolated among which *Aspergillus flavus* was the most common.
Conclusion: Yeasts are the most common causes of onychomycosis. It afflicts mainly house-holding women t due to their high exposure to water and detergents.

The Effect of Vitamin E on Expression Bcl-Xl and Metacaspase Genes in *Candida albicans* Apoptosis

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Objectives: *Candida albicans* is the most common human pathogenic yeast in people with impaired immune system. The antioxidant activity of vitamin E has long been known. Apoptosis is a physiological form of programmed cell death controlled by a wide range of proteins. Due to the similarity between the internal pathway of apoptosis in human and mitochondrial pathway in yeast, this study was designed to investigate the genes involved in apoptosis.
Methods: In this study, *Candida albicans* (ATCC14053) was used for performing antifungal susceptibility test together with vitamin E soluble in tween 20 according to CLSI document M27-A3. After determining MIC, the fungus was massively cultured. At 50,150,180mg/ml concentrations, RNA was extracted and the cDNA was prepared. The changes in expression of the Bcl-xl Metacaspase genes level were analyzed by using a quantitative real-time PCR assay.
Results: MIC was 180 mg/ml concentration in which the complete inhibition of fungal growth was observed. Base on quantitative Real Time PCR results, by increasing the concentration of vitamin E, the rate of Metacaspase gene expression was significantly increased. The highest expression was observed at the concentration of 180 mg/ml. According to the results of Real Time PCR, Metacaspase expression levels for Bcl-xl gene were negative
Conclusion: Vitamin E enhances the expression of Metacaspase gene and, thus, stimulates apoptosis in *C. albicans*. According to the negative results for Bcl-xl, it can be concluded that vitamin E has no effect on Bcl-xl gene expression.

Mucormycosis of Paranasal Sinuses in Uncontrolled Diabetic Patients after Dental Extraction: Two Case Report

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Objectives: Mucormycosis is a rare but fulminant opportunistic fungal infection, which occurs most often in diabetic and immunocompromised patients. Dental extractions may create a portal of entry for the fungal infection. The mucormycosis may be the original cause of the pain and can be misdiagnosed as dental pain. In this paper, two cases of mucormycosis are reported after dental extractions.
Case: The first case occurred in the maxillary sinus of a 53- year old addicted male patient which had cataract graft 8 months ago. The second case occurred in a 32-year old female patient with periorbital erythema and involved paranasal sinuses leading to enucleation of right eye.
Conclusion: The patients' uncontrolled diabetic condition created a suitable environment for the mucoral growth, and the dental extractions created a portal of entry into the paranasal sinus region. Early recognition and urgent treatment of mucormycosis is necessary to prevent the spread of infection which can lead to high morbidity and mortality. As it is estimated, 7.7% of the adult Iranian population have diabetes. Therefore, dental surgeons and healthcare practitioners should become familiar with the clinical manifestations of mucormycosis.

Effects of Aspirin as an Anti-Inflammatory Drug on Azole-Resistant *Candida glabrata* in Invitro

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Objectives: *Candida glabrata* has been considered a comparatively nonpathogenic saprophyte of the standard flora of healthy individuals, rarely causing serious infection in humans. *C. glabrata*, as well as other *Candida* species, is one of the class Fungi Imperfecti, the order Moniliales, and the household Cryptococcaceae. *C. glabrata* is just a nondimorphic yeast that exists as small blastoconidia under all environmental conditions as a pathogen.
Methods: In this research standard and resistant *C.glabrata* species cultured on dextrose agar and after that with clinical and laboratory standards institute document method been done, and standard *C.glabrata* species and resistant *C.glabrata* was demine. cDNA were synthesized with fermentas kit. Samples genotyping was performed base on Real Time PCR .in this study we estimate the gene expression of ERG 11, ERG3, ERG6 in compare with housekeeping gene Beta Actin gene. Finally, the gene expression was estimate with UVItec Analyze software.
Results: In the present study, a disk model system was used to investigate the effects of anti-inflammatory drug (aspirin) on formation by the strains of *C. albicans*. Drugs tested at a concentration of 1 mM inhibited Aspirin, produced the greatest effects, with aspirin causing up to 80% inhibition. Aspirin was active against growing and fully mature; its effect was dose related, and it produced significant inhibition at pharmacological concentrations.
Conclusion: Our findings suggest that anti-inflammatory drug (aspirin) is important for both development and orphogenesis in *C. albicans* and may act as a regulator in these physiological processes.

Antifungal Activity of Terrestrial *Streptomyces rochei* Strain HF391 against Clinical Drug-Resistant Isolate of *Aspergillus fumigates*

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Objectives: Actinomycetes have been discovered as source of antifungal compounds that are currently in clinical use. Invasive aspergillosis (IA), due to *Aspergillus fumigatus*, has been identified as individual drug-resistant *Aspergillus spp.* to be an emerging pathogen worldwide. This paper described the antifungal activity of one terrestrial actinomycete against the clinically isolated azole-resistant *A. fumigatus*.
Methods: Soil samples were collected from various locations of Kerman, Iran. Thereafter, the actinomycetes were isolated using starch-casein-nitrate-agar medium and the most efficient actinomycetes (capable of inhibiting *A. fumigatus*) were screened using agar block method. In the next step, the selected actinomycete was cultivated in starch-casein- broth medium. The inhibitory activity of the isolates was evaluated by using agar well diffusion method.
Results: The selected actinomycete, identified as *Streptomyces rochei* strain HF391, could suppress the growth of *A. fumigatus* isolates that were isolated from the azoles -treated clinical samples. This strain showed more than 15 mm inhibition zones around the colonies growth on agar media.
Conclusion: The obtained results of the present study introduced *Streptomyces rochei* strain HF391 as terrestrial actinomycete that can inhibit the growth of clinically isolated *A. fumigatus.*

Detection of Fungi by Conventional and Semi-Nested PCR in Patients with Presumed Fungal Keratitis

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Objectives: Fungal keratitis is a supportive, ulcerative, and sight-threatening infection of the cornea that sometimes leads to blindness. The aims of this study were to recover of facilities for laboratory diagnosis, to determine the causative microorganisms, to recognize the predisposing factors of mycotic keratitis and to compare conventional laboratory diagnostic tools and semi-nested PCR.
Methods: Sampling had conducted in patients with suspected fungal keratitis. Two corneal scrapings specimens, one for direct smear and culture and the other for semi- nested PCR were obtained.
Results: Of the 40 expected cases of mycotic keratitis, calcofluor white staining showed positivity in 25%, culture in 17.5%, KOH in 10%, and semi-nested PCR in 27.5%. The sensitivities of semi-nested PCR, KOH, and CFW were 57.1%, 28.5%, and 42% and specificities 78.7%, 94%, and 78.7%, respectively. The time taken for PCR assay was 4 to 8 hours, whereas positive fungal cultures took at least 5 to 7 days.
Conclusion: Due to the increasing incidence of fungal infections in people with weakened immune systems, uninformed use of topical corticosteroids and improper use of contact lens, fast diagnosis and accurate treatment of keratomycosis seems to be essential**.** Therefore, according to the current study, molecular methods can be used to detect mycotic keratitis early and correctly which leads to appropriate treatment.

Treatment of Dandruff by Iranian Traditional Medicine

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Objectives: Nowadays, human fungal disease is a serious problem, and one of the most common related diseases is dandruff. Dandruff is a mild form of seborrheic dermatitis that is characterized by scaling of the scalp. It is a common scalp disorder with the prevalence of up to 30 percent.
In Iranian Traditional Medicine (ITM), Dandruff is called "HAZAZ" that is described in detail in a separate section titled under skin diseases.
Methods: This study was a descriptive-review according to available and valuable Iranian traditional medicine literatures, such as Qanun compared with modern medicine.
Results: Dandruff is characterized by the flaky white to yellowish scales seen on the scalp and less frequently on the nasolabial folds, behind the ears, eyebrows, and intertriginous areas.
There are several factors causing dandruff such as microbial and non-microbial factors. The microbial etiopathology is the presence of lipophilic yeast belongs to the genus *Malassezia*.
In ITM, dandruff is described as a small object such as bran flour that is caused by three reasons:
-Intemperate scalpe(For example warmer, colder, drier or more humid than normal)
- Drying the scalp
- Drying the scalp and body at the same time.
Today there are many different treatments for dandruff, such as antimicrobial agents like selenium sulfide and imidazole ,topical antifungals such as ketoconazole.
In ITM, treatment is divided into two categories depending on the degree of symptoms:
-in mild symptoms: Rose oil, violets Oil, Pumpkin oil (topical)
In moderate to severe symptoms: degenerative and scraper drug such as: Cicer arietinum, Althaea foenum-graecum, Natron and Trigonella foenum
Conclusion: Dandruff is a common problem, but in modern medicine it does not have absolute treatment; therefore traditional medicine can give cheaper, more accessible and more effective treatment for it.

The Effect of Ozone on the Clinical Isolates of *Aspergillus* Species

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Objectives: Ozone (O_3) is a highly active inorganic diatomic allotrope O_2 that contains to three of Oxygen atoms. Ozone is a powerful oxidant that has a high potential against microorganisms. Although, Ozone has a long history, however, it has been recently used in several technical applications, such as wastewater treatment, medical technology, and food processing. In addition, during the last decade, Ozone has been used as new agents for the control of microorganisms in oral cavity and antimicrobial therapy. The aim of the present study was to investigate the antifungal efficacy of gaseous Ozone against clinical isolates of *Aspergillus niger* and *A. flavus*.
Methods: 5 mL of standard suspension of fungal conidia was prepared in saline solution with 0.5% Tween 80 and adjusted to 0.5 McFarland. 5µL of suspension was inoculated on Sabouraud dextrose agar (SDA) as control. The suspension was divided into 5 test tubes and exposed to Ozone gas (400mg/h) for 1, 2, 3, 4 and 5 minutes, respectively. Then, 5µL of each suspension was cultured on SDA. All cultured plates were incubated at room temperature for 24-48 hours. All plates were compared with the control for fungal growth and colony counts were applied for each plate.
Results: In the present study, all isolates of *Aspergillus* were sensitive to Ozone at different ranges. Although all isolates were killed after exposure to Ozone after 5 minutes, the growth of all isolates approximately decreased to 90% and 50% after 4 and 3 minutes exposure of to Ozone. On the other hand, *A. flavus* isolates were more sensitive than *A. niger* to Ozone. In addition, degradation and destruction of *Aspergillus* melanin was also identified.
Conclusion: Our results suggest that Ozone could be considered as an effective fungistatic and fungicidal agent for clinical isolates of *Aspergillus*. However, further studies are required to confirm our results.

Antifungal Treatment Strategies for Invasive Aspergillosis in Patients with Hematological Diseases Using Voriconazole

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Objectives: Voriconazole is a new-generation azole, which is now generally recommended as first-line treatment for proven or probable IA in hematology patients. Since fungal infection is difficult to diagnose and to treat early, strategies such as antifungal prophylaxis, empiric or pre-emptive antifungal therapy with voriconazole are widely considered for the prevention of IA in the hematology setting. We conducted a retrospective, single center study to identify the distribution of different antifungal treatment strategies in a group of hematology patients using voriconazol therapy.
Methods: All the patients were classified according to the diagnostic criteria of the EORTC/MSG to identify the documented proven or probable IA. Voriconazole was administered orally, IV or IV followed by oral.
Results: Between Oct. 2013 and Jun. 2015, a total of 62 immunocompromised patients (29 Females, 33 Males) were screened. The mean age was 41 years (range 20-64) with hematologic malignancies including ALL (n=19), CML(n=16), AML (n=11), aplastic anemia (n=7), pancytopenia (n=4), and CML (n=5). The daily voriconazole dose was administered in 2 divided doses, 200 mg or 400 mg, given IV (16), IV and orally (14) and orally (32). The median maintenance dosage of voriconazol was 5.2mg/kg twice daily (range, 2.2–22.0) for suspected and documented IA as prophylaxis or empirical therapy in 25, treatment for possible in 22, for probable in 10 and proven in 5 cases.
Conclusion: There is a growing concern about the widespread application of antifungal prophylaxis (i.e., induction of antifungal resistance). Therefore, the important role of using standardized diagnostic approach before routine clinical practice for treating IA and achieving better outcomes shall be considered.

Potentials of Traditional Persian Medicine: Mineral Anti-microbial Agents

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Objectives: There are many medical problems for which modern treatments are not optimal. On the other hand, current medications have many side effects, which has led to increase in the research on the traditional medicines of the world. Traditional Persian medicine (TPM) is the sum of information, knowledge and exercises applied in both treatment and prevention of diseases in Persia since ancient times. Today, a major global concern is the antimicrobial resistant against bacterial, viral, and fungal pathogens with epidemic potential. It is one of the causes of growing efforts to find new anti-microbial agents. In recent years, there have been new studies on the application of minerals as antifungal and antimicrobial agents. Inorganic agents have the advantage of being more durable and thermo-stable compared to organic matters. The use of inorganic anti-microbial agents has opened new application fields. Iranian ancient scholars used boles and minerals as antibacterial and antifungal agents. These agents could be a source for further studies in this field.
Methods: In this study we searched for medical earths in two of the most referred Persian materia medica from 16th and 18th century. The found earths were listed, identified and those which had related anti-microbial effects were introduced for further research.
Results: we found total number of 25 earths in the two traditional books, 12 of these agents have related antimicrobial effects.
Conclusion: Infectious diseases cause a great economic burden in health care system. Due to the increase in the antibiotic resistance the ability to treat infectious pathogen is decreasing throughout the world. Clay minerals and iron oxides offer an inexpensive therapeutic option for topical infectious problems. Traditional Persian medicine offers lists of registry of medicinal compounds. A group of these compounds are minerals which were used in the history to treat infections. Their mineralogical composition is Widespread. These minerals are from different types of laterites, ferrolites, ochres, and colored clays and soils. We listed 12 of the minerals used in TIM to treat microbial infections yet further research is needed to validate their efficacy.

Antifungal Susceptibility Testing of Clinical and Environmental Isolates of *Aspergillus flavus* to Voriconazole and Itraconazole

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Objectives: Invasive aspergillosis (IA) is a leading cause of morbidity and mortality in patients with immunodeficiencies. Although *A. fumigatus* is known as the prevalent species to cause invasive aspergillosis, there are some reports from the Middle East including Kuwait, Iran and Saudi Arabia with a tropical to arid climatic conditions which have shown that *A. flavus* is the most frequent causative agent of invasive aspergillosis. Several studies have also reported the presence of drug resistance of different species of *Aspergillus.* Limited information is available on the *in vitro* susceptibility and resistance patterns of *A. flavus* isolates against azoles in Iran. So, in this study we aimed to identify the Minimum inhibitory concentrations (MIC) values of two antifungal agents including itraconazole and voriconazole against clinical and environmental isolates of *A. flavus* collected from Mazandaran, Tehran and Mashhad provinces.
Methods: The clinical and environmental isolates of A. flavus were identified by sequencing of *β-tubulin.* The MICs of itraconazole and voriconazole for all isolates of *A. flavus* were determined by the guidelines proposed by Clinical and Laboratory Standards Institute (CLSI) M38-A2 for filamentous fungi.
Results: Thirty clinical and60 environmental of *A. flavus* were collected from Mazandaran, Tehran and Mashhad provinces.MIC_{50}, MIC and Geometric mean of itraconazole for *A. flavus*isolates were 0.25, 0.5 and 0.21µg/ml respectively. The MIC_{50}, MIC and Geometric mean of voriconazole were 0.25, 0.5 and 0.27 µg/ml.MIC results of all *A. flavus* isolates showed they were susceptible to antifungal agents, except for two environmental isolates that demonstrated MIC 2 µg/ml for itraconazole.
Conclusion: The current study demonstrated that there is no clear difference in MIC values between clinical and environmental isolates of *A. flavus.* There was no full resistance among *A. flavus* isolates.

The Study on the Antifungal Activities of Novel Derivatives of Indol, Benzofuran and Dihydropyrimidine against *Candida*, *Aspergillus* and Dermatophytes Species.

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Objectives: Over the past two decades, the number of resistant microbial pathogens has increased dramatically. This emergence of resistant strains, which is mainly due to inappropriate and extended use of broad-spectrum antibiotics, poses a serious threat to public health. To overcome antibiotic resistance, there is a great tendency toward synthesizing and screening the antimicrobial activities of novel, Hence, in this study, we synthesized and determined the antimicrobial activities of indole, benzofuran and dihydro pyrimidine derivatives.
Methods: The antifungal activities of the compound were evaluated against standard species of *Candida*, *Aspergillus*, and

Exophiala dermatitidis, *Pseudallescheria boydii*, *Penicillium marneffei*, *Cryptococcus neoformans* and clinical isolates of dermatophytes. Additionally, antibacterial activities of the compounds were determined against *Staphylococcus aureus*, *Escherichia coli*, and *Enterobacter faecalis*. Initially, antimicrobial activities of five different synthetic molecules (1A-5Awere studied against several standard strains of fungi and bacteria according to the CLSI methods (M38-A2 for filamentous fungi and M27-A2 for yeasts). Then, four new derivatives of the most effective molecule were synthesized (B-C), and the minimum inhibitory and lethal concentrations of these compounds were studied on standard strains as well as clinical isolates of azole-resistant yeasts.
Results: Among all synthetic compounds, two benzofuran derivatives had the best antifungal effect against most standard strains of yeasts, dermatophyte and even azole-resistant fungi. None of the tested compounds exhibited antibacterial activities.
Conclusion: Of the synthetic derivatives, compounds containing chloro group at position C4 of the naphtofuran ring had significant antifungal activity. Further studies are still needed to address the mechanism of action and cytotoxicity of the compounds.

The most Common Fungal Infections in Opium Addicted persons in Kerman

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Objectives: Opium is a narcotic drug. The use of different narcotic drugs such as opium exposes the addicts to different kinds of diseases and makes them susceptible to numerous diseases such as fungal infection. The fungal infections are frequently observed among patients addicted to narcotics. These infections range from asymptomatic mucosal candidiasis to spreading infections and lethal meningitis.
Methods: The present study included 36 individuals with fungal infection addicted to opium. These individuals were patients referred to the Medical Mycology Laboratory of Afzalipour Medical School, Kerman University of Medical Sciences. Fungal samples, including the sputum samples, skin, BAL, and mouth samples were prepared after the diagnoses and confirmation of a physician. A direct slide was prepared by potassium hydroxide solution (KOH). Sputum, BAL and oral swabs were stained with Giemsa. Samples were cultivated on Sabouraud's dextrose agar with and without chloramphenicol. The cultures were incubated at 32 °C for 3 weeks under aerobic conditions. The data were analyzed in a descriptive manner by SPSS Software (version. 16; IBM Inc.).
Results: The mean age of the individuals in this study was 35.43 ±9. 9. Among the 36 opium addicts, 28 smoked opium and, and 8 had used an edible form of opium for more than 3 years. Candidiasis was diagnosed among 31 individuals while aspergillosis was detected among 5 members.
Conclusion: Based on our findings, it seems that opium addicts suffer from a type of chronic inflammation. The ultimate influence of these effects is their interference with or weakening of the immune system, which prepares a suitable condition for the development of fungal infection.

Cytokine Levels in Plasma Samples of HIV-positive Patients with Oral Candidiasis

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Objectives: Cell-Mediated Immunity (CMI) by CD4+ Th (T helper)-type cells is the predominant host defense mechanism against Oral Candidiasis (OC) in HIV-infected individuals. Weakened CMI and depletion of $CD4^+$ T cells are the main factors contributing to the output of OC in HIV-positive individuals. The cytokines produced by Th1, Th2 and Th17 cells play a role in mediating an increasing susceptibility to OC during HIV infection. The present study investigated plasma concentration of IFN-γ, IL-4, IL-6 and IL-17 in HIV-1 patients suffering from OC.
Methods: In total, 98 samples in four groups (HIV-positive and HIV-negative persons with and without OC) were obtained from the oral cavities. Swabs were plated on Sabouraud-dextrose agar with choramphenicol under aerobic conditions at 32°C and in CHROMagar Candida media in the dark at 35°C for 48 hs to produce species-specific colors and were observed daily for the growth. 10% KOH preparation and Giemsa stain were used for the microscopic examination of samples. The diagnosis of OC was confirmed by hyphae being present on a smear and a positive swab culture result having characteristic colony morphology. Blood samples were obtained to assess plasma level of IFN-γ, IL-4, IL-6 and IL-17 using ELISA technique.
Results: There was a statistically significant difference in the plasma concentration of IFN-γ, IL-6 and IL-17 but not about IL-4. Our findings suggested a significant interaction between fungal infection and HIV on expression of assessed cytokines.
Conclusion: Alone and together, fungal infection and HIV could seriously alter immune system function as assessed by measuring the levels of the plasma cytokines. Therefore, these results provide important new information relative to the putative immune-based factors associated with resistance and/or susceptibility to OC in HIV-positive persons.

Fungal Keratitis in Patients with Corneal Ulcer in Isfahan, Center of Iran

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Objectives: Mycotic keratitis is a fungal infection of the cornea that sometimes leads to the loss of the eye. Certain conditions like trauma to the eyeball, corticosteroids and antibiotic therapy and corneal transplantation are predisposing factors in fungal infections. The aim of the present study was to evaluate the fungal keratitis in patients with corneal ulcers referred to Faiz Hospital in Isfahan, center of Iran.
Methods: A total of 150 patients with corneal ulcers were participated in the study. The data were collected by examining and questioning the patients during October 2014 to September 2015. Corneal scraping was performed by an ophthalmologist using standard techniques. The specimens were inoculated directly on Brain-heart infusion agar (BHI) and Sabouraud dextrose agar (SDA). The part of specimens collected on slid were stained with Giemsa stain.
Results: The age range of the patients was 13 to 88 years. Three (2%) of 150 patients with corneal ulcers were confirmed for fungal infection by microscopy and culture. Two (1.3%) fungi (*Fusarium spp*.) and one sample (0.6%) yeast cell were isolated.
Conclusion: Considering that fungal keratitis was confirmed via direct examination and culture preparation, accompanying these methods leads to definitive diagnosis in fungal keratitis.

The Prevalence of Superficial and Cutaneous Fungal Infections in Patients Referred to Two Pathology Laboratories on Sari, Iran 2014-2015

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Objectives: Despite specialized mycology laboratory of

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Mazandaran University of Medical Sciences in Sari, Some examples suspected to fungal infections may be evaluated in other pathology laboratories. Therefore, knowledge of the frequency of reported cases in other laboratories is important for community health planning. The aim of this study was to determine the prevalence of superficial and cutaneous fungal infections in Patients referred to two pathology laboratories (Nayerein and Andishe) in sari during18 months(March 2014 to July94).
Methods: Superficial and cutaneous mycological Sampling and direct examination were requested for 190 patients (57.9% womenand42.1% male).Only 118 cases of them had culture test request for samples. Direct examination for samples was performed on the use of KOH, KOH+ DMSO, lactophenol cotton blue stain. Fungal culture media (SC, SCC and BHI agar) were used for isolation of fungal agents.
Results: The mean age of patients were 40.7 years. Based on direct test, a kind of superficial and cutaneous fungal infection was diagnosed in 61(32.1%) persons. Among them, 15(24.6%) patients had diabetes as an underlying disease. Dermatophytosis was diagnosed in 26 (42.6%), saprophytic mold infections in 17 (27.9%), *Tinea* versicolor in 10 (16.4%) and candidias in 8 (13.1%) patients. The distridution of clinical form of dermatophytoses were as follows: tinea unguium 10(5/38%), tinea corporis 7(9/26%), tinea mannum 3(5/11%), jock itch 3(5/11%), tinea capitis 2(7/7%) and tinea pedis 1(8/3%). *Trichophyton rubrum* and *Trichophyton mentagrophytes* were the most common agents of dermatophytosis. In patients with saprophytic mold infections, *Aspergillus* spp. diagnosed as the most common agent.
Conclusion: Our results indicated that the dermatophytes and *Aspergillus* species are the most important agents of superficial and cutaneous infections in the society. Meanwhile, epidemiological information linked to all laboratories in the city, province and country can be effective in planning for disease control and prevention.

Effect of 900 MHz Microwave Radiation on *Candida albicans*

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Objectives: Today, the number of registered users of the mobile phone communication network has exceeded from the total numbers of the world population, while little knowledge is released about the biological effects of 900 MHz microwave radiation originating from the handsets or the base transceivers stations,. The Current study was designed for the evaluation of the effects of 900-MHz radiation on *Candida albicans* proliferation, adherence, and alpha-Int1 gene expression.
Methods: *Candida albicans* (ATCC:10231) grown in yeast Peptone Dextrose broth was distributed into five tubes (5 ml, 10^6 cells/ml) and exposed to 900 MHz GSM radiation for 6, 12, 18 and 24 hours, while the fifth tube was kept far from radiation. Cell densities at 0, 6, 12, 18 and 24 hours were assayed (turbidometry in 630 nm). Equal cell densities (10^6 cells/ml, 200 ul) from exposed and unexposed yeasts were transferred into 96 well plates and incubated for 4 hours for biofilm formation by the yeast. Yeast densities in biofilm network were assayed using MTT method. Alpha-int1p expression was also measured in the five yeast samples using mRNA from the yeasts and Real-time PCR method.
Results: Microwave exposure led to increased proliferation rate and increased biofilm formation by the yeasts and the effect was prominent in 18 –hour- exposed samples. Real-time PCR results showed increased expression levels of the alpha-int1p in microwave exposed yeasts.
Conclusion: Enhanced proliferation, enhanced biofilm formation and amplified alpha-int1 protein expression demonstrated that *Candida albicans* cells exposed to 900 MHz radiation are more virulent than unexposed cells.

Dermatophytosis Due to *Microsporum incurvatum*, a Neglected Geophilic Species

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Objectives: The geophilic species *Microsporum gypseum* is known to have three anamorphic states (i.e. *Microsporum gypseum M. fulvum* and *M. incurvatum*). Contrary to the first species, infection due to *M. incurvatum* was considered to be very infrequent. We report the first case of Tinea faciei due to *M. incurvatum* worldwide.
Case: The patient was an Iranian 4-year-old child, inhabitant of a village in Izeh, Khuzestan, southwestern Iran, with a history of erythematous and scaly lesions on her face lasting for two months. Direct microscopy of the scraped crusts was indicative of dermatophytosis and in the culture on Mycosel agar a fast growing colony with powdery texture and pale-brown in color arose. Micro-morphology of the isolate was suggestive for *M. gypseum*. However, partial amplification and sequencing of the internal transcribed spacers (ITS) and of beta tubulin (BT2) regions proved the identity of isolate as *M. incurvatum*. The isolate was deposited in the CBS Fungal Biodiversity center as strain CBS 130948. The patient was treated with a four-week regimen of oral griseofulvin.
Conclusion: This report is interesting since *M. incurvatum* as causative agent of dermatophytosis has been noted to be very rare all around the world. More attention and taking effective sequenced-based methods are required to identify the species and regions where the organism exists.

Medieval Iranian Physicians' Approach in Prevention and Treatment of Fungal Otitis External

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Objectives: Fungi are one of the causes of otitis externa, the prevalence of which is growing due to the increase in the consumption of antibiotics. The other predisposition of otomycosis that are manifested by redness, swelling and possibly discharge from the ear canal, are high humidity and trauma to ear. In this study, the preventive and curative approach of medieval Iranian physicians was examined.
Methods: In this study, the subject of the outer ear infections was evaluated from 4 primary resources of Traditional Persian Medicine (TPM), including "Canon in medicine", "Sharh Al-Asbab", "Teb-e-Akbari", and "Exir-e-A'zam" along with the pharmacological text "Makhzan Al-adviyeh" ; then, the databases including Medline and Google Scholar were reviewed for known effects of drugs that are used in the treatment of external ear infection in the texts.
Results: Today, the use of acidic solutions of acetic acid in combination with hydrocortisone is one of the effective treatments for external ear infection. In TPM, vinegar topical drop in combination with rose oil was used for this condition due to its anti-inflammatory, anti-bacterial, and anti-fungal properties. Other topical combinations for fungal or parasitic infections of the ear, which are currently known for their antifungal effects, include borax, Aloe, Wormwood, Bitter-apple and Peach leaf. On the other hand, drying of the ears after swimming exposure to moisture and use of swimming pool is one of the well-known methods in preventing of otitis externa; that has been emphasized in TPM texts, and interesting ways have been expressed for its use
Conclusion: The treatment method of Medieval Iranian physicians in the treatment of the external ear infection is in line with modern scientific observations, and studying of these approaches can be helpful in improving the health services in this field

Antifungal Susceptibility Profiles of Environmental

Cryptococcus neoformans Isolates from Shiraz, Iran

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Objectives: Cryptococcosis is one of the most common opportunistic fungal infections around the word. *Cryptococcus neoformans* is an important human and animal pathogen whose main environmental source of habitat is guano. This study reported the antifungal susceptibility profiles of environmental *C. neoformans* var. *grubii* isolates originating from pigeon dropping sources in Shiraz, Iran.
Methods: Twenty two *C. neoformans* var. *grubii* from pigeon dropping were isolated and identified.
In vitro antifungal susceptibility of amphotericin B, fluconazole, voriconazole and itraconazole was carried out using 96-well microdilution trays according to Clinical and Laboratory Standards Institute broth micro dilution protocol.
The drug dilutions were dispensed in plates. The final concentrations of the drugs ranged from 0.125 to 64 mg/ml for fluconazole and 0.03 to 16 mg/ml for amphotericin B, itraconazole and voriconazole. Microplates were incubated at 35 °C for 72 hs and the MIC end points were read visually compared with the drug-free control wells.
Result: In vitro antifungal susceptibility testing showed that all isolates were susceptible to amphotericin B, fluconazole, itraconazole and voriconazole with MIC ranging 0.125-0.03, 1-0.125, 0.125-0.03, and 0.25-0.03, respectively.
Conclusion: A constant surveillance antifungal susceptibility profile of environmental strains of *C. neoformans* is necessary to monitor the emergence of any resistant strains in order to ensure more successful therapy of cryptococcosis.

Identification of Yeasts Isolates from Oropharyngeal of Iranian HIV-Positive People and Determination of Their Antifungal Susceptibilities

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Objectives: Although the incidence of opportunistic yeast infections has decreased since the introduction of prophylactic antifungal drugs in HIV-Positive People, the constituents of normal flora and the susceptibility of commensal yeast to antifungal drugs may change over time. Accurate yeast identification and determination of their susceptibility to antifungals is essential for the clinical management of these people. This study determined the frequency and the susceptibility of isolated yeasts from oropharyngeal washing samples of Iranian HIV-Positive people to antifungals.
Methods: oropharyngeal wash samples were collected from 89 HIV-Positive people. Yeasts were isolated on Sabouraud agar plates and differentiated on a chromogenic medium, respectively. Yeast identification was conducted by a PCR-RFLP method using the restriction enzyme *Msp*I. The sensitivity of isolated yeast to common antifungals was determined by disk diffusion method according to the CLSI-M44-A protocol.
Results: 113 yeast isolates were obtained from clinical samples. Different *Candida* species were identified by PCR-RFLP method. *C. albicans* was the most identified species (54.87%), followed by *C.glabrata* (23.89%), *C. kefyr* (11.51%), *C. tropicalis* (5.31%), *C.krusei*(1.77%), *C. parapsilosis* (0.88%) and other species (1.77%). 18% of isolates showed resistance to one or more antifungals.
Conclusions: Although *Candida albicans* is on top of the list of yeasts colonizing in oropharyngeal cavity of these HIV-positive people, emergence of the rare species like *C. kefyr* is an important sign for changing the normal flora in such population. Also increase in the number of resistant species should be considered as an alarm for the clinical management of these people at risk.

Frequency of Vulvovaginal Candidiasis in 20-68 Years Old Women in Lar Dey Laboratory in 2014.

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Objectives: Vulvovaginal candidiasis is the second common fungal infection among women. Almost 75% of the women has faced in their life it. In the past three decades, the rate of attacking fungal infections has been increasing. The majority of cases of vulvovaginal candidiasis were diagnosed to be *Candida albicans.* The aim of this study was to investigate the prevalence of valvovaginal candidiasis in pop smear samples of non-pregnant women in 2014 year in Lar.
Methods: In this descriptive study, 4073 Pap smear samples from nonpregnant womens with symptoms of vulvovaginal candidiasis have been cleared by KOH 10%; presence of fungal elements such as yeast and hyphae was examined. The analysis of Candida species was done through germ tube and chlamidospore agar tests.
Results: In this study, 4073 women ageing from 20-68 years were studied in the current study. Among patients with symptoms of abnormal vaginal discharge, burning and itching of the 511 Candida species were separated from the culture medium. Between 69.27% (354) were *Candida albicans* and 30.72% (157) cases were non-*albicans* species, respectively 5 cases of trichomoniasis were isolated from patients.
Conclusion: the majority of cases isolated were fungi and, therefore people should be strongly informed about fungal infection, symptoms and the precaution measures.

The Relationship between Grade Walter and Fungus Isolated from Tissue Caught in Patients with Diabetic Foot Ulcers

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Objectives: Many reports have shown the increasing incidence of Candida infections in diabetic patients, particularly those partially treated. Yeast colonization in these patients, is a common phenomenon especially in those with uncontrolled blood sugar.
Methods: 65 patients with diabetic foot ulcers without prior anti-fungal treatments were involved in the study. Sampling was performed by scraping the surface of the skin of diabetic patients from their feet and between their toes. The samples were then inoculated on the plates. The patients' records were collected according to the degree of involvement (level 1.mild lesion infection, 2. deep lesion 3.acute deep abscesses, 4.severe involvement of single finger, 5. full - foot involvement)
Results: *Candida glabrata* was isolated as the most frequent species and *C. albicans* as the least frequent species in grade 3 and 4. Of the *Aspergillus* species, the *Aspergillus fumigatus* was isolated as the most frequent species and *A. flavus as the least frequent species,* in grades 4 and 5, respectively. *Penicillium species was frequently isolated from* grades 3 and 4.
Conclusion: Concerning the high prevalence of fungi in the examined regions, more attention needs to be paid to the foot of the diabetic patients

Molecular Identification and Proteinase Activity of Clinical Isolates of *Candida parapsilosis* Complex

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Objectives: Molecular studies and genetic analysis have revealed

the fact that *Candida parapsilosis* consists of three genetically distinct species. Extracellular enzymes such as proteinase play an important role in the pathogenesis of *Candida* species. The aim of this study was to identify clinical isolates of the *Candida parapsilosis* complex and to evaluate in vitro proteinase activity of the species in Shiraz, Iran.

Methods: 71 clinical isolates of *C. parapsilosis* previously identified by conventional methods were used in this study. Genomic DNA was prepared by boiling method. By using S1F and S1R primers, *SADH* gene region of the isolates was amplified. PCR-RFLP method was used for the identification of species using *BanI* restriction enzyme. Proteinase activity of the isolates were measured and compared with each species.

Results: Of the 71 clinical isolates, 65 (91.5%) were identified as *C. parapsilosis sensu stricto*, 6 (8.5%) as *C. orthopsilosis,* but no isolates were found as *C. metapsilosis*.

Of the 65 *C. parapsilosis,*70.1% had very high activity and 29% high activity. Of the 6 *C. Ortho psilosis* isolates, 83% had proteinase activity. 32% and 66.6% of the isolates reveals high enzyme activity, respectively.

Conclusion: In this study, we did not identify any *C. metapsilosis*. A few number of the samples and different geographic and ecological life situations of the patients could be involved in this matter. It was also determined that due to high activity of this enzyme, it could be considered as one of the most important enzymes in the virulence of *Candida parapsilosis* complex.

Antifungal Effect of Amphotericin B and Silver Nanoparticles On Mucor :*In Vitro*

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Objectives: Invasive fungal disease represents a major threat to life in immunocompromised patients and is now one of the most common causes of infection in this group. There is a limited range of antifungal agents available to treat disease, caused by *Mucors*. Therefore it is necessary to find new ways of treatment for *mucor*. The purpose of this study was to investigate the antifungal effects of Amphoteresin B and silver nanoparticles on *Mucor* in vitro.

Methods: Antifungal effects of Amphotericin B and silver nanoparticles are against *Mucor* investigated by agar dilution method.After that, to measure MIC and MFC values of silver nanoparticles and Amphotericin B, Micro Dilution Broth method was performed. At the end, the MIC and MFC values of silvernanoparticles were compared to MIC and MFC of Amphotericin B.

Results: The results obtained from agar dilution method confirm that the silver, nanoparticles can decrease fungal colonies in dose-dependent manner. The data of silver nanoparticles shows that colonies of fungal decreases and then becomes fixed. Based on the results of micro dilution broth method, the MIC and the MFC values of silver nanoparticles are 15.62 ppm and 31.25, respectively and for amphotericin B MIC was 3.9 and MFC was 7.8.

Conclusion: According to the study, silver nanoparticles can be used as an effective treatment for the control of *Mucor*. Effects of silver nanoparticles, according to their size was less than the Amphotericin B, but anti-fungal medication side effects on cells and drug resistance reported from around the world shows the need to find an alternative for the treatment of mucormycosis. According to this study, silver nanoparticles can be more clinical trials to be an effective drug without side effects and drug resistance in the treatment of mucormycosis introduced.

Comparative Genotyping of *Candida albicans* Strains Isolated from Human and Dog Clinical Specimens Based on Multi Locus Sequence Typing

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Objectives: *Candida* species are causative agents of most human fungal infections and *C. albicans* is known as the most prevalent species of this genus responsible for candidiasis. Strain typing and species identification is essential for gaining deep knowledge about biology, epidemiology and determination of their population structure. DNA-based methods such as Multi locus Sequence Typing have high sensitivity with clear and highly repetitive results. The present study was a comparative study on genetic profile of *C. albicans* isolates from human and dogs using MLST method.

Methods: In order to be analyzed by MLST method, DNA fragments from 7 Housekeeping gene encoding genes were sequenced after amplification using specific primers based on MLST data base. Polymorphic regions were recognized in 40 samples and different alleles and sequence types were determined using bioinformatics methods.

Results: In the present study, investigation on seven locus containing 2883 nucleotides revealed 68 polymorphic regions which showed 71 separate alleles in different locus. Furthermore, 32 different genotypes were obtained from 40 isolates.

Sequence analyses revealed that CaVPS13 has the most polymorphic nucleotides. In contrast, CaAAT1 gene has minimum diversity and polymorphic sites.

Conclusion: Genetic diversity was remarkably high among *C. albicans* isolates and the diversity was similar among human and animal isolates. No phylogenic relation was found among *C. albicans* strains from human and dogs. Clade distributions between human and dog isolates were significantly different, demonstrating population isolation between the groups. These differences may indicate a limited strain transfer between groups or differential selection of *C. albicans* isolates in humans and dogs. However, our results showed that there is no specific human and animal progeny. Although transmission between human to animals is more challenging than human to human, our finding shows that this is not impossible.

Emergence of Azoles Resistance *Candida* Species in Iranian AIDS Defined Patients with Oropharyngeal Candidiasis

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Objectives: Oropharyngeal candidiasis (OPC) and antifungal drug resistance are the major problems in patients infected with human immunodeficiency virus. The increased reports of antifungal resistance and expanding drug therapy options prompted the determination of antifungal susceptibility profile. The present study was undertaken to determine the antifungal susceptibility of *Candida* species isolates from Iranian patients acquired immunodeficiency syndrome (AIDS) with oropharyngeal candidiasis.

Methods: One hundred *Candida* isolates from oral cavity of Iranian AIDS defined patients (TCD4<200) with oropharyngeal candidiasis were obtained and cultured on CHROMagar and Sabouraud's dextrose agar. All isolates were identified according to assimilation profile, colony color, and other conventional methods. Broth Micro dilution of the antifungal drugs, according to the methods described in Clinical and Laboratory Standards Institute (M27-S4 and M44-A), was performed.

Results: Among sixty *C.albicans* strains, 56.7% were resistant to fluconazole, 38.3% of *C. albicans* strains were resistant to ketoconazole and clotrimazole. *C. albicans* resistance isolates to polyene antifungal includes amphotericin B were scarce (1.7%). 52.2% of *C. glabrata* strains were resistant to fluconazole and 47.8% and 30.4% of isolates were resistant against ketoconazole and clotrimazole, respectively. All *Candida* isolates were susceptible to nystatin and caspofungin.

Conclusion: Based on the result, we concluded that screening of resistant *Candida* isolates by disk diffusion or broth dilution methods are essential for surveillance and preventing antifungal resistance for the management of the patients. Nystatin is widely used in clinical practice for HIV patients in Iran. There is no evidence of enhanced resistance to this drug while, in this study, it showed high resistance to azole antifungals specially fluconazole. Regarding no resistance to caspofungin, its administration is suggested for the treatment of OPC in AIDS patients.

Survey of Antimicrobial Effects of Novel 1,3 Thiazole Derivatives

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Objectives: Nowadays, due to fungal and bacterial drug resistance, bacterial and fungal infections have increasing, which shows the needs for the introduction of novel drugs. Thiazole derivatives have so many applications in biological terms that can be good alternatives for antifungal and antibacterial drugs, and may have a better effect than anti-bacterial and anti-fungal drugs with fewer side effects for the host. The aim of this study was to evaluate the antifungal and antibacterial properties of newly synthesized derivatives Thiazole and its comparison with existing antifungal and anti-bacterial drugs on yeasts, molds and important medical bacteria.
Methods: In this research, by using MIC technique, Disk diffusion method, Micro dilution broth testing and measuring the diameter of inhibition zone. The sensitivity of medicinal drug, fluconazole, itraconazole gentamicin with newly synthesized Thiazole derivatives were examined on bacteria and fungi.
Results: According to the antimicrobial susceptibility results, 1 ,3 - Thiazole type2d exhibited an MIC90 of 200 µg/ml for *Candida albicans*, 25 µg/ml for *fusarium solani*, 50 µg/ml for *Trichophyton mentagrophytes*, for 25 µg/ml *Aspergillus fumigatus*, 50 µg/ml for *Bacillus subtilis*, 200 µg/ml for *Pseudomonas aeroginosa*, and 12.5 µg/ml for *E.coli*. Moreover, the MIC90 of 1 ,3-Thiazole type 2e was determined as *200* µg/ml for yeast *Candida albicans*, *25* µg/ml for *Fusarium solani*, 100 µg/ml for *Trichophyton mentagrophytes*, 12.5 µg/ml for *Aspergillus fumigatus*, 200 µg/ml for *Bacillus subtilis*, 400 µg/ml for *Pseudomonas aeroginosa*, and 25 µg/ml for *E.coli*.
Conclusion: Thiazole derivatives cannot be used to treat infections caused by the yeast, mold fungi, and bacteria, these derivatives have less antimicrobial effect in comparison to the current antibiotics.

The Assessment of Fungal Air Flora of Zahedan City during 2014

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Objectives: Transmission of fungi through the air is very dangerous for the health of the community. It is very important to determine annual and seasonal prevalence of airborne fungi. The aim of this study was to determine the air fungal flora of Zahedan city.
Methods: In this cross sectional descriptive study, Zahedan city was divided into two areas of countryside and central. In each area, 15 points were identified and two samples (A and B) were taken from each. During this investigation, 50 samples (25 samples for each season) were obtained from the air of Zahedan. For sampling, precipitating method (settle-plate method) with SC media were used. Then, the samples were immediately transferred to the laboratory and incubated at 25 ℃ for 7-10 days; afterwards, the colonies of each sample were counted and tested. 480 colonies belonging to nearly 7 genuses of different types of fungi were identified. Then, molds and yeasts were identified by morphological structure of colonies and biochemical methods.
Results: The results of the most frequent isolated fungi were as follows: *Penicillium* (30.5%), *Alternaria* (28%), *Aspergillus* (21%), yeast (8%), *Mucor* (5%), *Fusarium* (4%), *Acremonium* (2%), and Sterile hyphae species (1.5%).
Conclusion: According to our findings in this study, the mentioned fungi are air fungal flora and, therefore, hard to get rid of. The best precaution seems to be recommending individuals with respiratory diseases in Zahedan to use mask, safety filters in air conditioners, anti-moisture sets in home and office, and other protective measures to avoid being exposed to fungi.

Molecular Differentiation of *Aspergillus* Species Using Random Amplified Polymorphic DNA (RAPD)

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Objectives: *Aspergillus* spores are inhaled pollutants and play an important role in creating different kinds of aspergillosisas life-threatening nosocomial fungal infections. In the present study, genetic diversity and phylogenetic relationship of *Aspergillus* species isolated from Tehran air was studied using Random Amplified Polymorphic DNA (RAPD)-Polymerase Chain Reaction (RAPD-PCR).
Methods: A number of 38 *Aspergillus* strains belonging to 12 species, including *A. niger* (11 strains) ,*A. flavus* (7 strains), *A. tubingensis* (5 strains), *A. japonicus*4 strains), *A. ochraceus* (4 strains), and 1 strain from each *A. nidulans*, *A. amstelodami*, *A. oryzae*, *A. terreus,A. versicolor, A. flavipes,* and *A. fumigatus* were cultured on Sabouraud Dextrose Agar. Fungal DNA was extracted from mycelia and used for the amplification of gene fragments in RAPD-PCR using 11 primers.
Results: Seven primers including PM1, OPW-04, OPW-05, P160, P54, P10, and OPA14 yielded suitable fragments. Data from RAPD-PCR of gene fragments were analyzed using UPGMA software. A dendrogram based on 7 primers was generated and shoed 7 main clusters for 12 examined *Aspergillus* species. The Similarity indices of *A. niger*, *A. japonicus*, *A. flavus*, *A. tubingensis*, and *A. ochraceus* were reported as 41%, 87%, 31%, 18% and 37%, respectively. These species were resided in separate clusters while strains belonging to *A. nidulans*, *A. oryzae*, and *A. versicolor*had a common ancestor in a separate cluster.
Conclusion: Our results showed both inter- and intra-species genetic diversity for *Aspergillus* species and indicated that RAPD-PCR can be used as a rapid, sensitive and reproducible method for evaluating genetic diversity and phylogenetic relationship of environmental *Aspergillus* species providing comprehensive data for the management of *Aspergillus*-related diseases.

Antifungal and Antibacterial Activity of Some Benzothiazol Derivatives

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Objectives: The aim of this study was to investigate the effect of some benzothiazole derivatives (1-10) on different species of bacteria and fungi.
Methods: 10 drug sensitivity experiments were carried out using broth micro-dilution according to the CLSI protocol. Antifungal activities of the compounds were studied at different concentrations and were compared with the results of positive and negative controls.
Results: Some of the examined compounds showed remarkable antifungal effect on yeasts and saprotrophic fungi, while they have no effects on bacteria. Of the examined compounds**,** N1,N2-dimethyl-4-(1,3-benzothiazol-2-yl) aniline and 2-(4-nitrophenyl)-1,3-benzothiazole had the most antifungal activity even against fluconazole resistant strains. Compounds, 2-(3-pyridyl)-1,3-benzothiazole,and 2-(2-furyl)-1,3-benzothiazole had good antifungal activities, and other compounds showed good antifungal activity on some tested strains.
Conclusion: These results suggest that some of the derivatives should be investigated further for possible use in antifungal products.

Study the Relationship of *Candida* Species with Lactobacillus Species in Patients with Fungal Vaginitis and Healthy Individuals

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Objectives: Vaginal candidiasis is the second cause of vaginal infections and almost 75% of healthy females get infected by these yeasts at least once during their reproductive age. The present study aimed to determine the relationship between the presence of different species of *Lactobacilli* and the overgrowth of *Candida* in patients with vaginal candidiasis and healthy individuals.
Methods: The study was conducted on 120 patients suspected with vaginal candidiasis and 21 healthy individuals. Following the clinical examination by a gynecologist, samples were taken from the vaginal discharges for culturing on SDA and MRS agar, gram staining, and determining the pH. The *Candida* species were differentiated by CHROMagar *Candida* and rapid-ID 32 tests. The *Lactobacillus* species were identified using the biochemical test (API-CH 50).
Results: Of the examined patients, 42 women (35%) were identified as vaginal candidiasis based on clinical symptoms and positive-culture. The most frequently isolated species identified were *C.albicans* (57.1%), followed by *C. glabrata* (11.9%), *C. krusei* (9.5%), *C.kefyr* (7.1%), *C. parapsilosis* (2.4%), *C.zylanoides* (2.4%) and *C.rugosa* (2.4%). Of the 21 healthy controls, the culture of the vaginal swabs yielded positive results in only 5 cases (23.8%) which were all identified as *C. albicans*. *L.acidophilus* and *L.delbrueckii* were the most frequent isolated species in both groups. No significant association was found between the number and species of *lactobacillus* and vaginal candidiasis. A significant relation was found between the pH of vaginal discharge and itching.
Conclusions: To the best of our knowledge, there has been no previous report on distribution of both vaginal *Lactobacillus* and *Candida* species in healthy women and patients in Iran. As a significant association was found between the growth of *Lactobacilli* and pH as well as pH and *Candida* colonization, these two organisms might have a mutual interaction. Further studies are still needed to address such an interaction.

In Vitro Activities of Antifungal Drugs against 199 Clinical and Environmental Isolates of *Aspergillus flavus*, an Opportunistic Agent

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Objectives: *Aspergillus flavus* is the second leading cause of invasive and non-invasive aspergillosis, it is also the most common cause of fungal sinusitis, cutaneous and endophthalmitis in tropical countries. Since resistance to antifungal drugs has been seen in patients, susceptibility testing can be helpful in defining the activity spectrum of an antifungal and determining the appropriate drug for treatment.
Methods: 199 *A. flavus* strains were identified to the species level by sequencing the internal transcribed spacer regions of the rDNA region and partial β-tubulin gene fragments. The antifungal susceptibilities of clinical (n=171) and environmental (n=28) isolates of *A. flavus* to amphotericin B, itraconazole, voriconazole, posaconazole, and caspofungin were determined in accordance with CLSI document M38-A2.
Results: In clinical samples, *A. flavus* (87.5%) was significantly more recovered from sinus and cutaneous specimens. Caspofungin followed by posaconazole showed the lowest MICs. All isolates had caspofungin MEC_{90} (0.063 µg/ml) lower than epidemiologic cut-off values, and 3.5 % of the isolates had amphotericin B MICs higher than epidemiologic cut-off values.
Conclusion: This study demonstrated that all *A. flavus* strains showed a uniform pattern of low MICs for all antifungal agents. Caspofungin and triazoles had a better in vitro activity against the *A. flavus* strains. However, their clinical effectiveness in the treatment of *A. flavus* infection remains to be determined.

Comparison of Antifungal Effect of Thiazole Derivatives with Silver Nanoparticles, an in Vitro Study

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Objectives: Along with increasing antifungal resistance in recent years, using novel antifungal compounds has been extended considerably because researchers have been investigating new antifungal compounds. Thiazole derivatives and silver nanoparticles are chemical compounds with antifungal effects which have recently attracted researchers. In this research, the inhibitory effects of four thiazole-thiazolidine derivatives were studied on Aspergillus niger, *Candida albicans* and *Fusarium solani*.
Methods: In this study, at first, thiazole derivatives and silver nanoparticles were prepared as solution. Then disk diffusion was used for calculation of growth inhibition zone diameters and serial dilution method in microplates was used to assess minimum inhibitory concentrations (MICs).
Results: Results showed that 6a-c thiazole derivatives and silver nanoparticles had no significant inhibitory effects on all of the fungi, but growth inhibition zone diameters and MIC were reported 16 mm and 64 µg/ml for 6d thiazole derivative on *Aspergillus niger*.
Conclusion: In this study, only the existence of thiazole ring doesn't have inhibition effects. The inhibitory effects of these compounds depend on cross linking to this ring; For example connection of oxygen to thiazole ring in 6d derivative is a proof to this claim, and also diameter and number in silver nanoparticles have important role, in antifungal effect.

Investigation of Broccoli Antifungal Properties on *Candida Albicans*, *Candida glabrata* And *Candida tropicalis* Yeasts

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Objectives: Recently considerations were focused on substitution of herbals instead chemical pharmaceuticals. Some of these plants such as broccoli consumed as food.
Therefor in current study the effect of antifungal performance of broccoli investigated on *Candida albicans*, *Candida glabrata* and *Candida tropicalis*.
Methods: There for in this study broccoli oil extracted by steam distillation and its antifungal effect was evaluated by disk diffusion method to determining MIC (minimum inhibitory concentration) and MBC by microdilution (serial dilution). Antifungal effects of broccoli oil was compared by SPSS software in all samples. Identification of essential oil compounds were performed by GC/MS method.
Results: Results show that *Candida albicans* yeast has a significant different in value of $p<0.05$, *Candida glabrata* in $p<0.05$ and in *Candida tropicalis* at $p<0.05$ has no significant effect.
Conclusion: Essential broccoli oil compounds are: Trans pinocarveol, ethyl ether, grandisol- dihydrocarvone which identified by GC/MS method. According to the results it seems that presence of Carvone in broccoli, and particularly *Candida albicans* make this plant as an antifungal Species.

Isolation and Identification of Samples of *Candida*

Vulvovaginitis in Women Referred to Health Centers of Arak City and Effect of Equisetum Arvense and Quercus on the *C. albicans* Species

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Introduction: Among the vulvovaginal infections, the second prevalent infection is Vulvovaginal candidiasis which is created due to abnormal growth of candid species in genital system of the women. It is necessary to determine candida species for effectively treating the disease and determining the drug susceptibility patterns. Consumption of herbs in medicine has found special place. Equisetum arvense is regarded as an effective drug in the treatment of wounds. Quercus has been also used for treating many diseases.
Methods: The samples isolated from patients were identified byphenotypic methods including culture on Corn meal agar containing Tween 80, germ tube, culture on CHROMagar Candida medium. The effect of the extract on the isolates was studied with Agar well diffusion method on SDA medium. Also the effect of the extract (with Clevenger and water distillation method) of these two plants was studied using broth microdilution method.
Results: This study investigated 152 patients suspicious of Vulvovaginal candidiasis. 75 yeasts were isolated from 152 patients and identified as Candida albicans. 55 yeasts isolates were identified as non- albicans (*Candida kruseii, Candida glabrata, Candida tropicalis*), and the remaining 22 yeasts were not identified. In broth microdilution method, $MIC_{50}$was reported as 12.5µl/ml in *Candida albicans* for Equisetum arvense and Quercus and MFC was reported as 25 µl/ml for both plants.
Conclusion: Among the simple methods for the identification of the yeast species, it is very simple and also valid to culture on the CHROMagar Candida medium. In this research, isolation of Candida albicans species is more than that of non- albicans species.

Fungal Contamination in Hot Springs in Mazandaran Province, Iran, 2015

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Objectives: Use of public places such as swimming pools, saunas and hot springs are modes of cutaneous and superficial fungal infection transmission in humans, especially immunocompromised patients. The study of opportunistic and pathogenic agents in these places can be very effective to eliminate or reduce pollution and prevent possible infections.
Methods: 66 samples from 22 hot springs were collected in sterile bottles with a volume of 250 ml and transferred to the university laboratory and passed through sterile 0.45 µm filters. The filters were placed directly in the plates containing Sabouraud Dextrose Agar with Chloramphenicol (SC) and Sabouraud Dextrose Agar with Chloramphenicol and Cyclohexamide (SCC) for identification of opportunistic and dermatophytic fungi. The plates were incubated at 25°C form 10 days to 3 weeks. Routine mycological techniques were applied to identify grown fungi.
Results: 54 plates of 66 were positive for fungal growth. Out of 246 grown fungal colonies, 11 different fungal genera were identified. *Aspergillus niger* (29.26%), *Penicillium spp.* (24.39%), *Cladosporium spp.* (16.66%), *Alternaria spp.* (6.09%), *Candida spp.* (5.69%), *Aspergillus fumigatus* (4.87%) *Aspergillus flavus* (3.65%), *Rhodotorula spp.* (2.43%), Unknown fungi (2.43%), *Geotrichum spp.* (2.03%), *Epicocom spp.* (1.62%) and *Acremonium spp.* (0.81%) were the fungal isolated. None of the dermatophyte fungi were isolated.
Conclusion: The study showed the presence of various saprophytic fungi in hot springs, so, immunocompromised patients should avoid swimming in hot springs. Dermatophyte fungi were not observed in the hot springs, so probable indication could be that mineral water can inhibit the growth of pathogenic fungi.

Antifungal Activity of Silver Nanoparticles against Amphotericin B Resistant *Candida parapsilosis* Strains, alone and in Combination with Amphotericin B

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Objectives: Fungal infections are more frequent in patients who are immune-compromised.
Considering the number of antifungal drugs available are limited because prophylaxis with antifungals may lead to the emergence of resistant strains. Therefore, there is an urgent medical need for novel antifungals. On the other hand, nano-science has been emerged as an effective way to develop new approaches to design new antifungal drugs. In this study, nano- silver was synthesized and its antifungal effects on clinical isolates and ATCC strain of *Candida parapsilosis* were investigated. The aim of this study was to investigate the effect of Ag-NPs alone and in combination with Amphotericin B on resistantance and also ATCC strain of *C. parapsilosis*.
Methods: We studied the effect of Amphotericin B, nanosilver and their combination on 5 Amphotericin B -resistant *C. parapsilosis*. The Minimum Inhibitory Concentration (MIC) for *Candida parapsilosis* were determined by a broth microdilution method based on the Clinical and Laboratory Standards Institute (CLSI) method outlined in documents M-27 S3
Results: Standard strain of *C. parapsilosis* (ATCC 22019) was inhibited with MIC 0.5 µg/ml of Amphotericin B and 0.25 µg/ml of silver nanoparticle. In combination of Amphotericin B and silver nanoparticle, MIC was 0.03-13 µg/ml. However, MICs of resistant strains were different.
Conclusion: The obtained results indicated that silver nanoparticles can be inhibiting resistace in *C.parapsilosis* and cause MIC decrese 3 to 4 fold. The nanosilver is comparable to current antifungal drugs and it inhibits the growth of these fungi at very low concentrations.

Isolation and Molecular Identification *Rhodotorula* Species from Fruit Juice

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Objectives: Yeasts play a significant role in the nutrition industry, medicine, and biocontrol of plant pathogens. Lack of routine morphological and physiological procedures for identification of *Rhodotorula* spp. has caused using molecular method. The main goal of this study was identification of *Rhodotorula* Species isolated from fruit juice using molecular techniques.
Methods: A total of 50 Samples of fruit juice were obtained from different supermarkets in Isfahan. They were transferred to the laboratory in order to study the presence of *Rhodotorula* spp. Samples were cultured on potato dextrose agar medium. The primary separation was done according to their colony color (pink, orange, red). For preliminary identification of the isolates, each of the internal transcribed spacer1 (ITS1) and ITS2 regions of ribosomal DNA (rDNA) was amplified separately, and the mixture of both amplicons was electrophoresed on agarose gels. For final discrimination of the selected isolates the entire ITS1-ITS2 was sequenced followed by BLAST analysis.
Results: In this research, it was found that the isolated yeast from fruit juice belong to the *Rhodotorula* genus. The species were *R.mucilaginos* (10), *R.glutinis* (5), *R.slooffiae* (3) and *R.minuta* (3). So, molecular methods are useful for the identification of yeast species such as *Rhodotorula*.
Conclusion: Molecular methods are useful for the identification of yeast species such as *Rhodotorula*. *R. mucilaginosa* was the most prevalent species in fruit juice samples.

Identification of *Candida* Species in Patients with Oral Lesion

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Undergoing Chemotherapy Along with Minimum Inhibitory Concentration (MIC) to Fluconazole

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Objectives: Oral candidiasis is the most common fungal infection in patients undergoing chemotherapy. Various species of *Candida*, especially *Candida albicans* is known as the most important etiological agent of fungal infections. The purpose of this study was to identify *Candida* species from oral lesions of these patients and antifungal susceptibility of the clinical isolates.
Methods: Among 385 patients with different cancers, 55 (14.3%) showed oral lesions. Oral swabs were performed to identify the yeasts, using direct smear and CHROM-agar Candida medium. Micro dilution method was prepared in different concentrations of fluconazole and minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) of each species was compared.
Results: Oral candidiasis was confirmed in 36 cases by direct examination and culture. *Candida albicans* and *non-albicans* represented in 26 (72.2%) and 10 (27.8%) of the isolates respectively About 76.5% of *Candia-albicans* and 23.5% *non-albicans* isolates were resistant to fluconazole. Data showed that 62% and 30.7% of resistant strains of *Candida albicans* were found in patients with gastrointestinal cancer and lymphoma, respectively.
Conclusion: Data shows that *C. albicans* is the most commonly identified species in oral candidiasis and majority of fluconazole resistant *C. albicans* were found in patients with gastrointestinal cancer and lymphoma. Therefore, we recommend an alternative drug instead of fluconazole as the first line of treatment for candidiasis in these type of cancers. Administration of fluconazole in patients undergoing chemotherapy should be prescribed in accordance with the type of cancer.

Identification of *Candida* species isolated from Recurrent Vulvovaginal Candidiasis Patients by conventional and Molecular Methods, and Their Susceptibility to Fluconazole.

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Objectives: Today the incidence of Recurrent Vulvovaginal Candidiasis (RVVC) and candida species resistance to antifungal drugs, such as fluconazole show a rising trend. There are several reports indicating that resistance to antifungal agents and recurrent yeast infections are serious problems among Iranian patients. The aim of this study was isolation and identification of candida species from patients with RVVC, and assessment of their susceptibility to fluconazole in Gonabad city, northeastern Iran.
Methods: Identification of the candida species isolated from twenty RVVC patients were determined by usual laboratory tests and Polymerase Chain Reaction-Restriction Fragment Length Polymorphism (PCR-RFLP) method. Antifungal susceptibility testing of the isolates was performed by broth microdilution technique for fluconazole in accordance with Clinical and Laboratory Standard Institute (CLSI) M27-3 guidelines. All of the tests were repeated four times. Then, the mean of Minimum Inhibitory Concentrations (MIC90s) values for fluconazole on candidal isolates were obtained. The ranges of concentration in all the tests were 0.24-125 µg/ml for this antifungal agent.
Results: By using the non-molecular techniques and the PCR-RFLP molecular method for the diagnosis of candida species isolated from RVVC patients, Candida albicans was identified as the unique etiologic agent. The mean of MIC90s value for flucunazole in all of the candida albicans isolates was 31.25 µg/ml. Based on CLSI standard protocol, the antifungal effect of fluconazole against Candida albicans strains isolated from RVVC patients was susceptible dose- dependent.
Conclusion: According to the findings of this research, high dose of fluconazole or other antifungal drugs should be used for the treatment of patients with RVVC.

Compositions of *Nepeta binaludensis* and *Cuminum cyminum* Essential Oils and Theirs Antifungal Effects on *Candida* Species Isolated from Recurrent Vulvovaginal Candidiasis patients.

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Objectives: Recurrent Vulvovaginal Candidiasis (RVVC) that is a chronic condition causing discomfort and pain, is caused by Candida species. RVVC resisting to conventional therapy and the great potential of essential oils against microorganisms have led us to carry out this study. The aim of this research was to identify chemical compositions of *Nepeta binaludensis* and *Cuminum cyminum* essential oils and their antifungal properties against candida species isolated from RVVC patients.
Methods: In this experimental study, the essential oils of the *Nepeta binaludensis* aerial parts and *Cuminum cyminum* seeds were extracted by hydro- distillation procedure. Chemical composition analysis of the essential oils was performed by using Gas chromatography linked to Mass spectrometer (Gc/Ms). Then, by applying broth microdilution technique and four times of repetition, the mean of Minimum Inhibitory Concentrations (MIC90s) and the mean of Minimum Fungicidal Concentrations (MFCs) of the above-mentioned essential oils and their mixture were certified on candida species isolated from twenty RVVC patients.
Results: The main constituents of *Nepeta binaludensis* oil were 1,8-cineole (71.56%), Cyclopentapyran (4.72%), O-cymene (4.05%), 2β-pinene (3.23%), and Moslene (2.87%), while the main components found in *Cuminum cyminum* oil were γ-terpinen (21.07%), cuminaldehide (18.78%), 2-norpinene-2-carboxaldehyde (16.68%). β-pinene (16.13%), Benzenmethanol (15.58%), and O-cymene (6.46%). The means of MIC90s and MFCs of the *Nepeta binaludensis, Cuminum cyminum* and their mixture essential oils on candida species isolated from 20 RVVC patients were 8.00, 7.90, 7.22 µg/ml and 16.20, 15.81, 14.83 µg/ml, respectively. The statistical tests showed no significant correlation between MIC90s and MFCs of the essential oils and their mixture used in this study (P = 0.05).
Conclusion: The findings of this study showed that *Nepeta binaludensis, Cuminum cyminum* and their mixture essential oils had suitable antifungal activities on candidal isolates in patients with RVVC.

Time to Overcome Fluconazole-resistant *Candida*: Solid Lipid Nanoparticles as a Novel Antifungal Drugs Delivery system

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Objectives: A antifungal therapy would result in complication in management due to changes in patterns of invasive fungal infections, epidemiology and drug susceptibility**.** Here, attempts were made to prepare the Fluconazole loaded Solid Lipid Nanoparticles (Flu-SLNs) in addition to investigate the efficacy of optimal formulation on Fluconazole (Flu) resistant strains of some *Candida* species.
Methods: Fluconazole loaded Solid Lipid Nanoparticles was produced using Prob-ultrasonication techniques. The properties

of obtained SLNs were characterized by Field emission scanning electron microscopy and differential scanning calorimetry (DSC). Also, FT-IR was used to investigate the drug chemical structure. The minimum inhibitory concentrations for new formulation against Fluconazole-resistant strains of some *Candida* species were investigated using CLSI document M27-A3.
Results: The Flu-SLNs presented spherical shape with the mean diameter, zeta potential and entrapment efficiency of 84.8 nm, −25 mV and 89.6%, respectively. DSC study demonstrated that Flu alone encapsulated in SLNs was in the amorphous form. FT-IR analysis revealed that there were hydrogen bond interactions between the Flu alone and SLN components. The drug release from SP-SLNs showed burst release behavior at the initial stage (the first 30 min). Flu-resistant yeast strains behaved as susceptible ones after treating with Flu-SLNs (≤8μg/ml). The MIC_{50} drug concentration was obtained as 2μg/ml, 1μg/ml and 2μg/ml for Flu-resistant strains of *C. albicans, C. parapsilosis and C. glabrata*, respectively.
Conclusion: In this study, we evaluated novel delivery systems for combating some *Candida* strains which show low susceptibility against conventional formulation of Flu as the first choice of treatment.

Comparison of Methanol-related with Aqueous-related Garlic Extracts Based on their Effects on MIC Results in *C. albicans*

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Objectives: *Candida albicans* is an opportunistic fungal pathogen commonly found in the human gastrointestinal and female lower genital tracts. The ecological, biochemical, and morphological characteristics of *C. albicans* make it a unique, biologically interesting microbe, and its pathological potential makes it a medically important eucaryotic microorganism.
With the rise in fungal resistance to drugs, there is considerable interest in the development of other classes of antifungals for the control of infection. Garlic (*Allium sativum*) has been used as a medicine since ancient times and has long been known to have antibacterial, antifungal and antiviral properties.
Methods: In this study, different concentrations of aqueous as well as methanol garlic extract on *Candida albicans*ATCC14053 were examined. Concentrations of 20-50-80-100-120-150 mg/ml of aqueous and methanol garlic extract were used separately. MIC was performed based on CLSI method and was determined according to macroscopic and microscopic results.
Results: MIC for aqueous garlic extract was 120 mg/ml and for methanol garlic extract was 100 mg/ml. MIC was defined as the lowest concentration that completely inhibited the fungal growth.
Conclusion: The inhibition of fungal growth with methanol garlic extract was seen more than aqueous garlic extract. Methanol garlic extract, as compared to aqueous garlic extract, inhibits fungal growth in a lower concentration.

Isavuconazole Therapy in a Patient with Spread Mucormycosis

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Objectives: Isavuconazole is a new extended-spectrum triazole with activity against yeasts, molds, and dimorphic fungi. It is approved for the treatment of invasive aspergillosis and mucormycosis. The advantages of this triazole include the availability of a water-soluble intravenous formulation, excellent bioavailability of the oral formulation, and predictable pharmacokinetics in adults. A randomized, double-blind comparative clinical trial for the treatment of invasive aspergillosis found that the efficacy of isavuconazole was non-inferior to that of voriconazole. As clinical experience increases, the role of this new triazole in the treatment of invasive fungal infections will be better defined.
Methods: We reported a patient with relapsed acute myelogenous leukemia after allogeneic stem cell transplantation who developed disseminated mucormycosis due to *Rhizomucor pusillus*/R. miehei involving lung, brain, and skin. After failing posaconazole, the patient was intolerant to Amphotericin. Despite ongoing treatment for relapsed leukemia, he was treated effectively with isavuconazole for over 6 months.
Results: The use of isavuconazole allowed the patient to go home with oral treatment. Remarkably, his mucormycosis disease improved steadily with a decrease in the size of lung (50%) and brain (25%) lesions in addition to resolution of skin lesions and brain edema despite ongoing AML relapse requiring further treatment with hydroxyurea, sorafenib, and azacitidine.
Conclusion: Isavuconazole is under investigation in phase 3 of studies on its safety and efficacy for the treatment of fungal infections caused by *Candida spp*., *Aspergillus spp*., other filamentous fungi, rare molds, yeasts, and dimorphic fungi (ClinicalTrials.gov registration no. NCT00413218, NCT00634049, and NCT00412893). Our report suggested that isavuconazole can become an option to treat patients with mucormycosis, especially those who cannot tolerate amphotericin-based therapy. (This work was presented in abstract form at the 49th Annual Meeting of the Infectious Diseases Society of America, Boston, MA, and 22 October 2011 [14].)

A Cross-Sectional Study of Gastro-esophageal Candidiasis in Tehran, Iran

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Objectives: Gastro-oesophageal candidiasis is a rare infection and appears mainly in debilitated or immunocompromised patients. Colonization by *Candida* spp. may occur in this regions and the organism can remain for several months or years in the absence of inflammation. The main infection symptom is the presence of white plaques in gastro-oesophageal surface. *C. albicans* remains the most prevalent *Candida* spp. identified in gastrointestinal candidiasis. Regarding differences in susceptibilities to antifungal drugs among *Candida* spp., identification of isolates to the species level is significant to ensure quick and appropriate therapy.
Methods: A total of 398 patients undergoing gastrointestinal endoscopy during February 2012 to October 2014 were included in the present study. Histological sections from all endoscopic gastric and oesophageal biopsies were prepared and stained with Periodic acid–Schiff (PAS), and examined for presence of fungal elements. A part of biopsy sample subcultured on sabouraud glucose agar and genomic DNA of each strain was extracted using FTA ® Elute MicroCards. Molecular identification of *Candida* isolates was performed by PCR-RFLP technique with the restriction enzyme *Hpa*II.
Results: 21 out of 398 cases (5.2%) were found to have gastro-oesophageal candidiasis. *Candida albicans* was the main strain isolated from clinical samples (90.5%), followed by *C. glabrata* (4.7%), and *C. parapsilosis* (4.7%). Age range of patients was between 2 months and 67 years. Male to female ratio was 12/9.
Conclusion: Because of varying antifungal susceptibility of *Candida* spp. careful species designation of the clinical isolates of *Candida* by a rapid and meticulous method like PCR-RFLP was recommended.

Excellent Management of Rhinocerebral Mucormycosis with Posaconazole in a Diabetic Patient

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Objectives: Rhinocerebral mucormycosis is a fatal infection typically affecting diabetic or immunosuppressed patients. The most frequently recognized genera in mucormycosisare *Rhizopus, Rhizomucor, Mucor*, and *Lichtheimia*. In most cases, infection is caused by inhalation of fungal spores. In spite of antifungal therapy, mortality rate of patients who have mucormycosis is still very high (40-85%).
Case: A 45-year-old man had black nasal discharge, ptosis of right eye, bulging on right side of his face, and facial pain. Biochemical

tests indicated FBS: 370 mg/dl, and Hemoglobin A1c: 11%. The patient was hospitalized for intravenous (IV) insulin infusion therapy (0.1 U/kg/h). Brain MRI study with multiplanar images revealed only a few periventricular and deep white matter hyperintense foci. These were compatible with ischemic changes. Grey matter signal, cerebral ventricles, major intracranial vessels, basal ganglia and brain stem were normal. Opacification of paranasal sinuses and nasal cavity was seen due to sinusitis, mostly on right side with extension to right orbit. Due to involvement of fondus of right orbit and optic nerve, infection due to fungus origin was suggested. Fortunately, invasion to brain vessels was not seen. Amphotericin B (1 mg/kg/day) was prescribed for him and maxillary and ethmoid sinuses were debrided. A biopsy specimen from maxillary sinus was taken. Hematoxylin and eosin stain displayed broad aseptate hyphae with right angles in the background of necrotic debris, but in this case, the isolate did not grow on the synthetic media. As the consequence of orbit involvement, right eye enucleation was carried out. After 40 days, posaconazole (5 mg/kg) was added to his antifungal regimen, and patient was discharged after 15 days. The patient was followed up for a year and he is still alive.
Conclusion: Early detection, surgical excision and appropriate debridement, suitable antifungal therapy, and control of risk factors like diabetes mellitus are the main parameters of successful management of this lethal infection among diabetic patients.

Identification and In Vitro Antifungal Susceptibility of *Candida* Isolatesin Pediatrics

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Objectives: *Candida* species are the normal microflora of an individual's oral cavity, vagina, and gastrointestinal tract and are responsible for different clinical forms of candidosis ranging from mucocutaneous colonization to bloodstream fatal infections. *Candida* species are the third most prevalent cause of pediatric health care–associated bloodstream fungal infection. Hence, providing an epidemiological feature of candidiasis and also preparing an antifungal susceptibility profile of clinical *Candida* isolates among pediatrics seems necessary
Methods: During July 2013 to February 2015, 105 patients were examined for candidiasis by phenotypic tests. Genomic DNA of positive cases was extracted and amplified by polymerase chain reaction. The PCR products were digested using the restriction enzyme *Msp*I. *Candida* species were identified after standard agarose gel electrophoresis. Minimum inhibitory concentration (MICs) was determined by using microdilution broth method according to recommendations stated in the clinical and laboratory standards institute (CLSI) M27-A3 and M27-S4 documents.
Results: Forty-three patients (40.9%) had *Candida* infection. The most specimens belonged to nail infections (39.5%), and candidemia (13.9%). The age range of patients was between 18 days and16 years. *Candida albicans* was the most prevalent species isolated from pediatric patients (46.5%). MICs ranges for amphotericin B, fluconazole, and itraconazole were (0.025-0.75 µg/ml), (0.125-16µg/ml), and (0.094-2 µg/ml), respectively
Conclusion: Due tothe high incidence of *Candida* infections among pediatrics, increase of fatal infection like candidemia, and emersion of antifungal resistance *Candida* isolates, early and precise identification of the *Candida* species and determination of antifungal susceptibility patterns of clinical isolates may lead to the better management of the infection.

Demodex Dermatidis Mimicking Dermatophytosis: A report of five cases

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Objectives: Dermatophytosis is a superficial fungal infection confined to keratinised tissues of skin, hair and nail. It is difficult to diagnose dermatophytosis only base on clinical signs cause of several other skin diseases which mimic the typical fungal lesion. Demodicosis is a skin diseases causing by *Demodex* species can be clinically indistinguishable. The mites usually are found in the skin of the face, scalp, and upper limbs. *Demodex folliculorum* and *Demodex brevis* are the main cause of demodicosis in human. *Demodex folliculorum* is a saprophytic mite of the human pilosebaceous facial skin specially eyelashes. These mites live around the hair follicles and cause dermatitis mimicking dermatophytosis.
Case: *Demodex* is a tiny mite that in humans lives in the hair follicle of facial skin face, forehead, cheeks and eyelashes and external ear canals. There are two mites principally involved in human demodex infestations, *Demodex folliculorum* and *Demodex brevis*. Most people carry a few of these mites without experiencing any problems but these mite infestations can cause severe symptoms. When the mite population increases significantly, it causes sufficient irritation and damage to the area. Infestation with *Demodex* mites is known as demodicosis. Symptoms include ocular irritation, itching, and scaling of lids. It can be a serious problem for people living with HIV or suffering with other causes of a weakened immune system. Dermatophytosis is a superficial fungal infection confined to keratinised tissues of skin, hair and nail. It is difficult to diagnose dermatophytosis only base on clinical signs cause of several other skin diseases which mimic the typical fungal lesions. This paper presents five cases of demodicosis which primary clinical symptoms mimicking dermatophytosis .The patients referred to medical mycology labs of Shiraz medical school and Faghihi hospital in Shiraz, Iran.
Methods: five patients with severe lesions in hair, face and skin referred to medical mycology lab of Shiraz medical school and Faghihi hospital. Three patients had sever lesions on scalp and hair mimicking Tinea capitis.Two of these patients suffering mental retardation and acute lymphoblastic leuckemia as predisposing factors. The other patients had irritant, redness and vesicular bordered plaques on face and body skin mimicking Tinea corporis. Skin scrapping and hair plug did used for sampling and KOH smear prepared for direct examination.
Results: Direct examination of samples reveals a lot of elongated body mites that consists of two fused segments with eight short legs attached to the first body segment in scales and hair samples. *D. folliculorum* identified as causative agent in all cases.
Conclusion: *Demodex* mites live in sebaceous glands and hair follicles on the skin and found mostly on older children and adults. Skin lesions such as rosacea, pityriasis, dermatophytosis and blepharitis have been attributed to Demodex. Mites transfer between people by skin and hair contact and almost never eradicated entirely from the human body.

Occurrence of *Candida albicans* Infection and Its Antifungal Susceptibility/Resistance Pattern among HIV Positive Patients Attending Anti-Retroviral (ART) Clinic, Infectious Diseases Hospital, Kano, Nigeria.

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Objectives: *Candida* species are the most common cause of fungal infections worldwide and the leading opportunistic mycosis in HIV and AIDS patients. Understanding of the antifungal susceptibility/ resistance patterns of pathogenic fungi is key in guiding appropriate therapy selection for mycoses and may also provide an estimation of antifungal effectiveness, ensuring good treatment outcome and monitoring of development of drug resistance
Methods: A descriptive cross sectional study was conducted for 2 years from May 2013 to May 2015. Seven hundred and ninety six (796) consented HIV positive patients who agreed and accepted to be tested for vaginal/urethral, oral and urinary candidiasis were recruited. Three clinical samples comprising of high vaginal/ urethral swabs, oral swabs and mid-stream urine were collected from each patients who fulfilled the inclusion criteria. Specimens were cultured on sabouraud dextrose agar and *C. albicans* isolates were identified using the germ tube technique. The disk diffusion method was used for antifungal susceptibility testing using four antifungal agents.
Results: Out of 796 clinical samples, 263 yielded positive

growths of Candida species with prevalence of 33.0% and that of *C. albicans* was 28.8% in the study population. Vaginal/urethral samples had the highest prevalence, 42.6% of *C. albicans* followed by Oral swabs with 32.2% and the least of 26.9% in mid-stream urine. These where, however, not statistically significantly different ($p<0.005$). *C. albicans* isolates were most sensitive to ketoconazole (98.1%) and clotrimazole (56.5%). Nystatin and fluconazole recorded the poorest sensitivities with 0.6% and 3.9%, respectively. Very high Resistance to commonly used antifungal agents found to be in Nystatin (99.3%) and Fluconazole (96.1%)
Conclusion: Monitoring antifungal susceptibility/ resistance among Candida species is very useful because, apart from tracking and detection of resistance, it also gives clues to emerging threats of new resistant strains.

Prevalence Rate of Fungal Infections in Patients Visiting Birjand Educational Hospitals during March2011 to October 2014.

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Objectives: In developing countries, fungal infections are major problems. There are limitations in the treatment of fungal diseases. The aim of this study was to investigate the epidemiology of fungal infections in patients admitted to Birjand educational Hospitalsfrom March 2011toOctober 2014.
Methods: From March 2011 to October 2013, there were a total of 722patients suspected of mycosis referingto medical mycology labs in Birjand, Iran for Medical Mycology examination. Skin, hair and nail sampleshad beentaken by scraping from patients and collected for diagnosis. Diagnosis was confirmed by direct microscopyand, if necessary,byculture according to the mycology routine laboratory methods. Afterdatacollection, softwareSPSS (16) testwas used fordescriptive statistics (percentage, frequency, meanandstandard deviation),andsquareanalysisata significance level ofα=0/05wasdone.
Results: A total of 335 cases (48%) suffered from superficial and cutaneous mycosis. The most common age were 20 to 29 years. The most common infections were *Tinea versicolor* and also infections were Dermatophytosis, Aspergillusis, Erythersma, and candidiasis.
Conclusion: According to the results, the most common fungaldisease was *Tinea versicolor* in Birgand and the age group 20 to 29 years were the most common affected. Type of job and high humidity might predispose the individuals to this infection.

Evaluation of Uranyl ion ($UO2^{+2}$) Uptake by Hyphomycetous Fungi.

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Objectives: the presence of toxic and hazardous pollutants such as uranium and other radionuclide in nuclear wastes is one of the main challenges for human societies and a major threat to the environment. In addition to the radioactive properties of uranium, because of calcium homologous, Bone-oriented elements member remains in the body for a long time. The aim of this thesis was investigating the adsorption of uranyl ion and its being picked up by some hyphomycetous fungi in Iran.
Methods: To determine the amount of uranium absorption, spectrophotometry method was performed. Of the fungi studied for uranyl attraction, those that had the most absorptive properties (uranyl ion removal from the environment) were introduced in this research. Optimal absorption of uranyl ion by certain fungi in different pH and temperature conditions as well as contact time duration was studied. Finally, the selected fungus was identified at the species level using PCR technique.
Results: The most absorption of uranyl ion was seen by a hyphomycetous mold named *Alternaria*, which was collected from Ahvaz city – southwestern Iran. After DNA extraction, ITS1, 5.8S, ITS2 Gene fragment of ribosomal subunit was amplified by polymerase chain reaction for definite identification of the selected mold. PCR products were sent to Sinacolon Company for DNA sequencing.
Conclusion: *Alternaria brassicate* was islated and determined as one of the suitable fungi for the absorption of uranyl ion.

Aspergillus and Aflatioxin

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Objectives: Aflatoxins are large groups of mycotoxins that are produced by especial species of *Aspergillus*, especially *A. flavus* and *A. parasiticus.* Aflatoxins are of various types such asG_2, G_1 B_2 and B_1. *Aspergillus* infections can appear in different forms, including disease in the hosts with natural immunity, infection in hosts with damaged tissue and suppressed immunity. Considering the importance of aflatoxin in humans, this study aimed at investigating *Aspergillus parasiticus* toxin and ways to identify and extract these fungal toxins. Identifying the ways these fungi produce toxins would provide the basis for further research.
Methods: For this purpose, the fungus *Aspergillus parasiticus* Spear was purified to single spore method on PDA and WA. Then the ability to produce toxin were studied on coconut agar medium. Following the toxin production, the fungus was cultured on rice and corn, and after7 days, fungal toxin was extracted. A quantitative amount of the toxin was determined by TLC.
Result: Dark green colonies on PDA were confirmed as *Aspergillus parasiticus*. Fluorescence quenching around fungal colonies on agar coconut confirmed the presence of aflatoxin. Fluctuation on TLC revealed that the fungus produced toxin on rice and corn 2.36 and 1.67micrograms per milliliter.
Conclusion: Therefore, the characteristics of this fungus are shown through fluorescence on the coconut agar and different media. The production of different fungal toxins such as aflatoxin causes irreparable effects on human health.
Allergic Bronchopulmonary Aspergillosis; a Review of the Literatures

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Objectives: Allergic Broncho Pulmonary Aspergillosis (ABPA) is a rare disease characterized by an allergic inflammatory response to the colonization by aspergillus or other fungi in the airways. ABPA occurs in nonimmunocompromised patients, in the absence of invasive aspergillosis, and is defined as a hypersensitivity disorder induced by an *Aspergillus* species. Most patients with ABPA have either asthma or cystic fibrosis.
Methods: A comprehensive literature search of published studies from 1970 until 2015 about the Allergicbronchopulmonary aspergillosis was performed using PubMed/MEDLINE, Google scholar, Elsevier databases, Scopous and Iranian databases such as Irandoc, SID, Iranmedex and Magiran by keywords: ABPA and *Aspergillus*.
Results: The inhalation of spores from the environment is followed by growth of hyphae in the mucus of the bronchial tree and stimulates an immune response involving Th2 CD4+T-cells and IgE and IgG antibodies. Genetic factors and activation of bronchial epithelial cells in asthmaor cystic fibrosis are responsible for the development of a CD4+Th2 lymphocyte activation and IgE, IgG and IgA-AF antibodies production. ABPA is an important complication for patients with asthma and cystic fibrosis. The diagnosis of ABPA is based on the presence of a combination of clinical, biological and radiological criteria. ABPA progresses in five stages including: acute, remission, exacerbation, cortico-dependent asthma and Fibrosis (end-stage).
Conclusion: ABPA is a disease with varied clinical, radiological, and serological patterns. Treatment differs depending on the ABPA stage.High dosesof corticosteroids are the main treatment for ABPA; although the long-term benefits are not clear, their many side effects are well documented. A group of compounds, the

azoles, have activity against *Aspergillus fumigatus* and have been proposed as an alternative treatment for ABPA. ABPA is associated with an accelerated decline in lung function.

Determine the Prevalence and Evaluate of the Dermatophytosis Infection b\Between Elementary Children of Koohrang in 2014-2015

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Objectives: The aim of this study was to determine the rate of prevalence of dermatophytosis among elementary school students in Koohrang town in 2015.
Methods: From a total of 4313 elementary schools students of Koohrang, 891 cases were evaluated for cutaneous lesions. The suspicious head, nail and cutaneous lesions were examined by direct smears and culture methods for the presence of fungal elements.
Results: Out of 891 subjects, 40 cases were sampled. 10 cases were confirmed to be positive for fungal infections. The causative agents of 8 dermatophytosis were identified as follows; *Trichophyton verrocosum* (5cases), *Microsporum canis*, *M. gypseum*, *Trichophyton violaseum*one case of each dermatophyte.
Two cases were *Malassezia spp*. the agent of pityriasis.
Conclusion: Seventy percents of positive cases lived in poor hygienic quality. Probably more important causes of this condition are lower health and lifestyle of ranching and farming. As dermatophytosis is a zoonotic disease, so lifestyle is significant in prevalence of it. Agriculture and ranching and living with other animals such as cats and dogs closely,in addition of low health and low awareness are important risk factors for dermatophytosis.

The Prevalence of Yeast Colonization on Prepuce of Uncircumcised Infants

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Objective: The yeast fungi including *Candida* and *Malassezia*genus comprising normal flora of the human skin and male genital region, may cause balanitis and urinary tract infection. The aim of this study was to determine the prevalence of yeast colonization on preputial area of infants prior to circumcision.
Methods: A total of 200 clinically healthy infants were included in this study. Genomic DNA of all positive yeasts growth was extracted and D1/D2 domains of the large subunit (LSU) ribosomal DNA was amplified using polymerase chain reaction. The yeast species were identified using nucleotide Blast at GenBank sequence database.
Results: In 200 infants aging between 4 day to 9 month (mean age 58±49 day), 7 (3.5%) cases showed the yeast colonization. All yeast isolates were identified as *Candida albicans* with highest (99-100%) sequence identity.
Conclusion: The low rate of yeast colonization in preputial area of infants less than one year old confirmed the health benefit of circumcision in this age.

Antifungal Susceptibility Patterns of Phenotypic Variants of Mouth Isolates of *Candida albicans*

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Objectives: *Candida albicans*, a common human yeast pathogen, can switch between several different phenotypes. Some of these phenomena are closely correlated with its pathogenicity and their antifungal susceptibilities. The present study aimed to determine the susceptibility to antifungal drugs of phenotypic variants of *C. albicans* isolated from oral cavity of healthy individuals.
Methods: In the present study, 25 isolates of *C. albicans* from the mouth cavity of healthy individuals were inoculated on Phloxin B agar plates and incubated at 37°C for 5 days. Drug susceptibility testing of different phenotypes against 6 antifungal drugs (bifonazole, fluconazole, econazole, miconazole, terbinafine and amphotericin B) was performed by using micro broth dilution technique as described by CLSI.
Results: In the present study, 6 different phenotypes of *C. albicans,* including fuzzy, stars, stippled, dark pink, white and pale pink colonies were identified. All phenotypes were sensitive to fluconazole. 16 out of 50 phenotypic variants of *C. albicans* were resistant to econazole, and 36 phenotypes were resistant to amphotericin B. Terbinafine and bifonazole were active at 8 µg/mL or lower concentrations while miconazole activity was observed at 1 µg/mL or more concentrations.
Conclusion: Our results showed that all phenotypic variants of *C. albicans* are sensitive to fluconazole at ≤ 8 µg/mL whereas other antifungals have variable effects on phenotypic variants of *C. albicans*.

The Diagnostic Value of MRI in Early Detection of Cryptococcal Meningitis in Immunocompromised Patients

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Objectives: *Cryptococcus neoformans* is an opportunistic and ubiquitous infectious agent that for unknown reasons has a great desire to involve in the CNS system through haematogenous spread from the lungs. The cerebral cryptococcal infections can affect both immunocompromised and immunocompetent patients. These infections are mostly found in immunocompromised patients with the majority of the MRI findings related to these patients. The aim of this study was to determine the diagnostic value and sensitivity of MRI as a non-invasive method in early diagnosis of this infection.
Methods*:* In this prospective study, 2 immunocompromised patients with histopatologically confirmed cryptococcal meningitis were evaluated by MRI. The MRI images of these patients were then consistently reviewed by an experienced neuroradiologist. The images were evaluated for parenchymal involvement, meningeal enhancement, ependymal enhancement, and choroid plexus involvement. The results of MRI interpretation were then classified and reviewed for correlation with pathological findings.
Results*:* According to defining imaging features, patients with cryptococcal meningitis were confirmed by MRI. All patients participating in this study were immunocompromised.
Conclusion*:* The results of this study showed that MRI can be used as a rapid and noninvasive method for early detection of cerebral cryptococosis infection in immunocompromised patients. Based on these findings, MRI method, with acceptable sensitivity and specificity, may be able to replace invasive methods for detection and confirmation of cerebral cryptococcal infection.

Rare Case of *Aspergillus Ochraceus* Osteomyelitis of Calcaneus Bone in a Patient with Diabetic Foot Ulcers

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Objectives: Diabetes is the most common metabolic disease in humans. The most common causes of infection which have been reported in these patients are bacteria and fungi such as *Candida, Aspergillus, and Rhizopus* species.
Case: We report a 68-year-old male with a history of type II diabetes for 2 years with calcaneal osteomyelitis caused by *Aspergillus ochraceus.* The patient had two ulcers on the right heel bones for the past 6 months with no significant improvement. Magnetic resonance imaging (MRI) of right foot showed a destructive lesion in posterior part of calcaneus with soft tissue involvement secondary to calcaneal osteomyelitis with abscess of the bone and soft tissue. In excisional biopsy, chronic inflammatory cells and fungal septate hyphae were seen. SDA and BHIA culture media after 72 hours of incubation at 27°C yielded yellow-orange colonies with granular texture and the reverse was pale to brownish. The polymerase chain reaction assays were performed with the yielded colonies. A part of β- tubulin gene was amplified using primer pair Bt-F (5′-GGTAACCAAATCGGTGCTGCTTTC) and Bt-R (5′- ACCCTCAGTGTAGTGACCCTTGGC) and sequenced for accurate identification. The comparative DNA sequences analysis by nucleotide Basic Local Alignment Search Tool (BLAST) showed that the amplified sequence had 99%identity with the beta-tubulin genes of *A. ochraceus* with GenBank accession number FR775371.1. Antifungal susceptibility testing of the isolate was performed by microbroth dilution technique in accordance with Clinical and Laboratory Standard Institute (CLSI) guidelines M38-A2. Finally, the patient was treated with amphotericin B (Deoxycholate) 50mg/d and oral voriconazole 200mg 2 times per day and was discharged with good general condition.
Conclusion: Proper and early diagnosis and treatment of diabetic foot infection can reduce or prevent complications, such as osteomyelitis and amputation. The annual examination of feet for skin and nail lesion, sensation, anatomical changes, and vascular circulation can be useful for the prevention and control of infection.

In vitro antifungal susceptibility of *Aspergillus* species isolated from COPD patient

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Objectives: In recent years, an increase in cases of pulmonary infection by the genus *Aspergillus* among patients with chronic obstructive pulmonary disease has been observed.
Methods: In a two- year duration study from 2014 and 2015, inclusive, a total of 50 patients from 3 medical ICUs in certain hospitals in Sari, Iran were processed**.** Samples obtained from sputum, bronchoalveolar lavage (BAL) and tracheal aspirates were cultured for fungi each week. Identification based on morphological characteristics followed by sequencing of the partial beta-tubulin gene using the specific primers was performed. Minimum inhibitory concentrations (MICs) and minimum effective concentration (MEC) of antifungal agent were determined according to the Clinical and Laboratory Standards Institute M38-A2 document**.**
Results: *Aspergillus* section *Fumigati* was the species most frequently recovered by culture (43.7%), followed by *Aspergillus* section *Flavi* (37.5%), *Aspergillus* section *nigi* (12.5%) and *Aspergillus* section *terrei* (6.2%). All isolates were tested for susceptibility against amphotericin B, itraconazole, voriconazole, posaconazole and caspofungin. Geometric means, ranges, MIC50, and MIC90 values were performed. In each run of work, the MICs of anti fungal drugs for the control strains were within accepted limits. Totally, all strains were susceptible to caspofungin ranging between (0.008-0.5 µg/ml); moreover, they had low MICs to posaconazole ranging (0.008-0.5 µg/ml). Also the MIC ranges of itraconazole were between (0.063->16 µg/ml) for *A. fumigatus* isolates which was the widest range and the highest MICs in drugs. In general, one *A. fumigatus* isolate exhibited MIC_0 values above the clinical breakpoints for itraconazole.
Conclusion: In COPD patients, in the presence of symptom of infection and positive cultures for *Aspergillus* species from respiratory samples, treatment with antifungal agent should be considered.

In vitro antifungal Susceptibility of Non-*albicans Candida* Species from Vulvovaginal Samples

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Objectives: Vulvovaginal Candidiasis (VVC) is a common vaginal infection affecting about 75% of women during reproductive age. According to some studies, VVC infections due to non-*albicans Candida* species have become more common and most non-*albicans Candida* species are resistant or have high MICs against azole antifungal drugs. The aim of this study was evaluate the antifungal susceptibility of non-*albicans Candida* species against some antifungal drugs.
Methods: One-hundred vaginal discharge samples were obtained by wet sterile swap from women with VVC who referred to Golestan social security organization hospital during 1392-93. Antifungal susceptibility test was performed according to the CLSI M27-A3 broth microdilution method, and minimal inhibitory concentrations were determined against Nystatin, Fluconazole, Amphotericin B and Itraconazole.
Result: The MICs of all Non- *albicans* isolates against Amphotericin B and Nystatin was low, ranging between 0.016 – 0.5 and 0.125 – 0.5 µg/ml, respectively. A total of 2 (14.28%) strains of *C.glabrata* showed high MIC values which was above the clinical breakpoints for itraconazole (MIC: 8 µg/ml) and fluconazole (MIC: 64 µg/ml) tested by in vitro antifungal susceptibility testing.
Conclusion: Due to the increasing trends in emergence of drug-resistant clinical isolates of *Candida* in addition to changes in epidemiology of candidiasis, information about the susceptibility patterns of Non-*Candida* spp. can be helpful for the clinicians for choosing the best therapeutic option to manage the patients.

Green Synthesis of Silver Nanoparticles: another Honor for the Yeast Model *Saccharomyces cerevisiae*

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Objectives: Microorganism-based synthesis of nanostructures has recently been well established as a green method for the sustainable development of nanotechnology. Nowadays, emerging resistant pathogenic bacteria and fungal isolates and also the probable inability of bacteria as well as fungi to develop resistance against silver nanoparticles (SNPs) antibacterial action, several biological properties, such as antifungal, antiviral and particularly antibacterial activities have been intensely studied. In this study, we used the yeast model *Saccharomyces cerevisiae* for the synthesis of SNPs and investigated its antifungal activity against some isolates of *Candida albicans*.
Methods: A standard strain of *S. cerevisiae* was grown on liquid medium containing mineral salt and exposed to 2mM of AgNO3. The reduction of Ag+ ions to metal nanoparticles was investigated virtually by tracing the color of the solution which turned into reddish-brown after 72 hrs. Further characterization of synthesized SNPs was performed afterwards. In addition, antifungal activity of synthesized SNPs was evaluated against fluconazole-susceptible as well as fluconazole-resistant isolates of *Candida albicans*.
Results: The UV-vis spectra demonstrated a broad peak centering at 410 nm which corresponds to the particle size much less

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than 70 nm. The results of TEM demonstrated that the particles were formed fairly uniform, spherical, and small in size with almost 83.6% % in 5-20 nm range. The zeta potential of silver nanoparticles was negative and equal to 25.0 mv which meets the quality and suggested that there was not much aggregation. Silver nanoparticles synthesized by *S. cerevisiae* showed antifungal activity against fluconazole-susceptible as well as fluconazole-resistant Candida *albicans* isolates and exhibited MIC_{90} value of 2 and 4 µg/ml, respectively.
Conclusion: The yeast model *S. cerevisiae* has successfully demonstrated potential for extra cellular synthesis of fairly mono dispersed, tiny silver nanoparticles.

Identification and Antifungal Susceptibility Pattern of *Candida* species Isolated from Patients with Nosocomial Candiduria

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Objectives: Nosocomial candiduria could be due to cystitis, pyelonephritis, or fungus ball in urinary tract system. Several reports also imply to candidemia and upper urinary tract involvement as the complications of candiduria. The aim of this study is the assessment of nosocomial candiduria; identification of *Candida* isolates and determination of their drug susceptibility pattern.
Methods: Urine samples of 115 hospitalized patients were collected during five months. *Candida* species were isolated and identified using conventional and molecular (PCR-RFLP) diagnostic methods. Antifungal susceptibility profiles for amphotericin B and fluconazole were performed using broth microdilution method based on CLSI M27-A2 guideline.
Results: Nosocomial candiduria was diagnosed in 5 (4.3%) patients. Isolated *Candida* species identified as *Candida albicans* (n: 4) and *C. glabrata* (n: 2). Two strains of *C. albicans*, and *C. glabrata* strains were resistant to fluconazole.
Conclusion: Similar to several reports, the results of this study indicated that *C. albicans* is the main *Candida* species causing nosocomial candiduria and drug resistant *Candida species* are causative agents of candiduria in hospitalized patients.

Ovicidal Activity of Nematophagous Fungus *Paecilomyces lilacinus* on *Taenia Hidatigena* Eggs

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Objectives: Parasite eggs are probably the most resistant stage in parasite life cycles, pathogenic for human and animals. It is hence essential to implement methods of prevention to control transmission by means of reduction of environment contamination by infective eggs. The objective of this study was to evaluate the in vitro ovicidal activity of nematophagous fungi isolated from soil.
Methods: Samples of soil from some locations were cultured on water agar 2% containing antibiotics. The plates were then baited by placing 1 ml of free living nematodes suspension containing 5000 free living nematodes. Two repetitions were done per sample, and the plates were kept at 25°C. After 2 days, plates were checked and daily observations were done for 2 months. Free living nematodes trapped with mycelium were transferred to PDA. This method was carried out to recover nematophagous fungi. *Arthrobotrys oligospora* CBS 251.82 were obtained from research Institute of Plant Protection and were used as the reference strain. Isolated nematophagous fungi and *Arthrobotrys oligospora*were cultured on water agar 2% medium for 10 days, with ten replicates. Control group contained petri dishes without fungi, with water agar 2% medium. After fungal growth, one ml of an embryonated *Taenia hidatigena* suspension was poured over the fungal cultures. At interval 7-14-21 days, 100 eggs were removed from each plate and evaluated by optical microscopy.
Results: *Paecilomyces lilacinus* were isolated from the collected soil and verified with PCR followed by sequencing. They showed ovicidal trait on *Taenia hidatigena* eggs while *Arthrobotrys oligospora* showed less effect on *Taenia hidatigena* eggs.
Conclusion: These results showed that the use of *Paecilomyces lilacinus* in biological control of *Taenia hidatigena* is promising.

Prevalence of a Variety of *Candida* Species in *Candida* Vaginits in Women Referred to University Hospitals of Mashhad University of Medical Sciences in 2014-2015

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Objectives: Vulvovaginit could involve patient in several times and inside physical disease it also could cause mental illness and also it is consider the second common vaginal infection. *Candida albicans* is the most common species that are isolated from candidiasis, but in recent years due to increase of patients with immune deficiency and other risk factors, other pathogenic *Candida*, such as *C. glabrata*, *C. parapsilosis* and *C. tropicalis* have increased. The aim of this study is to identify the species isolated in women with vulvovaginal candidiasis infection.
Methods: taking samples from patients and cultured in sabourd dextrose agar then by using different tests such as germ tube test, cultured in CHROM agar, corn meal agar+ tween 80, 1% and assimilation test by API 20C AUX kit.
Results: In this study 76/2% *Candida albicans*, 8/9% *C. parapsilosis*, 6/4% *C. glabrata*, 4% *C. tropicalis* and 1% *C. kefir* were isolated. Age group 36-25 years had the highest rates of infection with the average 4/90 percent. Among non-pregnant women *C. albicans* and *C. glabrata* have the highest rate. The significant increase was observed in *C. parapsilosis* in patient using antifungal drugs.
Conclusion: In this study, a significant increase in the amount of non-albicans candidates such as *C. glabrata*, *C. parapsilosis* and are seen.

Investigation of Mannose–Binding Lectin Level and Deficiency in Patients with Dermatophytosis

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Objectives: Dermatophytosis is a cutaneous fungal infection with a worldwide occurrence. In dermatophyte infections, the release of keratinocyte cytokines, in the presence of dermatophyte antigens, causes an acute phase response; subsequently, the acute-phase proteins are produced by hepatocytes. Mannose–binding lectin (MBL), an acute-phase protein, also acts as a kind of pattern recognition receptor.MBL deficiency plays a role in susceptible viral, bacterial, fungal and parasitic infections. Some research has been conducted on the role of acute-phase proteins in dermatophyte infections. This study has been designed to determine the serum MBL levels in patients with dermatophytosis.
Methods: This cross-sectional study, included 96 healthy individuals and 105 patients with dermatophytosis, in access sampling procedure. Microscopic examinations were conducted and cultivated to detect dermatophytes, and in the cases that the identification of different dermatophyte species was necessary, complementary examinations were conducted. Additionally, the enzyme– linked immunosorbent assay (ELISA) was used to determine the serum MBL levels of healthy individuals and patients. Various tests (Chisquare, Fisher exact, Mann - Whitney, Kruskal Wallis, Kendal tau correlation coefficient and ROC curve analysis) were used to examine the relationships between variables, when the $P < 0.05$ were considered as significant level.
Results: The mean serum MBL level of healthy individuals and patients, was 1.53 ± 1.87 µg/mL and 1.97 ± 2.03 µg/mL ($P = 0.039$), respectively. Using ROC curve analysis, the MBL level

was established as a significant predictor of dermatophytosis (P = 0.042). MBL deficiency (serum level < 1 µg/mL) was more common in healthy group (56.2%) than the patients with dermatophytosis (41.0%).
Conclusion: The findings showed that the increased concentrations of serum MBL in patients with dermatophytosis play a role in this fungal infection. The high frequency of MBL deficiency in healthy individuals was compared with patients indicated that MBL deficiency is not a predisposing factor of this type of infection.

Investigation the Growth Rate of *Aspergillus fumigates*, as a Cause of Aspergillusis, Following Suppression of *Elongation factor-1* (*EF-1)* Encoding Gene

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Objectives: Aspergillosis is a large spectrum of diseases caused by members of the genus *Aspergillus*. *Aspergillus fumigatus* is a renowned saprophytic airborne fungus. Multi factors and metabolites are implicated in the pathogenesis of *Aspergillus fumigates.* Translation elongation factors (EFs) are the principal molculse of protein synthesis on ribosome. *EF-1* binds guanine nucleotides and in its GTP-liganded form can interact with aminoacyl tRNA to bring it to the A-site of the ribosome. Following hydrolysis of the GTP, *EF-1*·GDP is released from the ribosome. The effects of different variety of antibiotics have been examined on inhibition of *EF-1*. Diclofenac sodium is a non-steroidal anti-inflammatory drug. Antimicrobial effects of this drug have been proven in several studies. Therefore, in this project, we studied the effects of diclofenac sodium on *EF-1* gene expression.
Methods: In this experimental study, according to the CLSI protocol (M38-A2 Molds), a Standard strain of *Aspergillus fumigatus* (ATCC14489) was cultured on PDA medium for 7 days. Fungal suspension prepared at concentration of 5×10^4 CFU/ml and minimum inhibitory concentration (MIC) determined treating 50-900 µg/ml diclofenac sodium. For RNA extraction, *A.fumigatus* was inoculated into SDB treated with 500,700 and 900 µg/ml diclofenac sodium for 72h at 35°C. cDNA was generated using a reverse transcriptase and Real-Time PCR performed for measuring the exact level of mRNA-*EF-1*.
Results: The more increase in the concentration of diclofenac sodium, the more decreased in, mycelium production decreased and deviation was been seen in their natural shape. diclofenac sodium concentration above 500 µg/ml showed a significant inhibitory effect on the *Aspergillus fumigatus* growth. By Real-Time PCR, expression level of *EF-1* gene reduced and this observed at concentration of 900 µg/ml as well.
Conclusions: our finding suggested that diclofenac sodium could cause a drastic reduction of the growth rate of *Aspergillus fumigates* and *EF-1* gene expression. Therefore, it can be evaluated in clinical trial, as one of the most effective pharmacological agents, and can be used for the inhibition of Aspergillusis following the growth of *Aspergillus fumigatus*.

Biosynthesis of Silver Nanoparticles Using *Carum carvi* Extract and Its Inhibitory Effect on Growth of *Aspergillus fumigatus*

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Objectives: *Aspergillus fumigatus* is a fungus of the genus *Aspergillus*, and is one of the most common *Aspergillus* species to cause disease in individuals with immunodeficiency. Application of nanoparticles for treatment of fungal diseases has emerged as a promising tool in medicine and mycology during recent years. The present study was carried out to investigate the biosynthesis of silver nanoparticles using herbal extract of black Zira (*Carum carvi*) and to evaluate antifungal effects of the resulting nanoparticles on the growth of *A. fumigatus*.
Methods: Herbal extract was prepared by hydro-extraction method. For bioreduction process, 2.5ml of the 200mM AgNO3 solution was added to 47.5ml of plant extract to get a final concentration of 10mM. Biosynthesis of silver nanoparticles was studied by UV-Vis spectrometry, transmission electron microscopy (TEM), scanning electron microscopy (SEM) and x-ray diffraction analysis (XRD). Moreover, the concentration of nanoparticles was measured by high resolution ICP-OES spectrometer. Inhibitory effect of silver nanoparticles on *A. fumigatus* was studied by serial dilution method.
Results: The results of electron microscopy indicated that silver nanoparticles had spherical shape with average size of 10nm. XRD results showed peaks corresponding to (111), (200), (220) and (322) Bragg reflections that shows presence of SNPs in the sample. ICP test showed that the concentration of nanoparticles was 2.934mg/l in average. The results of serial dilution test showed that SNPs at the concentration of 50µg/ml can inhibit the growth of the pathogen; thus, the minimum inhibitory concentration (MIC) of the SNPs was determined as 50µg/ml.
Conclusion: Our results showed that plant extract of *C. carvi* is a suitable platform for biosynthesis of silver nanoparticles. Serial dilution assay indicated that silver nanoparticles synthesized by the plant extract are effective inhibitory agents against the growth of *A. fumigatus.* The silver nanoparticles generated by plant extract can be used for the production of new antifungal drugs.

PCR-RFLP on β-Tubulin Gene for Rapid Identification of the most Clinically Important Species of *Aspergillus*.

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Objectives: *Aspergillus* species are important agents of life-threatening infections in severely immunocompromised patients. Since the various species of *Aspergillus* vary in their responses to antifungal agents and virulence factors, it is very important to identify clinical isolates of *Aspergillus* at the species level. Identification of *Aspergillus* species relying on properties of the colonies is time-consuming and requires remarkable expertise. In this study, we evaluated the potency of β-tubulin (BT2) gene for the differentiation of the most common species of *Aspergillus* in an *in silico* and experimental restriction fragment length polymorphism (RFLP) profile.
Methods: In this study, 273 clinical and environmental isolates as well as 6 reference strains of *Aspergillus* species were used to optimize PCR-RFLP reaction.
Beta tubulin gene was amplified using universal primers Bt2a and Bt2b, and products were, subsequently, digested with the restriction enzyme *Alw*I.
Results: After digestion of partially amplified β-tubulin gene with the restriction enzyme *Alw*I, six medically important *Aspergillus* species including *A. fumigatus, A. niger, A. flavus, A. nidulans, A. terreus,* and *A. clavattus* were differentiated.
Conclusion: PCR-RFLP method using the restriction enzyme *Alw*I is a low-cost, rapid and reliable test for the identification of the most medically important *Aspergillus* species.

Identification and Investigation of Drug-Resistant Yeast Species Isolated from the Skin of Patients with Acne Clinical Protests Referred to the Dermatology Clinic

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Objective: Acne is a pathological disorder and a chronic inflammation in the Sebaceous follicles and one of the most popular dermatology damages that has affected millions of people worldwide. Bacterial and fungal skin flora agents are involved in its creation.
Methods: In this cross-sectional study 70 clinical specimens from suspected skin with acne protests (the West Mazandaran) were collected by sterile swab and were streaked on SDA medium containing chloramphenicol. The plates were incubated for 48 hours in 37° c. Suspected colonies were studied through microscopic examination and subsequent passage in accordance with Mycology of standard procedures and the type of fungal colony color in CHROM agar for the isolation of the yeast was identified for final approval, Candida Species Sequencing Method

was performed, and susceptibility testing was done to review Candida for drug-resistant isolates based on CLSI method.
Results: Of 70 clinical isolates studied, 11 species of Candida including *C. parapsilosis* 8 (72.73%), *C.krusei* 1(12.5%), *C. lusitaniae* 1 (12.5%), *Candida kefir* 1 (12.5%), and a *Trichosporon Asahi* was identified and isolated. Study of *C. parapsilosis* isolates susceptibility to various concentrations of the antifungal agents to isolate Cp1 has shown that the isolated Cp8 Cp5 with MIC5 equal to 32, 0.5, 0.25 and MIC90 of <64, <1, <0.5 µg/ml fluconazole, itraconazole and ketoconazole were respectively resistant. Apart from the isolation of Cp1 and Cp8 which had relative strength, almost all other species of *C. parapsilosis* isolates were susceptible to these drugs.
Conclusion: Etiological factors, pathogenesis, drug resistance and risk factors of acne and the role of yeast to induce skin disease as a contributory factor in causing acne can be a topic of interest in dermatology.

Candida Urinary Tract Infection among Hospitalized Women in Firozgar Hospital,Tehran,Iran in 1394

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Objectives: In the past two decades, the rate of opportunistic pathogens involved in the urinary tract infection has significantly risen.These infections such as Candiduria can be asymptomatic or might turn into systemic infections in some cases.
Diabetes, pregnancy, the use of antibiotics or stroids, are many risk factor that contribute to the development of candiduria. This study aimed to estimate the amount of candida species and to determinethe colony counts in urinarysamples ofhospitalized patients.
Methods: In the prospective study, 100 urine samples were taken from women who had been hospitalized for more than 10 days at Firozgar hospital and had one of the cases of diabetes, surgery, catheter, or the use of antibiotics or steroids within a period of at least 10 days.
The urine sample was collected in sterile tube and transferred tomycology laboratory. After centrifuge, the pellet was cultured on the sabauraud dextrose agar Medium with chloramphenicol incubated 48 hours in 37 ˚ C. Then the growth was checked and the identification of species was done by Candida chrome agar and corn meal agar with tween 80 and API kit.
Results: The frequency of different species of candida isolated from the urinary tract infections of hospitalized female patients were as follows: *Candida albicans* (75%), *glabrata* (23%), and *tropicalis* (2%), respectively.
Conclusion: Concerning our result in this study, urine infection *by candida* has high frequency and regarding the occurrence of non-*albicans* species and the antifungal resistance phenomenon fungal infection in urine is remarkable as well as bacterial infection that may disseminate to other organs and lead to candidemia.

Antifungal Activity of Caffeine in Combination with Fluconazole against *Candida albicans*.

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Objectives: Iranian (Lahijan) black tea caffeine was shown to have antifungal activity against *Candida albicans*. The aim of this study was to investigate whether the combination of caffeine and fluconazole (FLU) has an effective antifungal activity on a FLU-resistant (MIC>64 mg/L) *C. albicans* strain *(*PTCC-5027*)*.
Methods: Caffeine from Lahijan black tea was extracted and its pharmacological effects against 20 clinical isolate of FLU-sensitive and-resistant C. albicans were evaluated by Colony Forming Units (CFU) method. Furthermore, the synergistic effect of caffeine and FLU againstPTCC-5027strain was investigated.
Results: Our results indicated the antifungal efficacy of Lahijan black tea caffeine on *C. albicans* isolates and subsequent identification of caffeine in combination with FLU againstPTCC-5027 strain. The concentrations of caffeine causing 90% growth inhibition (MIC_{90}) of PTCC-5027 strain, FLU-resistant and -sensitive *C. albicans* isolates were 25mg/L, 24.4 mg/L and 37.2 mg/L, respectively. The combination of caffeine with FLU showed stronger antifungal activity against PTCC-5027 strain. The addition of 12.5 mg/L caffeine to FLU 10-50 mg/L (below MIC_{90}), inhibited the growth of PTCC-5027 by 99.3%–99.7%, concentrations at which neither caffeine nor FLU alone affects the growth.
Conclusion: It can be concluded that caffeine has antifungal effect on *C. albicans* and, in combination with FLU, can enhance the antifungal activity of FLU against *C. albicans*. The synergism of the combination of caffeine and FLU induces multiple antifungal effects, resulting in the use of lower dose of FLU. It is promised that this decreases the side effects of antifungal drugs.

Saccharomyces Infections – A Comprehensive Review

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Objectives: The genus Saccharomyces comprises widely known yeasts, with *Saccharomyces cerevisiae* as the most famous representative *Saccharomyces boulardii*, widely used in bread, ethanol and beverages industries, and also used in the pharmaceutical industry to obtain lepuridin. *Saccharomyces cerevisiae* and *Saccharomyces boulardii*, are used to treat certain gastrointestinal diseases. In human beings, the genus Saccharomyces may colonize gastrointestinal, respiratory and urinary mucosas in patients with underlying diseases. Although rare, 'uncommon' yeast infections are increasing, with Saccharomyces acknowledged as an emergent germ, with an incidence of up to 4% among blood culture germs, Its association with other yeasts (especially Candida) is also well described in the literature as determining high mortality rates. Early fungal therapy improves the prognosis.
Methods: A literature and institutional review was completed for Saccharomyces infections over the past 25 years including common agents, difficult diagnosis, treatment problems and outcome.
Results: A review of scientific literatures reveals about 20 cases of saccharomyces infection in humans. Severe immunosuppression, prolonged hospitalization, prior antibiotic therapy, and/or prosthetic cardiac valves are the settings where saccharomyces infection has been observed. Predisposing factors in Saccharomyces infections are similar to those of invasive candidiasis, and intravascular catheter and antibiotic therapy are the most frequent. S. boulardi is found in more cases of Saccharomyces fungemias and is exclusively isolated from blood. Overall, Saccharomyces clinical isolates exhibited low susceptibility to amphotericin B and azole derivatives. Researchers present cases of *S. cerevisiae* fungemia and aortic graft in immunocompetent adult.
Conclusion: Because Saccharomyces can be a common saprophytic contaminant, biopsy and pathologic confirmation of infection are often necessary for a definitive diagnosis. Amphotericin B is the treatment of choice for serious infections with this organism.Historically, phenotypic identification of Saccharomyces has been unreliable because standard commercial mycology test kits do not discriminate between the different species of Saccharomyces. Recently, different genotypic techniques such as ribosomal DNA sequencing, random amplified polymorphic DNA, DNA chromosomal profiles, and mitochondrial DNA restriction analysis have been used to successfully identify isolates of Saccharomyces to the species level. Saccharomyces organisms are increasingly reported as agents of invasive infection, especially in immunocompromised or critically ill patients.

Inhibitory Effects of Vitamin A and K_1 on *A.parasiticus* Growth, Aflatoxin Production and *aflR* Gene Expression in *A.Parasiticus* by Real Time PCR

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Objectives: Aflatoxins are toxic compounds that are produced as secondary fungal metabolites by some of *Aspergillus* wich

frequently leads to the contamination of food and agricultural products. Aflatoxin B_1 is the most important and potent human mutagen and hepato-carcinogen agent. Many studies have been conducted by scientists worldwide regarding the detection of aflatoxins and preventing its occurrence in foods and animal feed; however, numerous cases of contamination of foods and agricultural products with aflatoxin are still appearing. Although the antibacterial and antifungal effects of many of vitamins as natural compounds have been proven, the mechanism of vitamins effect on *Aspergillus parasiticus* growth and aflatoxin production is not clear yet. In this study, the effects of vitamin A (retinol) as a powerful antioxidant and vitamin K_1 on *Aspergillus parasiticus* growth, aflatoxins production and the *aflR* gene expression were studied.
Methods: A standard strain of Aspergillus parasiticus ATCC 15517 was applied for performing antintifungal susceptibility test in different concentrations of vitamin A and K1.Antifungal susceptibility test was performed according to CLSI M38-A2 protocol. Vitamin K1 had been provided in suspension whereas vitamin A was dissolved in tween 40 and absolute alcohol,respectively.Vitamin A was dissolved in its own solvent to get the diluted concentration of (64,32,16,8 mg/ml) .For vitamin K_1 different concentration (500,250,125,62.5,mg/ml) were prepared. After the culture of *A.parasiticus* , we measured the minimum inhibitory concentration (MIC) for a different concentration of each vitamins. Aflatoxin concentration in the control and treated media was determined by HPLC method. Also, the mRNA was extracted and cDNA synthesized by universal primers. The Quantitative changes in aflR gene expression were analyzed via Real Time PCR.
Results: For vitamin A, the minimum fungicidal concentration was yielded as 32 mg/ml and the minimum inhibitory concentration for vitamin A and K_1 were yielded 16mg/ml and 500 mg/ml, respectively. The aflatoxin production in samples of negative control, positive control and samples treated with different concentrations of vitamins was evaluated by HPLC method. HPLC analysis results also showed that aflatoxin production reduced in samples treated with 16 mg/ml of vitamin A and 500 mg/ml of vitamin K_1. The concentration of 16mg/ml of vitamin A and 500 mg/ml of vitamin K_1 inhibited the toxin production as 98.8% and 91.5% respectively. In addition, the level of *aflR* gene expression was significantly reduced after treating with 16 mg/ml of vitamin A and 500 and 250 mg/ml of vitamin K_1.
Conclusion: Based on the obtained results, vitamin A has significant effects on *Aspergillus parasiticus* growth, aflatoxin production and the rate of *aflR* gene expression. Vitamin K_1 could not inhibit the fungal growth completely; however, the rate of *aflR* gene expression and aflatoxin production was significantly reduced after fungal treating with vitamin K_1. Consequently, using natural compounds such as vitamins may be considered as potential antifungal and antitoxic factors in food industry and the industries related to agriculture.

Effects of Thiamine on Growth, Aflatoxin Production, and *AflR* Gene Expression in *Aspergillus parasiticus*

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Objectives: Mycotoxins are secondary fungal metabolites with a very high diversity that are produced by some species of *Aspergillus* which frequently leads to the contamination of food and agricultural products. Recently, elimination of aflatoxin contamination in food and feed has been considered by scientists worldwide. Although the antibacterial and antifungal effects of vitamins as natural compounds have been proven, the mechanism of vitamins effect on *Aspergillus parasiticus* growth and aflatoxin production is not clear yet. In this study, the effect of thiamine (vitamin B_1) on *Aspergillus parasiticus* growth, aflatoxins production and the *aflR* gene expression was studied.
Methods: A standard strain of *Aspergillus parasiticus* was applied for performing antifungal susceptibility test in different concentrations of thiamine. Antifungal susceptibility test was performed according to CLSI M38-A2 document. The concentration of aflatoxin was determined by HPLC. Moreover, the quantitative changes in the aflR gene expression were analyzed by Real Time PCR method.
Results: The minimum inhibitory concentration was yielded as > 500 mg/ml. However, HPLC analysis results showed that aflatoxin production reduced in samples treated with 500 mg/ml of thiamine. In addition, the level of *aflR* gene expression was significantly reduced after treating with 500 and 250 mg/ml of vitamin B_1.
Conclusion: Based on the obtained results, thiamine could not inhibit the fungal growth completely. However, the rate of *aflR* gene expression and aflatoxin production was significantly reduced after fungal treating with thiamine. Consequently, using natural compounds such as vitamins may be regarded as potential antitoxic agent in food industry and the industries related to agriculture.

Epidemiology of Fungal Rhinosinusitis in Tehran, Iran

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Objectives: Fungal rhinosinusitis (FRS) is an important infection of para nasal sinuses, which encompasses two main categories; invasive and noninvasive forms according to histopathological findings. *Aspergillus*spp are the most common species isolated from noninvasive form, while *Mucorales* are more frequently isolates from acute infections.
Methods: Four hundred fifty patients suspected to fungal rhino sinusitis were investigated in this cross-sectional prospective study from June 2009 to Sep 2013. All patients underwent endoscopic sinus surgery of the middle meatus. Tissue biopsies were investigated for culture, histopathology, and molecular examination.
Results: Totally, 87 patients were diagnosed with fungal rhinosinusitis. *A. flavus*
was the most common etiological agent of chronic invasive form (CIFRS), allergic fungal rhinosinusitis (AFRS) and fungus ball (FB), while *Rhizopusoryze* (26.7%) was the most common cause of infection in acute invasive fungal rhinosinusitis (AIFR). However, a few rare species such as *Shyzophyllum commune* and *Fusarium proliferatum* were also isolated.
Conclusion: Diabetes was the most important predisposing factor for patients with acute invasive form of sinusitis and the most involved sinuses were unilateral multiple sinuses and maxillary sinus.

A Case of Fungus Ball-Type Pansinusitis Due to *Fusarium proliferatum*.

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Objectives: Incidence of fungal sinusitis due to the genus Fusarium has increased during the last two decades. We reported a case of fungus ball sinusitis with involvement of multiple sinuses in an Iranian 21-year-old woman.
Methods: The patient was diagnosed as having a fungus ball-type sinusitis in computerized tomography scan.
Results: The sinus biopsy revealed fungal structures on histopathological and direct microscopic examinations, and a Fusarium species arose in culture. Partial sequencing of the translation elongation factor 1-alpha identified the isolate as F. proliferatum. Removal of all lesions by endoscopic surgery resulted in a favorable outcome.
Conclusion: To the best of our knowledge, this is the first case of F. proliferatum-associated fungus ball which involved multi-sinus, which highlights the efficiency of molecular methods for the discrimination of fungal agents involved.

Antimicrobial Activity of Tio2 and Ultraviolet-C Light on Fungi and Common Gram Positive Bacillus Contaminated in the Herbal Drug Industry

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Objectives: Effective and widespread photo catalytic techniques are being developed for applications including disinfection, water cleaning, air pollution, pharmaceutical and food industry, biological and environmental problems. Due to the chemical composition of the spores of fungi and bacteria that are commonly live in soil and water, disinfection process is both difficult and expensive. Antimicrobial activity of UV light and photo-catalysts such as (TiO_2) titanium dioxide, TiO2/UV were examined as a viable inactivation if a wide range of harmful microorganisms and can be provided as a treatment method.
Methods: In this study photocatalytic deactivation of *Aspergillus parasiticus*, *Candida albicans* and spore of bacteria (*Bacillus subtilis*, *Bacillus cereus*) were investigated by using Tio_2 NPs (0.1-2 g/L) and UV light in a reactor.
Results: The activity of UV and TiO2 increased with exposure time to 2 hours. TiO2 alone did not show significant antibacterial and antifungal activity.
Conclusion: These results showed that the quantity of sterilization could be affected by the type of catalyst, exposure time, UV wavelength and average nanoparticle size and the photocatalytic disinfection against spore species were mainly effective in UVC and the rate of inactivation improved by the presence of TiO2 NPs and increasing the exposure time. These particles could be used as a significant fungicide and bactericide in agricultural applications and food industry.

Investigation of Expression efg1, bcr1 and hwp1 Genes in *Candida albicans* Isolates by RT-PCR Technique and their Effect on Biofilm Formation

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Objectives: *Candida albicans* as a commensal fungus, resides on mucosal surfaces and in the gastrointestinal and genitourinary tracts. It cause frequently recurrent disease of mucosal membranes in both immunocompromised patients and healthy individuals. Biofilm formation is the most important virulence factor of *C.albicans*. *C.albicans* biofilm mainly comprise two kinds of cells: oval yeast form and hypha. Formation of biofilm control by multiple gene.
Methods: We used 50clinical isolates which confirmed *C.albicans* by PCR-RFLP. Then the total RNA was extracted from *C.albicans* isolates by glass bead and lysis buffer, and cDNA was synthesized using Reverse Transcriptase enzyme. RT-PCR was used to evaluate the expression of bcr1, hwp1 and efg1 genes. Biofilm formation was evaluated in 96-well microplate and then tetrazolium reduction was assayed. All data were analyzed using t-test by SPSS sofeware.
Results: the results of PCR with Specific primers Bcr1, Hwp1 and Efg1showed that 47(94%) isolates of *C.albicans* out of 50 had of three genes. Over the hand, Efg1 (25.53%), Bcr1 (95.7%) and Hwp1 (54%) of isolates was expression genes out of 47 by the RT-PCR. The results of the test tetrazolium reduction assay on the two isolates that had expression of genes and isolates that had Lack of expression genes shown significant whit P-value=0.014 (P<0.05).
Conclusion: Bcr1as a major transcription factor that had role in biofilm formation and it had several target in downstream Including, Hwp1 that had the ability adherence to Abiotic surface and epithelial cells. EFG1 gene had role in Regulation of hyphal morphogenesis of *Candida albicans.* The major function of this gene is triggering to hyphe formation process. According to the result of MTT test in biofilm formation, in comparison isolates was expression genes and isolates had lake expression genes conforms thatPotential impress of these genes in biofilm formation and Continuation biofilm of *C.albicans.*

Extensive Tinea Corporis Due to *Trichophyton simii* in a Nine-Month-Old Child

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Objectives: Incidence of *Trichophytonsimii* in dermatophytosis even in endemic area of India was noted to be limited. Recently, it has been shown that high similarity between morphological features of atypical *T. simii* isolates to other dermatophytes like *Trichophyton interdigitale* and *Arthroderma benhamiae*, led to, misidentification of the taxon in many instances.
Case: We have investigated a case of tinea corporis in a nine-month old female infant with extensive erythematous lesions. Morphological features of the recovered isolate from the culture resulted in the identification of *Trichophyton interdigitale*. For accurate identification, the internal transcribed spacer regions (ITS) of the ribosomal DNA (rDNA) gene was subjected to amplification by ITS1 and ITS4 primers. Subsequently, digestion restriction by *Mva*I enzyme and sequencing showed that *T. simii* is the causative agent of infection. The antifungal susceptibility test was also performed for the isolate. The minimal inhibitory concentrations (MICs) of the isolate against four common antifungal agents were determined according to the Clinical and Laboratory Standards Institute's (CLSI) M38-A2 document for filamentous fungi. The MICs of antifungal drugs were as follows: Terbinafine: 0.008 µg/ml, Itraconazole: 0.032 µg/ml, Griseofulvin: 0.5 µg/ml and Fluconazole: 16 µg/ml.
Conclusion: The species like *T. simii*, formerly known as restricted to some endemic regions, are not infrequent in non-endemic areas but less known and underestimated. To determine its true prevalence of infection, application of DNA sequence-based procedures is needed.

Onychomycosis and its Approach According to Iranian Traditional Medicine

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Objectives: Dermatophytes occur worldwide, and infections with these organisms are extremely common. Dermatophyte infection of the nails is more often termed onychomycosis. The nail becomes thickened and discolored and may crumble; onycholysis almost always occurs. Many dermatophyte infections are diagnosed by their clinical appearance. The major decision to be made with regard to therapy is whether the extent of nail involvement justifies the use of systemic antifungal agents that have adverse effects, may interact with other drugs, and are costly. In Iranian Traditional Medicine, onychomycosis is termed "*jozam"* of the nails which is described in detail in a separate section under skin diseases titles.
Methods: This study was a descriptive review according to Iranian Traditional Medicine literatures such as *Great Elixir* in comparison with modern medicine.
Result: It is called *jozam* of the nails, when nails become thick and dense especially at the base and so dry that if scratched, it will come apart little by little, and if the nail is contracted and curved, it is termed "*taaghof*". Its etiology is the accumulation of *Soda* (atrabilious) humor which is cold and dry in nature. The treatment is divided into local and systemic treatment and also change in diet. Due to etiology, which is dry humor, local treatment is focused on oils as moisturizing drugs like salve of flax seed oil, honey and wax to reduce the nail roughness, and then debridement of nails is

recommended.
Conclusion: Although some minor similarities is observed in treatment of onychomycosis in traditional and modern medicine, proposed approach of traditional medicine has some important benefits such as local usage, lower cost and more accessibility

Inhibitory Effects of Silver Nano Particles on Growth and Aflatoxin B_1 Production by *Aspergillus parasiticus*

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Objectives: Aflatoxins (AF) are a group of metabolites produced by fungi belonging to the genus *Aspergillus*. The growth of *Aspergillus* species and the production of aflatoxins require the presence of certain favorable environmental conditions[1].Aflatoxin B1 (AFB1) is the most toxic and usually predominant, which is classified within class I of human carcinogens.In recent years the application of Nanoparticles in various fields has expanded considerably. Of various Nano particles, silver nanoparticles (Ag-NPs) are emerging as one of the most commonly used nanomaterial. Most of existing researches seek the effect of nanoparticles on bacteria, fungi and viruses[2].Therefore, the aim of this work was to determine the effects of Ag-NPs on growth and AFG_1 production of AF-producing *Aspergillus parasiticus*.
Methods: *Aspergillus parasiticus* was inoculated (10^6 conidia per ml of medium) to Potato Dextrose Broth (PDB) medium, then AgNPs was added and incubated by shaking at 130 rpm and 28 ˚c for 7 days. AF was assayed by High performance Liquid Chromatography (HPLC). Microbioassay on micro plates containing PDB medium (4 days at 28˚c) at different concentrations of AgNPs (60, 80, 100, 120, 140, 160, 180 and 200 µg/ml) was measured.
Results: The results demonstrated that minimum inhibition concentration (MIC) equal to 160 µg/ml was determined for AgNPs against *A. parasiticus*. The AgNPs effectively inhibited AFB_1 production at a concentration of 80 µg/ml.
Conclusion: The results obtained in this study show that AgNPs at concentrations lower than the MICdrastically inhibited production of AFB_1 by *A. parasiticus* in culture medium. The AgNPs may be useful to control AF contamination of susceptible crops in the field.

Prevalence of Superficial and Cutaneous Fungal Infections in North of Iran

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Objectives: Superficial infections are defined as fungal growth in skin and its annexes without invasion to deep tissues. Different studies have demonstrated that these mycoses remained as a public health problem in the majority of communities. Since the epidemiology of superficial infections is not unchanged, it is important to evaluate the pattern of distribution in different geographical regions of Iran. This study aimed to describe the spectrum of superficial infections in Ghaemshahr and Sari cities.
Methods: In this study, 176 cutaneous samples were taken from patients referred to medical labs in Ghaemshahr and Sari cities in 2013-2014. Direct examination of skin scrapings was performed with 10-20% potassium hydroxide (KOH) and lactophenol cotton blue. Some parts of the specimens were inoculated onto S and SCC agar and the cultures were subjected to gross and microscopic evaluation of colonies for precise identification.
Results: Sixty-one patients (34.65%) were affected by superficial fungal infections among which 44 people had dermatophytosis (25%), 9 candidiasis (5.11%) and 8 tinea versicolor (4.54%).
Conclusion: Dermatophytosis was the predominant infection in this study. Given the increase in occurrence of superficial infection, large scale epidemiological studies in different regions of Iran is inevitable.

Genetic Analysis Variability of *Aspergillus flavus* in Aflatoxin Gene Cluster Isolates from a Poultry Food Field

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Objective: Poultry industry is one of the most important food industries in Iran. Each year, millions of tons of corn and soybean for feed is imported from other parts of the world. As *Aspergillus flavus* is one of the most dangerous food contaminants, our objective was to assess the genetic variability of *A. flavus* isolates from different source and determinate quickly *Aspergillus* strain .
Method: DNA was isolated from fresh fungal culture and amplified with suitable primer designed by oligo 7. We used the aflT gene, which is present in the species of the section *Flavi* and aflR which is a regulatory gene for aflatoxin biosynthetic pathway to detect aflatoxin producers such as *A. parasiticus* and *A. flavus*. Moreover, these genes were used for the detection and taxonomical discrimination between the other species of this section.
Several molecular genetic techniques were tested to classify *Aspergillus* section *Flavi* strains. We used PCR and multiplex PCR for the amplification of six aflatoxin genes cluster aflD (nor-1) and aflP (omtA), aflO (omtB), aflR, afloq, aflT, afiR the ITS regions was suitable candidates for taxonomic analysis .
Result: The aflT gene is present in the species of the section Flavi. The aflR is a regulatory gene for aflatoxin biosynthetic pathway. We used this gene for the detection of aflatoxin producers such as A. parasiticus and A. flavus, and for the taxonomical discrimination between the other species of the section. PCR amplification of aflR gene fragment allowed us to discriminate four groups in only *A. flavus, A. oryzae, A. parasiticus* and *A. sojae.*
Conclusions: In this paper, we developed a new easy- to- handle, rapid and specific molecular method for the identification of 11 out of the 16 species within the *Aspergillus* section *Flavi* and for the diagnosis of toxicogenic strains.

Study of Germ Tube Formation in *Candida albicans* Among Vaginitis and Urinary Infection

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Objectives*: Candida albicans* is the most virulent species of candida species that can cause several forms of candidiasis in susceptible patients. Several factors including germ tube formation were as virulence factors for pathogenesis of *candida albican*s. The aim of the present study was to evaluate the formation of germ tube in different isolates of *candida albicans* from vaginitis, urinary infection, and normal flora from oral cavity of healthy donors.
methods: a total of 151 isolates of *candida albicans* including sixty isolates from vulvovaginal candidiasis, sixty isolates from urinary infection and thirty normal isolated from oral cavity and a signal reference strain of *Candida albicans* (ATCC 10231) were studied. To assess germ tube formation, the human serum was used. Rate and extend of germ tube formation were evaluated in 3 hours.
Results: the results showed that germ tube formation in 0.5-2 hours isolates of avaginitis and urinary infection was significantly more than the normal oral isolated. During 0.5h, in 11.66% ofurinary infection isolates and 1.66% isolates of vaginitis, germ tube was seen while the germ tube was not observed in normal flora. Percentage of germ tube formation after 2.5 hours remained almost identical and after 3 hours were similar. About the germ tube formation, a dramatic difference between the minimum and maximum range in the sample was not observed; however, a higher percentage of germ tube production in the isolates of urinary and vaginitis infection was observed.
Conclusion: The result of this study showed thatgerm tube formation production in isolates of urinary infection and vaginitis was clearly more than the normal isolates. Therefore, it can be concluded that there is a correlation between pathogenic *candida albicans* and this factor.

Detection and Identification of Yeast Isolates from Inpatients of Yazd Educational Hospitals and Determination of their Antifungal Susceptibilities

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Objective: Yeast infections are the most common fungal diseases in humans. Because of the importance of these infections in patients and lack of enough information about these infections in Yazd, this study was designed to determine the frequency and the susceptibility to common antifungals of isolated yeast in clinical samples and tried to determine their related risk factors.
Methods: 284 patients referring to Yazd educational hospitals were enrolled in this study. Common yeasts were differentiated on Chromagar *Candida* medium. Final yeast discrimination was fulfilled through PCR-RFLP method. The sensitivity of the identified yeast to Fluconazole, Itraconazole, ketoconazole, Amphotericin and Nystatin was determined by disk diffusion method according to the CLSI-M44-A protocol.
Results: 305 yeasts were isolated from 284 patients (21 patients were infected with more than one species). *Candida albicans,* followed by *Candida glabrata*, were the most common species, by both Chromagar and PCR-RFLP method. Also some uncommon or rare yeast species like *Candida kefyr* or *Rhodotorula rubra* were identified. Isolated yeasts showed the most resistance to ketoconazole (10.4%) followed by fluconazole (8%). *Candida krusei i*s the highest resistance to all tested drugs. No resistance was seen to Nystatin.
Conclusion: Yeast infections are common among patients in Yazd hospitals. Although primary mycological identification is necessary, the final yeast identification method like PCR-RFLP may help to recover from this concern in clinical laboratories. The frequency of identified yeast in this study is similar to previous studies conducted in other part of the country, but identification of some uncommon or rare yeast among isolated yeast showed emerging fungal infections in the area. Unfortunately a large portion of isolated yeasts in this study have shown resistance to available standard antifungals. This is a serious alarm for our health-care setting system.

Antifungal Effect of Curcumin against *Candida albicans*

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Objective: Curcumin is anatural product of turmeric from rhizomes of Curcuma Langa .This polyphenolic compound has been used traditionally in Asia for medicinal, culinary and other purposes. Candidiasis, caused by Candida albicans, is the most common opportunistic fungal infection and a serious medical problem that causes significant morbidity and mortality particularly in AIDS patients, transplant recipients, and other immunocompromised people. The purpose of this study was to investigate the antifungal effects of Curcumin against Candida albicans.
Methods: In this systematic review, relevant studies were identified through a Pubmed and Scholar search. Clinical trials, intervention studies and reviews published between 2000 and 2014 were selected. A total of 20 studies were reviewed.
Results: Most of the studies showed the ability of Curcumin to inhibit the growth of all the tested strains of Candida albicans. Some of them suggested that Curcumin exerts antifungal activity via inducing disruption of fungal plasma membrane. Its antifungal activity might be originating from alternation of membrane-associated properties of ATPase activity, ergostrol biosynthesis and proteinase secretion. Some other results provide the evidence that Curcumin acts as an antifungal agent via generation of oxidative stress.
Conclusion: Curcumin is found to be active against tested clinical and standard strains of *Candida albicans*.

Biofilm Formation Capacity of *Candida* Species Isolated from Medical Device Connected to ICU Hospitalized Patients.

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Objective*: Candida albicans* is an important human pathogen that causes a broad range of infection such as mucosal and systemic infection, especially among immune compromised and hospitalized patients .*Candida spp.* can make biofilms on bio and synthetic materials such as medical devices and catheters; on the other hand biofilm structures contribute to antimicrobial resistance.
The aim of this study was the identification of a type of *candida* isolated from hospitalized patients with medical device in ICU ward. Also biofilm formation of species and hydrophobicity ability was evaluated.
Methods: This study was descriptive-cross sectional. Fungal species were cultured on sabouro dexterose Agar (SDA) and incubated at 37°c .Then phenotyping and genotyping method including chrome Agar media and RFLP-PCR reaction was done. Biofilm formation ability of species was assessed via MTT and XTT assay on 96 well microplate, hydrophobicity potential assumed by adherence assay.
Result: The result of this study showed that among *candida* species isolated from 57 different samples including folly , nelaton , track and catheters , *candida albicans* had the most frequency among other isolates (29.8%) followed by *C.glabrata (26.3%)*and *C.tropicalis* (10.5%) and *C.kruzei* (14%) respectively. Also , MTT Assay showed that *candida albicans* has a stronger potential For biofilm formation than other non-*albicance* (*C.glabrata , C.tropicalis*) *candida* hydrophobicity test showed that all 3 species of *candida* had great potential to adhere to epithelial cells; although, this capacity of *C.albicans*was more than *C.tropicalis*and *C.glabrata* respectively.
Conclusion: Regarding the result of study, topography of device such as catheters can be associated with adherence of *candid*a species. In patients of intensive care unit, *candida* infection must be regarded because of their ability to biofilm formation and adhesion to medical device and causing systemic infection.

The Study of ALS and ALS3 Gene Expression and Biofilm Formation in Clinical Isolates of *Candida Albicans*

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Objectives: A cluster of genes involve in pathogenesis and adhesion of *Candida albicans* to mucosa and epithelial cells in vagina. The important one among them is Agglutinin Like Sequence (ALS) genes. Vaginal Candidiasis is remarkable health problem among women especial in reproductive age and currently antifungal resistance is increasing in *Candida* species. This study investigated the expression of ALS1 and ALS3 genes by Reverse Transcriptase polymerase chain reaction (RT-PCR) in *Candida albicans* strains isolated from women with vaginal candidiasis.
Methods: 53 strains of recognized *Candida albicans* were cultured on Sabaouraud Dextros Agar containing chloramphenicol for 48 hours at 37^0 C and examined for gene expression.
Total mRNA was extracted from *C. albicans* isolates and cDNA was synthesized using the Reverse Transcirptase enzyme. RT-PCR using specific primer was used to evaluate the expression of *ALS1*, *ALS3* through housekeeping internal control (*ACT1*) genes.MTT assay was carried out to assess adherence capacity and biofilm formation in *Candida albicans* isolates.
Results: Among 53 clinical isolates identified as *C.albicans*, 50 isolate were resistant to fluconazole whereas 3 strains were flconazole sensitive.40 patients (75.3%) with vaginal candidiasis expressed *ALS1 gene* and 41 patients (79%) expressed *ALS3* gene. Moreover, 39 individuals (73.5%) with candidiasis were positive for both *ALS1* and *ALS3* mRNA by the RT-PCR. Adherence capability in isolates with ALS1 or ALS3 genes expression was greater than control group (with any gene expression). Nevertheless, it was significantly much greater in isolates that expressed both ALS1 and ALS3 genes simultaneously.
Conclusion: Our results indicate that there is a considerable association between the expression of *ALS1* and *ALS3* genes and fluconazole resistance in *C.albicans* isolated from vagina. Also imperative percent of isolates under study expressed the ALS1 and

ALS3 genes as virulence factor that can contribute in adherence to vagina mucosa and biofilm formation.

Identification of *Candida* Species Isolated from Hospitalized Patients with Urinary Catheter and Determination of Fluconazole Susceptibility Test

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Objectives: Patients in different sections of the hospital must necessarily make use of urinary catheters for surgery and, due to the use of broad-spectrum antibiotics are susceptible to nosocomial opportunistic infections including urinary tract infections caused by *Candida* species. Hence, accurate detection and isolation of these species and determining the appropriate antifungal pattern due to existing high drug resistances, is considered as one of the research requirements in the field of mycology. Therefore, in this study we tried to examine sensitivity or resistance to fluconazole in *Candida albicans* species isolated from catheters in hospitalized patients with suspected candidiasis in the treatment centers.
Methods: In the present study, 55 Samples of urinary catheters from patients hospitalized in different sections of hospital were used and cultured on Sabouraud dextrose agar containing chloramphenicol. The isolates were confirmed morphologically and for detection from specific environment Chromagar was used, and also susceptibility of separated isolates to fluconazole was examined with micro-dilution method and determination of the MIC was performed using standards CLSI method.
Results: Candiduria was confirmed in 22(40%) patients. Isolate common factors of 22 positive cultures, including *Candida albicans*, with 13 Case(54%) of the dominant species , Thence *C. glabrata* with7 Case (32%)and C. krusei with3 Case (14%) were next in category. Of the 22 isolates positive candidate 13 isolates resistant, 4 case sensitive and 5 were susceptible dose dependent to Fluconazole. In all species *Candida albicans* species 50% and non-*Candida albicans* 68% were resistant to fluconazole, respectively.
Conclusions: According to the results of this study, *Candida* species isolated urinary catheters in hospitalized patients are different and Non-albicans species is increasing. According to the results and the resistance of this non-albicans, paying special attention to *Candida* infections resulting from patient urinary catheters is very important and the use of appropriate antifungal drugs to treat this infections is essential.

Chemical Composition and Antifungal Activities of the Essential Oil from *Salvia mirzayanii* Leaves

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Objectives: Resistance of many fungal pathogens to available drugs are global challenges having led to the growing interest in natural alternative products. *Salvia mirzayanii(S.mirzayanii*) is an Iranian endemic plant with various applications in folk medicine. The aim of this study was to investigate the chemical composition and in vitro antifungal activity of the essential oil from *S. mirzayanii.*
Methods: The chemical constituents of EO from *S. mirzayanii* were identified by gas chromatography/mass spectrometry (GC/MS). The antifungal activity of the EO against 15 standard and 24 clinical isolates yeasts strains were investigated by broth microdilution method according to the CLSI protocols.
Results: The main identified compounds were 1,8-Cineole (41.2%) followed by linalool acetate (11.0%), *α*-terpinyl acetate (6.0%) and myrcene (5.0%). The EO inhibited the growth of the examined yeasts at concentration ranging 0.06 to 2µL/mL.Moreover, the EO inhibited the growth of Azole-resistant *Candida* species at concentration ranging from0.12 to 1µL/mL.
Conclusion: Our results indicated that *S.mirzayanii* essential oil could be a potential natural antifungal agent for the treatment of fungal infections particularly against azole resistance cases.

Evaluation of Antibiotic Use and Isolated Fungus in Patients with Diabetes

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Objectives: Diabetes is one of the few diseases that should be studied from the two points of view, first, because of complications and failure is that the disease itself, such as hyperglycemia, weight loss, weakness, acidosis and the vascular complications that results in if cardiac arrest, brain, eye and kidney failure, coma and death appear. Secondly, the disease since the conditions and fertile ground for other infectious diseases, especially fungal diseases provides a crucial opportunity is.
Methods: During the period of 9 months, three quarters, 65 patients with diabetic foot ulcers that their wounds did not receive any anti-fungal therapy or surgery, sampling done from referred to Infectious diseases ward of Imam Khomeini Hospital of Tehran and then fungal infection were examined. The samples were collected on the plate. Then check patient records, according to the name - antibiotic use was investigated and quickly moved mycology laboratory.
Results: The relationship between the presence of the fungus in tissue and antibiotics that those who did not use antibiotics on healthy and caught tissue with fungus of all sorts, were studied. After antibiotic use was observed that the fungus for significant in the healthy and caught tissue was defunct and much less observed.
Conclusion: Types of vancomycin and clindamycin antibiotics have the lowest impact on the variety of fungus and *Aspergillus* fungi have most resistant, this means that this type of fungus after the use of antibiotics in healthy and caught tissue again most present from the other fungi.

Biosynthesis and Characterization of Silver Nanoparticles by *Aspergillus* species.

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Objectives: Currently, researchers have turned to natural processes such as using biological micro-organisms in order to develop reliable and eco-friendly methods for the synthesis of silver nanoparticles. In this study, we investigated extracellular biosynthesis of silver nanoparticles using four *Aspergillus* species, including *A.fumigatus, A.clavatus, A.niger and A. flavus* and the probable role of nitrate reductase in the biosynthesis of these nanoparticles.
Methods: The studied fungi were categorized into three different groups (high, intermediate and low) based on their nitrate reductase enzyme activity using nitrate reduction test kit (Fluka 73426, Sigma-Aldrich). For synthesis of silver nanoparticles, $AgNO_3$1mM was added to the cell filtrate of each of the fungi in an Erlenmeyer flask and agitated at 25°C in dark. The formation of silver nanoparticles in the cell filtrates was confirmed by the passage of laser light, change in the color of cell filtrates, absorption peak at 430 nm in UV-Vis spectra and Atomic Force Microscopy (AFM).
Results: After48 hs of incubation, the appearance of brown color indicated the formation of sliver nanoparticles in the medium. Based on the results of nitrate reduction test, nitrate reductase activity was high in *A.fumigatus*, intermediate in *A.clavatus* and *A.niger* and low in *A. flavus*. *A. fumigatus*was the most efficient species in the production of silver nanoparticles which produced greater amount of silver nanoparticles with smaller size and higher monodispersity while *A. flavus* exhibited the lowest capacity in the biosynthesis of silver nanoparticles.

Conclusion: Our findings showed a reasonable relationship between nitrate reductase activity and the efficiency of fungi in the biosynthesis of silver nanoparticles.*A. fumigatus* as the most efficient species had the highest nitrate reductase activity whereas *A. flavus* exhibited the lowest capacity in the production of silver nanoparticles which was in agreement with its low nitrate reductase activity.

Evaluation of the Adhesion of *Candida* Species to Acrylic Disc and Acrylic Disc Containing Various Concentration of Silver Nanoparticle

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Objectives: In patients using dental prosthesis, after not such a long time, we will see growth of various microorganisms under the prosthesis base, leading to inflammation and infections such as candidiasis. Since there has not been much focus on antimicrobial characteristics of acrylic resins so far, it is noteworthy to prevent microorganisms growth and infections. The purpose of this study was to determine the adhesion of candida species to acrylic disc and acrylic disc containing various concentration of silver nanoparticle.
Methods: This analytical - laboratory study was performed on 200 people in two steps. The first step involved sampling, direct microscopy, culture and complementary tests for the detection and isolation of the species. Second, the adhesion of *candida* species to acrylic discs containing various concentrations of silver nanoparticle were measured in comparison with the comtrols. At the end, data were analyzed by using chi-square and Kruskal-Wallis test.
Results: In this study, 56 positive cases were recognized. *Candida albicans* was the most specified species in individuals. There was a significant difference in the adhesion of the *candida* species ($p<0.001$). *C. tropicalis*, and *C. glabrata* had the most adherence and *C. albicans* had the least adherence to the acrylic disc.
Conclusion: In acrylic discs, increasing exposure time and silver nanoparticles concentration lead to more antifungal effect.

A Case of Isolated Laryngeal Carcinoma Candidiasis

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Objectives: Fungal infections most commonly occur in the immunocompromised patient, including AIDS, cancer, leukemia, patients on long-term corticosteroid or broad-spectrum anti-microbial therapy, patients with chronic systemic diseases, includeng diabetes mellitus and severe pulmonary disease, who have undergone successful organ transplantation. Candida overgrowth can lead to infections of the larynx. Here, we reported a 57-year-old, immunocompetent male patient with laryngeal carcinoma and tracheotomy, presented to the Department of Respiratory of Emam Khomeiny Hospital in Ahvaz, South Iran with granulation tissue formation subepithelial fibrosis with reactive inflammatory changes of the lining epithelium, without signs of dysplastic changes or malignancy.
Methods: The specimen was creamy brown tissue. The sampled material was divided into two portions: one for direct microscopy and the remainder for culture. The specimen was mounted in a solution of (20% KOH) and cultured into CHROMagar *Cadida* media and Sabouraud glucose agar and incubated at35°C for 24-48 hours. Histopathological examination of mucosal biopsy from larynx revealed an acute inflammatory exudate covered by necrotic tissue containing multiple yeast-like organisms with slender pseudohyphae suggestive of mucosal laryngeal candidiasis. In the culture on CHROMagar*Cadida* media, the colonies of the isolated yeasts yielded a pimk color and were identified as *Candida glabrat*. The patient was treated with Systemic therapy with fluconazole at 100 to 400 mg/day.
Conclusion: Candida is a yeast that is present in the oral cavity, ears, and other body surfaces. When the host's immune mechanisms and the protective mucosal barrier are impaired, Candida overgrowth can lead to infections of the larynx. Candidiasis and other fungal infections are relatively common in immunocompromised patients, but they have also been described in healthy individuals. Therefore, early recognition and treatment of this disease are important to prevent the spread of infection and systemic involvement.

Identification of *Candida spp*. Isolated from Candidemia in Tehran Hospitals

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Objectives: Candidemia is one of the most important fungal infections caused by species of the genus *Candida*. *Candida* infections and attributable deaths have increased during the past two decades. Due to the epidemiological issues as well as the ability of these yeasts to develop resistance against antifungal drugs, it is necessary to accurately identify the yeasts at the species level in the shortest time. Thus, an appropriate therapy could be initiated.
Methods: Over a period of 13 months, 204 positive blood cultures from 125 patients with candidemia who were admitted to some of the hospitals in Tehran were studied. The yeast isolation and species identification were done using phenotypic methods (production of germ tube in human serum, culture on CHROM agar *Candida* and corn meal agar containing Tween 80) and a molecular method such as PCR-RFLP. Eventually, these methods were compared in terms of accuracy, sensitivity, and speed of identification.
Result: Our results could be summarized as follows: 128 isolates of *Candida albicans* (62.4%), 36 isolates of *C. parapsilosis* (17.6 %), 18 isolates of *C. glabrata* (8.8%), 13 isolates of *C. tropicalis* (3.6%) and 4 isolates of *C. krusei* (0.2%) were identified and only 6 isolates remained unknown. Therefore, the most isolated *candida* species belonged to *Candida albicans.*
Conclusion: 65.2% of the yeasts were identified by phenotypic methods. However, PCR-RFLP identified 96.6% of isolates, precisely. Therefore, PCR-RFLP outperforms phenotypic methods by 48.2% in term of species identification. The most common species causing candidemia in this study were *C. albicans*, *C. Parapsilosis*, and *C. glabrata*, respectively. Premature infants, the elderly, and people with cancer are at the risk for candidemia more than other groups.

In Vitro Antifungal Activities of *Euphorbia macroclada* and Fluconazole Against Pathogenic *Candida* Species

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Objectives: *Candida* species constitute an important group of opportunistic fungi, which cause various clinical diseases. Considering the resistance of some *Candida* species to conventional antifungal agents, treatment of such cases may be challenging and complicated. The purpose of this study was to evaluate and compare the antifungal activities of *Euphorbia macroclada* latex and fluconazole against different *Candida* species.
Methods:Atotalof150*Candida*isolatesincluding*C.albicans*(n=77), *C. glabrata* (n=28), *C. parapsilosis* (n=23), *C. tropicalis* (n=15), *C. krusei* (n=4), *C. famata* (n=1), *C. kefyr* (n=1) and *C. inconspicua* (n=1) were included in this study. In vitro antifungal activities of *Euphorbia macroclada* latex and fluconazole against these

Candida species were evaluated, according to M27-A2 protocol on broth macrodilution method by the Clinical and Laboratory Standards Institute (CLSI).
Results: Among 150 Candida isolates, 98 isolates (65.33%) (i.e. *C. albicans* (n=41), *C. glabrata* (n=23), *C. tropicalis* (n=12) and *C. parapsilosis* (n=22) with minimal inhibitory concentration (MIC) ≤8 µg/ml) were susceptible to fluconazole. Resistance to fluconazole was noted in 15 isolates: *C. albicans* (n=10), *C. glabrata* (n=2), *C. krusei* (n=1), *C. kefyr* (n=1), and *C. inconspicua* (n=1), with MICs of 64 µg/ml. The remaining isolates (n=37) including *C. albicans* (n=26), *C. glabrata* (n=3), *C. tropicalis* (n=3), *C. parapsilosis* (n=1), *C. krusei* (n=3) and *C. famata* (n=1) with MIC=16-32 µg/ml showed dose-dependent susceptibility. The latex of *Euphorbia macroclada* was able to inhibit the growth of 30 out of 150 tested *Candida* isolates with MIC range of 128-512 µg/ml. These isolates were as follows: *C. albicans* (n=2), *C. glabrata* (n=4), *C. parapsilosis* (n=19), *C. krusei* (n=2) and *C. tropicalis* (n=3). Compared to other isolates, higher MIC values were noted for *C. albicans* and *C. glabrata* (512 µg/ml), respectively.
Conclusion: The latex of *Euphorbia macroclada* showed notable antifungal activities against some pathogenic *Candida* species. Therefore, it can be potentially used as an alternative antifungal agent in future. However, further research is required to identify its active components.

In Vitro Antifungal Efficacy of Nano-Silver Particles against *Aspergillus flavus* and *Aspergillus fumigatus*

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Objective: Aspergillosis is the fungal infection with a broad range of diseases caused by a fungal mould called Aspergillus. Aspergillus species have worldwide repartition. Due to the increase of fungal infection in immunocompromised patients, limited number of current antifungal agents and accurance of antifungal drug resistance, attempts to find suitable and alternative treatment strategies with less disadvantage is necessary. In recent years, use of silver nanoparticles (AgNPs), as novel agents in treatment of diseases has become an interesting subject. The aim of this study was to determine antifungal effects of Nano-silver particles against toxigenic fungus, *Aspergillus flavus* and pathogenic fungus, *Aspergillus fumigatus* .
Methods: In the present study, we assayed the inhibitory effect of AgNPs against of *A. flavus* PTCC 5006 and *A. fumigatus* PTCC 5009 with Broth Microdilution Antimicrobial Susceptibility Testing.
Results: *A. fumigatus* showed more sensitivity to antifungal effect of Nano - silvers than *A. flavus,* but inhibitory effect of NPs on two tested fungi was lower compared with ketoconazole.
The average MIC of Ag-NPs on *A. fumigatus* and *A. flavus* were 140, 160 µg/ml, respectively, whereas MIC ketoconazole was 30 µg/ml and 32 µg/ml for A. *fumigatus* and *A. flavus*.
Conclusion: Use of NPs as novel drugs is suggested in inhibition of pathogenic fungi (*A. flavus* and A. *fumigatus*) growth because of proven antifungal and antimicrobial properties.

Induction of Experimental *Pneumocystis carinii* Pneumonia in Immunodeficient Mice and Rats

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Objective: *Pneumocystis carinii* is an opportunistic pathogen that causes severe pulmonary disease in humans, dogs, rats, mice and other vertebrate species with acquired, induced, or inherited immune deficiency syndromes. The aim of this study was to induce of the experimental *P. carinii* pneumonia in immunodeficient mice and rats.
Methods: In this study, Depo-Medrol and dexamethasone were administered for induction of pneumocystosis in mice and rats models. the animals were randomly divided into treatment and control groups .The treatment group received subcutaneous injections of methylprednisolone (16 mg/kg once a week), and the other group received dexamethasone (1 mg/liter) in its drinking water . After 9 to 12 weeks of immunosuppression, when the infection reached moderate intensity, the animals were sacrificed to confirm the presence of *P. carinii* pneumonia. In next stage, presence of *P. carinii* was demonstrated by histopathology and Nested polymerase chain reaction (Nested PCR) in the lungs of mice and rats models.
Results: With Gomori methenamine silver stain, *P .carinii* in the lungs of mice and rats models was demonstrated by the appearance of brown to black cysts in the alveolar exudate. With the PAS stain was see the foamy pink exudate stains .The presence of the faint dots in the exudate correspond to nuclei of the trophic forms. With Toluidine Blue O stain, cyst wall of *P. carinii* were seen as round-, cup- or typically “deflated-ball”-shaped. All samples were confirmed by Nested PCR.
Conclusion: In the present study, we used Depo-Medrol and dexamethasone to induce PCP in mice and rats models. Nested PCR and toluidine blue O staining were more sensitive than other tested staining in detecting *P. carinii* in mice and rats models. Therefore, the use of both of them is suggested as the diagnostic method of choice for PCP.

Evaluation of Antifungal Effect of Methanolic Extract of *Salvia rhytidea* against *C. albicans* Isolates

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Objectives: *Candida* spp cause life-threatening infections in immunocompromised patients, leading to an increase in mortality rate. Human fungal pathogen, *C. albicans* is an opportunistic organism capable of causing mucosal and systemic infections. Due to limits on the use of an antifungal drug and emergence of azole resistance isolates and increased incidence of treatment failures, finding novel agent with antifungal properties is necessary. The aim of the present study was to assess the anti-fungal activity of methanolic extract of *salvia rhytidea* against *C. albicans.*
Methods: In this study, antifungal effect of methanolic extract of *salvia rhytidea* against 41 *C. albicans* isolates obtained from patients with different forms of candidiasis were evaluated using Clinical and Laboratory Standard Institute (CLSI) guidelines.
Results: The antifungal activity of *salvia rhytidea* against *C. albicans* exhibited MIC of 6.25 and 12.50 µg/mL for four *C. albicans* isolates. Five isolates showed MIC 25 µg/mL, 18 of them exhibited 50 µg/mL for MIC. Also the MIC of *salvia rhytidea* on 7 and 2 *C. albicans* isolates were 100 and >100 µg/ml, respectively.
Conclusion: Our Results showed that methanolic extract of *salvia rhytidea* was effective against *C. albicans* but various concentrations of it showed varying degree of antifungal activity.

Evaluation of Anti Dermatophyte Activities of Silver Nanoparticles

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Objectives: Dermatophytosis is a common cutaneous infections in humans and animals that is caused by keratinophylic fungus called dermatophytes. In recent years, drug-resistance to current antifungal for dermatophytes have been increasingly reported. The aim of this study was to investigate the antifungal effect of AgNPs on *Microsporum canis, Trichophyton mentagrophytes* and *Microsporum gypseum.*
Methods: An antifungal susceptibility test to Nano-silver particles was performed in comparison with Griseofulvi (GR) on three strains of dermatophytes; *Microsporum canis, Trichophyton mentagrophytes* and *Microsporum gypseum* by the broth microdilution method.
Results: Our finding suggested that *M. gypseum has* more sensitivity to antifungal effect of Nano - silvers than other tested fungi. The average MIC of Ag-NPs on *M. canis, T. mentagrophytes* and *M. gypseum* were 200, 180 and170 µg/ml, respectively, whereas this value was 60 µg/ml for Griseofulvin.
Conclusion: Our results proved that the Ag-NPs inhibit the growth of cutaneous fungal such as dermatophytes and confirmed the

efficiency of Ag-NPs as an anti-dermatophyte agent.

Identification of *Candida dubliniensis* Isolates among *Candida albicans* Isolated from Patients with Vaginitis and Evaluation of Proteinase and Coagolase Activities in These Isolates.

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Objectives: Vulvovaginal candidiasis (VVC) or vaginal candidiasis is a common fungal infection of the genitals causing inflammation, irritation, itching, and vaginal discharge. Common yeast infections are caused by *C. albicans*. However, there are other species of *Candida*, known as causative agents for this infection. Proteinase and coagulase enzymes in *C. albicans* are known as the virulent factors. The aims of this study were the identification of *C. dubliniensis* among the *C. albicans* isolates from patients with vaginal candidiasis and the evaluation of proteinase and coagolase activities in these isolates.
Methods: 100 *C. albicans* isolates were obtained from patients with candidal vaginitis referred to Shiraz Medical clinics. All isolates were previously phenotypically identified by CHROM agar, germ tube and chlamydospore formation. Then, these isolates were identified by using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) method. Moreover, the proteinase and coagulase enzymes activities were investigated.
Results: Using PCR-RFLP, 100 (100%) isolates of *C. albicans* were identified. 84% of isolates showed the proteinase activity whereas the coagolase activity was detected in 5% of the isolates.
Conclusion: PCR-RFLP is a simple yet precise method that may be used for the differentiation of *C. dubliniensis* and *C. albicans* isolates in clinical samples. As compare to proteinase, coagolase has a less significant role in fungal pathogenesis of *C. albicans* that were studied here.

Diagnosis of *Aspergillus* in Bronchoalveolar Lavage of Patients at Risk for Invasive Aspergillosis with Galactomannan Enzyme Assay

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Objective: Aspergillosis is induced by *Aspergillus* species, especially *A. fumigatus* that has emerged as an important etiologic agent of this mentioned infection. In the present study, an evaluation was conducted for assessment of the Enzyme immunoassay [EIA] method for finding of *Aspergillus* galactomannan antigen in Broncho alveolar lavage [BAL]. Due to the lack of reliable information on the evaluation of galactomannan levels in patients with suspected invasive aspergillosis, this work is the first study of its kind in Tehran based on the information available in the international databases.
Methods: In this cross-sectional study, 89 broncho alveolar lavage [BAL] were obtained from patients, in Shariati hospital between June 2013 and march 2014, with lung infiltration and suspected to pulmonary infection. The specimens were examined by direct miscorcopy and culture methods. The level of Galactomannan EIA in the BAL samples were tested in the laboratory of mycology in Tarbiat Modares University. The data were analyzed using XLSTAT software by plotting ROC Curve.
Results: 27 samples were positive by EIA, and18 samples by culture methods. The sensitivity, specificity, negative predictive value (NPV) and positive predictive value (PPV) for a BAL GM level of ≥1.0 were 94.4%, 85.9%, 98.4% and 62.9%, respectively.
Conclusions: The results of the present study, along with other studies, showed that the galactomannan test has high sensitivity and specificity for the diagnosis of invasive aspergillosis as well as high negative predictive value (NPV) to reject invasive aspergillosis.

Antifungal Effect of *Berberis vulgaris* (Barberry) Fruit on *Candida albicans*

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Objective: The Anitifungal activity of of *Berberis vulgaris* (Barberry) fruit on *Candida albicans* were determined.
Methods: An antifungal effect of *Berberis vulgaris* on *C. albicans* PTCC-5027 by the broth microdilution was performed and the minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) of *Berberis vulgaris* extracts were measured by the Clinical and Laboratory Standards Institute (CLSI). The test was performed in triplicate.
Results: The MIC and MFC of *Berberis vulgaris* were 150 mg/ml and 600 mg/ml, respectively.
Conclusion: The results showed that *Berberis vulgaris* extract has antifungal effect on *c. albicans*. Therefore, *Berberis vulgaris* can be used as a therapeutic for the treatment of candidiasis infections and could replace chemical drugs.

Evaluation of Biosurfactant Production from *Rhodotorula* Isolates

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Objectives: Biosurfactants are amphiphilic surface-active compounds that, classified into two important types; chemically and naturally produced biosurfactants. Several microorganisms such as bacteria and fungi are able to produce biosurfactants. Biodegradability, low toxicity, diversity of applications and functionality under different conditions are the characteristics of naturally produced biosurfactants. The main aim of the present study was to determine biosurfactant production by different isolates of *Rhodotorula* species.
Methods: In the present study 54 isolates of *Rhodotorula* including *R. glutinis* (48), *R. minuta* (2), *R. mucilaginosa* (2) and *Rhodotorula* species (2) were examined for biosurfactant production. All strains were inoculated in 5ml of Sabouraud dextrose broth and incubated at ambient temperature for 4 days. Cultures were centrifuged and supernatant evaluated to measure biosurfactant activity using diesel oil test and drop collapse assay microplate.
Results: In the present study, although all tested strains were capable to produce biosurfactant *in vitro*, the degree of biosurfactant was different among stains. 7.41% strains had the highest (5+) biosurfactant activity followed by 16.67%, 29.63%, 25.93% and 20.37% had 4+, 3+, 2+ and 1+, respectively.
Conclusion: It is concluded that *Rhodotorula* species are composed biosurfactant and the culture of *R. glutinis* have the highest biosurfactant activity.

Identification and Levels of Air-borne Fungi Present in Indoor Dust in Boushehr City, Iran

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Objective: Inhalation of fungal particles has been associated with the occurrence of adverse effects on respiratory system (i.e. it can induce allergic problems). Understanding the prevalence of indoor fungi levels is substantial in adopting preventative measures. So, our objective was to determine the prevalence of fungi within homes in Boushehr, Iran.
Methods: Indoor dust and air samples were collected using sterile wet swab and Andersen Volumetricair sampler, respectively, from 75 houses during six months. Samples were cultured on sabouraud dextrose agar Petri dishes and the fungi growth was observed for six days. Subsequently, total and genera-specific fungi were identified and counted.
Results: A total number of 29869 colony-forming units per cubic meter (CFU/m^3) and 26691(CFU/100 cm^2) of fungi were isolated from indoor air and dust samples, respectively. The most prevalent air-borne fungi (among the 12 identified genera) were yeast (50.4%) and *Aspergillus sp.*(34.1%). Other air-borne genera (15.5%) were *Alternaria*, *Penicillium*, *Cladosporium*, *Rhizopus,* etc. Yeast (85%) and *Aspergillus sp.*(12.8%) were the most frequent fungi among the 13 identified dust-borne genera with *Rhizopus*, *Alternaria*, *Cladosporium*, *Mucor* etc. constituting only 2.2% of the total.
Conclusions: *Aspergillus* genus was found to be the most abundant in both indoor air and dust samples in Boushehr Town. As this genus is a known potential allergen, it can be proposed that *Aspergillus* sp. might play an important role in respiratory allergic disorders in Boushehr. However, this matter should be addressed in more details by evaluating the relationship between allergic respiratory disorders and fungal levels in future studies.

Aspergillus Colonization in Patients with Chronic Obstructive Pulmonary Disease (COPD)

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Objectives: Chronic obstructive pulmonary disease (COPD) has been recognized as an emerging risk factor for invasive aspergillosis (IA). Airway colonization by *Aspergillus* spp. is a common feature in chronic lung diseases. Nowadays, prevalence of COPD has increased in critically ill patients. The aim of the present study was to isolate and identify *Aspergillus* spp colonization from the respiratory tract in COPD patient.
Methods: The study was done by a total of 50 COPD patients older than 18 years of age who were admitted to 3 medical ICUs in certain Sari/ Iran hospitals for at last 6 days. In all patients, samples obtained from sputum, bronchoalveolar lavage (BAL) and tracheal aspirates were cultured for fungi each week. Initially, *Aspergillus* isolates were identified with growth and standard morphological characteristic following conventional techniques. To confirm the identity of grown *Aspergillus*, the b-tubulin gene was sequenced using specific primers.
Result: From 2012 to 2014, 50 patients who had met our inclusion criteria were enrolled**.** Twenty seven cases (54%) were male and twenty three cases (35.5%) were female**.** most patients developed dyspenea following by hemoptysis, chest pain and high fever. Corticosteroids and Broad-spectrum antibacterial agents were administered to 75% and 80% of the patients, respectively. *Aspergillus* section *Fumigati* was the species most frequently recovered by culture (43.7%), followed by *Aspergillus* section *Flavi* (37.5%), *Aspergillus* section *nigi* (12.5%) and *Aspergillus* section *terrei* (6.2%).
Conclusion: One of the major risk factors in COPD patient for *Aspergillus* spp. colonization/ infection is treatment with corticosteroids. Therefore, in ICU patients with these underlying factors, treatment with antifungal agent should be considered in the presence of symptom of infection and positive cultures for *Aspergillus* spp. from respiratory samples. In contrast, Patients with no sign or symptom of infection and in the absence of risk factors while *Aspergillus* spp. are obtained from respiratory secretions of critically ill patients as being colonization and should not be started antifungal therapy.

Effect of Fluconazole Resistance on Expression of CDR1 Gene in *Candida glabrata*

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Objectives: Nowadays opportunistic fungi especially *C. glabrata* are the most common cause of life-threating infections in some patients. Although Fluconazole is the most effective drug to *C. glabrata*, resistance to this drug also develops most common. overexpression of ATP-binding cassette (ABC) transporter family membrane proteins; Cg CDR1, Cg CDR2 , Cg SNQ2 , Cg ERG11 are responsible for fluconazole resistance in a large proportion of candidiasis cases. However, the frequency of these mutations varies in populations. The aim of this study was the evaluation of CDR1 gene expression levels and fluconazole resistance mechanism in *C. glabrata* strains by REAL-TIME PCR method.
Methods: The study was descriptive and analytical. Candida species isolates from patients of Shariati Hospital and Behdasht university laboratory were identified by RFLP PCR method. After separation of 53 strains of *Candida glabrata* among the other species, at first susceptibility of *candida glabrata* isolates was assessed by MIC technique. Then, expression rate of fluconazole resistance gene CDR1 in resistance strain and susceptible strain using REAL-TIME PCR were determined by REST software.
Results: The results of drug sensitivity of 53 *C. glabrata* isolates from patients of Shariati hospital and Behdasht university laboratory revealed that 32% were susceptible, 64% were susceptible-dose dependent (SDD) and 3.7% were resistant. Resistance strain of *C.glabrata* (MIC=64 µg/ml) showed overexpression of CDR1 in REAL-TIME PCR test.
Conclusion: The use of antifungal susceptibility testing and REAL-TIME PCR showed overexpression of CDR1 in REAL-TIME PCR test and we can design new antifungal drugs for this gene for rapid and appropriate therapy of resistance cases.

Comparative Study between Fluconazole and Terbinafine in the Treatment of Tinea Corporis and Cruris

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Objectives: Dermatophytes can cause different manifestations in humans. One of these major manifestations is Tinea corporis and cruris involving the skin of trunk and groin and genital area. This study aimed to compare the efficacy of terbinafine and fluconazole for the treatment of Tinea corporis and cruris in terms of mycological aspect.
Method: In this clinical trial study, 30 subjects among patients with tinea corporis and cruris were selected .Patients were randomly divided into two groups. The first group was treated by fluconazole 150 mg weekly for four weeks, and the second group was administrated terbinafine 250 mg daily for two weeks. The follow-up time of patients was at the end of the treatment and the following month.
Results: At the end of treatment, 64.3% of the patients in the first group (administrated by fluconazole) developed clinical and laboratory responses while the second group demonstrated 75% clinical cure and had 81.3% proved negative by laboratory tests. One month later, 64.3% and 87/5%in the first and second group were treated, respectively. No side effects were reported in patients.
Conclusion: Tinea capitis/cruris has become an increasing public health concern in the last decade in Iran, but , to the best of our knowledge, no randomized double -blinded controlled studies using these drugs have been published. Although there was no significant difference between the two groups of patients in clinical and laboratory results, fluconazole seems more effective due to its lower price and easier administration.

Prevalence of Candida in Saliva and Skin lesions of *Psoriasis vulgaris* Patients

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Objectives: Psoriasis is a chronic inflammatory skin disease with a high prevalence of approximately 2%. In the present study, the presence of *Candida albicans* and other species of *Candida* were evaluated in the saliva and skin of 50 psoriatic patients and were compared to a control group of 50 healthy people. Moreover, the correlation between the severity of the psoriasis and the amount of *Candida* in the saliva and skin was tested by PASI.
Methods: To evaluate the presence of *Candida albicans* and other species of *Candida,* the saliva and skin samples were taken from 50 psoriatic patients and, 50 healthy individuals.Demographic information was collected about age, sex, psoriasis duration, involved areas and severity of involvement, family history, possible past diseases, and drug history. The samples were cultured in appropriate media and the grown colonies were counted and documented.
Result: There was *Candida albicans*in 34% of the saliva of patients' samples but in only 2% of control group which was statistically significant ($p<0.05$). Smear and culture of *Candida* in the saliva of patients was 46% and in the control group was 18% which was statistically significant ($p<0.05$). In quantitative evaluation, among 46% of psoriatic patients and control group with *candida*, 28% and 2% were severe, respectively. Severity of *candida* between case and control groups was statistically significant ($p<0.05$). Oral Candidiasis could be observed more commonly in psoriatic patients as compared to normal ones.
Conclusion: It could be concluded that *candida* colonization can be observed more commonly in psoriatic patients as compared to normal ones. We recommend that all psoriatic patients, especially those who have severe disease, be examined for *Candida* spp, and that they should be treated with antifungal drugs.

Molecular Diagnosis of Mycotic Keratitis in Paraffin-embedded Tissue by Semi-Nested PCR

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Objectives*:* Mycotic keratitis (Fungal keratitis) is an important ocular infection, causing blindness and visual impairment. Patients with keratitis usually report a sudden onset of pain, photophobia, discharge and reduced vision with an inflamed eye, and an opacity on the surface of the cornea suggestive of an ulcer. However, the diagnostic validity of these clinical features has been challenged in recent years, and the utility of clinical diagnosis alone can be unreliable.
The common approach to patients with suspected infectious keratitis is to begin with a Gram stain of the corneal scraping material. Studies have shown the sensitivity of Gram staining to be in the range of 36–50%. In addition, KOH is a rapid and inexpensive way to detect fungi. It has a sensitivity of 61–94% and specificity of 91–97% for detecting FK in different studies. Recently, polymerase chain reaction (PCR) has also emerged as a rapid sensitive and specific test for the diagnosis of fungal keratitis. This study was an attempt to evaluate the diagnostic power of PCR method in the diagnosis of mycotic keratitis in paraffin-embedded tissue samples.
Methods: In this study, 69 paraffin-embedded cornea scraping tissues were subjected to DNA extraction. The amplification of a β-globin gene by PCR method-based was used to confirm the quality of extracted DNA. Semi-NestedPCR using ITS primers was performed for the detection of Fungal DNA.
Results: PCR results on 69 biopsy samples suspected of keratitis, that were confirmed to have fungi through histopathological methods, showed that out of 49 pathologically positive samples, 47 were positive and 2 were negative, and that out of 20 negative samples, all were negative.
Conclusion*:* Direct identification of fungal DNA in paraffin-embedded tissues by semi-nested PCR method is a rapid, and reliable approche to definite diagnosis of fungal keratitis. Moreover, by sequencing PCR products, the etiologic agents can be determined with no need to culture the specimens.

An Investigation on Producing Horse Serum with Lyophilization Method for Germ Tube Test of *Candida albicans*

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Objectives: *Candida Albicans* fungi is an important factor for chronic and acute infections of human and germ tube is used for its laboratory recognition. Human serum is used to do this experiment nowadays, but regarding to its potential risks and also sometimes false results, it's better to use animal serums like horse instead. So in this research producing lyophilized serum of horse is considered.
Methods: Producing lyophilized serum of horse: 0.5 ml of fresh serum of horse was added to every ampoule and vial and after maintaining 24 hours in -20 C transferred to lyophilization machine to be dried in 8 hours. After that, the Lids of ampoules were barred in vacuum situation with gas flame and the lids of the vials were barred with aluminum covers and then exanimated.
Creating germ tube: 0.5 ml of sterile distilled water was added to ampoules and vials which contain lyophilized serum of horse and after dissolving, placed beside some colonies of *Candida Albicans* (ATCC 1031). After that, it was kept in 37 C incubator for 2.5 hours and finally existence of germ tube was exanimated by placing one drop of suspension between slide and cover slide.
Results: Germ tubes were observed in ampoules and vials containing lyophilized serum of horse after 5 months of creation. Usage and preparation of vials containing serum of horse is much easier than ampoules.
Conclusion: Regarding the problems preparing and transferring of fresh serum of horse and also this fact that human serums are high risk, using horse serum is a good alternative. Also its resistance for 5 months is validated but maximum possible duration of maintenance needs to be investigated.

Preparation of Certificate and Study the Different Maintenance Methods for Fungi Razi Type Culture Collection

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Objectives: Since the gradually fungi lose their viability after growth in laboratory media and after second cultures, some of their genotype and phenotype characteristics begin to change in order to preserve these properties in appropriate situation, some method such as lyophilization, steril water, steril soil, steril oil, freezing and etc are used.
The Razi collection (RTCC) has commenced to collect and maintain plenty of bacteria and fungi strain in recent years and prepare required microorganism to research and education centers as a valid reference.
Methods: The purpose of this research was preservation and maintenance of existing fungi in Razi collection using five methods: lyophilization, steril water, steril soil, steril oil, cryopreservation. So 45 strains of fungi by differents methods have been maintaned for three years and their ability to grow in suitable media was assessed.
Results: The results showed that maintenance of fungi with lyophilization is desired and ideal, but with regard to the lack of the growth of some strains and in order to achieve long term retention of fungi, it is suggested that maintenance of fungi be conducted using two or three different methods simultaneously in order to increase the probability of preserving strains in collection.
Conclusion: Every methods has its own pros and cons. However, it can't be said that maintenance of fungi is restricted to only these methods, but regarding to conditions and facilities, it could be obtional.

Immunological Approaches to Detection of Candidiasis Isolated from Patients with Vulvovaginitis in Tehran, Iran.

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Objectives: Vulvovaginal candidiasis (VVC) is one of the most common problems of female in the childbearing age and its prevalence has recently increased . It has been estimated that almost two-thirds of adult women experience at least one episode during their lifetime and approximately 50% of them have multiple episodes. VVC is considered as recurrent (Recurrent vulvovaginal candidiasis; RVVC) when at least three episodes occur within one year.
The aim of this research was comparing the result of indirect Immunofluorescence and ELISA with culture and direct microscopy examination in patient with vulvovaginal candidiasis.
Methods: 87 suspicious clinical samples were collected from patients with vaginitis symptoms that referred to several hospitals in Tehran, Iran. Direct examination was performed with 15% KOH. Then, all samples were cultured on Sabouraoud's dextrose agar containing chloramphenicol and incubated at 32ºC for 48-72h. Serological tests such as indirect immunofluorescence and ELISA were performed on sera of patients. To compare the quantitative and qualitative data in order t-student tests, chi-square and exact fisher test were used, if necessary.
Results: Out of 87 specimens, 50 cases were diagnosed as vulvovaginal candidiasis. In order of frequency the isolated pathogens were: *C. albicans*, *C. glabrata*, *C. kefyr, C. inconspicua* and *C.famata*. Also in order of frequency, control group were: *C. albicans*, *C. glabrata* and*C.kefyr*. In this study, all normal cases were negative in indirect immunofluorescence test and in patients group, 42 persons (84%) were positive and 8 persons (16%) were negative. Control group were negative in ELISA and in patients group 40 persons (80%) were positive and 10 persons (20%) were negative.
Conclusion: According to our results, it seems in cases where direct microscopic and culturing methods are not possible to perform, ELISA and indirect immunofluorescence can be used as an alternative method.

In vitro Antifungal Properties of *Pistacia atlantica* and Olive Extracts on Fungi

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Objectives: *Pistacia atlantica* grow in the Zagrossian region and are categorized into the *Anacardiaceae* family.
Methods: In this survey, we assayed the leaf and fruit extracts of *Pistacia atlantica* and leaves extracts of olive against *Candida spp*, including *Candida albicans*, *Candida glabrata*, *Candida tropicalis* and *Candida kurusie* also three species of filamentous fungi such as *Aspergillus niger*, *Aspergillus flavus*, and *Asergillus fumigatus* by agar-well diffusion technique.
Results: The minimal inhibitory concentration (MICs) values of fruit and leaf extracts of *Pistacia atlantica* were ranged 6.25-25 mg ml-1 and 6.25-12.5 mg ml-1 against tested *Candida spp*. and *Aspergillus spp*., respectively. The leaves extracts of Olive were inactive against *Candida spp*. and *Aspergillus flavus* and were active on *Aspergillus niger* and *Asergillus fumigatus* with MIC 12.5-25 mg ml-1. MICs of the mixed extracts of three selected plants ranged 6.25-25 mg ml-1.
Conclusion: Results revealed that the ethanolic extracts of selected plants have antifungal potency against tested fungi and can be used as natural antifungal agents.

Prediction of Drug – Drug Interaction (DDI) between Various Antifungal Azoles and Sildenafil Using a Physiologically Based Pharmacokinetic (PBPK) Modelling Approach: Comparing the Relative Inhibitory Effects

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Objectives: DDIs between drugs that are CYP3A4 substrate and antifungal azoles have been observed in vivo. We aimed to investigate the application of simulation in predicting the DDIs between sildenafil (a substrate for CYP3A4) in the presence of various antifungal azoles (Fluconazole, Itraconazole, and ketoconazole) as CYP3A inhibitors, using in vitro–in vivo extrapolation
Methods: In- vitro metabolic and inhibitory data were incorporated into PBPK models within Simcyp to simulate time course of plasma sildenafil and three azoles concentrations and Sildenafil PK parameters, when administered alone or in combination with azoles.
Results: Fluconazole and Itraconazole increased Sildenafil Cmax and AUC by 2.8 and 3.6 fold, respectively. In contrast, Ketoconazole caused a 3.2 fold increases in sildenafil Cmax and increased the AUC nearly 5.9 fold.
Conclusion: Combination of in vitro–in vivo extrapolation, and PBPK, was able to predict the direction and magnitude of PK changes under coadministration of sildenafil and antifungal azoles.

Role of Fungi in Diabetic Foot Ulcer- a Superficial Colonizer or True Pathogen

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Foot ulcer is the most common problem in patients with diabetes and the leading cause of hospitalization which may proceed with limb amputation. The pathophysiology of foot ulcer in these patients is complex and is mainly due to neuropathy, peripheral vascular disease, slower wound healing and immunopathy. Secondly, it and, result from virulence, antibiotic resistance of involved pathogens. The most common pathogens responsible for acute Diabetic Foot Infection (DFI) are aerobic bacteria. The diverse causative pathogens with vast virulence factors, and polymicrobial nature of DFI have further complicated antibiotic treatment. Opportunistic and commensal fungi are rare causative agent and should be considered in chronic foot ulcer with delayed healing in diabetic patients. One of the most controversial issues confronting the DFI is lack of widely agreed guidelines for its diagnosis, treatment, and management.
This review was aimed to address the role of fungi in chronic diabetic foot ulcer-true as pathogen or a superficial colonizer, to discuss the current diagnostic methods and report a rare case with calcaneal osteomyelitis caused by *Aspergillus ochraceus*in a patient with diabetic foot osteomyelitis.

***Candida spp*. Colonization of Endotracheal Tube in Intensive Care unit Patients**

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Objectives: Nosocomial infection is an important health-care problem in hospitals worldwide and is associated with considerable morbidity and mortality. Microbial biofilms has remained a major complication of tracheal intubation in patients requiring ventilator equipments. The aim of this study was to characterize *Candida spp*. biofilms in extubated endotracheal tubes from ICU patients.
Method: From the central region of each endotracheal tube, 1 cm section was cut and processed for quantitative microbial culture. Samples were cultured on Sabouraud Dextrose agar, and DNA extraction was performed by glass beads. ITS1-5.8S-ITS2 region was amplified by PCR and digested by the restriction enzyme *MspI*.
Results: Ninety isolates were evaluated from samples, of which *C. albicans* (42.3%) was the most frequently isolated species followed by other species of *Candida* included *C. glabrata* (25%), *C. tropicalis* (20.7%), *C. krusei* (9.8%), and *C. Parapsilosis* (2%).
Conclusion: The results showed that yeast biofilms can form on the surface of endotracheal tubes. *Candida* species are the yeasts which were isolated from these surfaces of infectious patients. We recommend a similar study designed in another hospital to determine the epidemiologic pattern of microorganisms frequency.

Determination and Modeling the Solubility of Ketoconazole in Binary and Ternary Solvents of Water, Propylene Glycol and Polyethylene Glycol 200

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Objectives: About 40% of invented pharmaceutical candidates have poor solubility in water. Therefore, in order to expand the usage of such compounds for various applications, it is necessary to establish a technique for increasing their solubility and bio-distributions. The cosolvency method has been used in this research. The main purpose of this investigation was to investigate the solubility of ketoconazole
Methods: The binary and ternary solvent mixtures were prepared by weighing the solvents. Then the excess amounts of ketoconazole were added to the prepared solvents at 25 °C. They were stored in a shaker, placed for a period of 72 hours in an incubator equipped with a temperature controlling system maintained constant within ± 0.2 °C. The saturated solutions of the drug were centrifuged at 12000 rpm for 10 min, and subsequently diluted with methanol. The solutions were then assayed at 221 nm using a UV-Vis spectrophotometer.
Results: The Jouyban−Acree model was used to fit solubility data of ketoconazole in the binary and ternary solvents in which the OMRDs were 10.5 % and 12.7 %.
Conclusion: It is important to find suitable solvent mixtures for producing liquid formulations. Also the Jouyban−Acree model fits well to the experimental solubilities in binary and ternary solvents. These findings are supported by small MRDs of the back-calculated and experimental solubility data.

Epidemiology and Clinical Manifestation of Fungal Infection Related to Mucormycosis in Hematologic Malignancies

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Objectives: Mucormycosis is an opportunistic fungus infection with acute and rapidly progressive nature in the hematologic malignancy patients. This study was done to investigate the prevalence and clinical manifestations of this infection among hematologic malignancies.
Methods: This cross-sectional study (descriptive-analytical) was performed investigating medical records of 677 patients of hematologic malignancy in Imam Reza Hospital between 2001- 2013. After collection, data were entered into Software SPSS 19 with a provided checklist that included demographic characteristics, clinical manifestations. Afterwards, the data were analyzed using descriptive (mean, frequency) and inferential (chi-square and independent -t-test) statistical methods (p-value < 0.05 was considered as statistically significant).
Results: Overall, the prevalence of Mucormycosis was 4.29 per 100 patients with hematologic malignancies (29 cases affected by Mucormycosis in 677 patients with hematologic malignancy). The infection proportion among men and women was 72.2 and 27.6%, respectively. Maximum cases of Mucormycosis were observed among AML patients (62.1%). The most commonplace involvement was lung (89.4%) and fever was the most popular sign of infection (100%). The most considerable and effective factor for the treatment of infection was using combined therapy of Amphotericin B and surgery (debridement).
Conclusion: Considerable prevalence and deaths related to Mucormycosis infection among patients of hematologic malignancy showed the importance of the need to have strategies for prevention and early diagnosis especially among acute leukemia patients.

Antifungal Activity of Silver Nanoparticles and Griseofulvin on the *Microsporum canis*

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Objectives: *Microsporum canis* is a pathogenic fungus with a universal diffusion which causes tine a capitis of fungal in animals and humans. *M. canis*, as a genesis of fungal tine a capitis, is far more epidemic and can be transmitted easily among animals and humans through physical contact or indirect contact as well as the materials contaminated by this fungus .Studies have indicated that silver nano- particles have more and stronger fungicidal activity against some fungi. It has been shown that silver nanoparticles may have antimicrobial activity. This study aimed at investigating the inhibitory and fungicidal effects of silver nano particles and fungicidal drug (griseofulvin) on *M. canis*.
Methods: The antifungal activity of silver nanoparticles and the drug against *M. canis* investigated using agar dilution method with sabouraud dextrose agar. In concentration 42/0 -544 ppm and 321-0444 µg/ml. Minimum inhibitory concentrations (MIC) and minimum fungicidal concentrations (MFC) were determined using microdilution with sabouraud dextrose broth.
Results: In the agar dilution method, the growth of *M. canis* was inhibited in >5/25ppm of silver nanoparticles and >/54 µg/ml of griseofulvin. It was found that the MIC of silver nanoparticles is 5/25 ppm and MIC of griseofulvin is /54 µg/ml. Also the MFC of silver nanoparticles is 3/5 ppm and MFC of griseofulvin is 544 µg/ml.
Conclusion: The results obtained from this study showed that, as compared with griseofulvin, silver nanoparticles are more effective and are being confirmed as a fungicidal.

Identification and Antifungal Susceptibility Testing of *Candida* species Isolated from Bronchoalveolar Lavage Samples

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Objectives: The frequency of fungal infections in immunocompromised patients, particularly by *Candida* species, has increased in recent years. Colonization by *Candida* species in respiratory tract in susceptible hosts may play an important role to proceed disseminated candidiasis. This study was designed to identify *Candida* species from bronchoalvoelar lavage (BAL), samples and determination of antifungal susceptibility of isolates to Ketoconazole, Clotrimazole, Fluconazole and Nystatin by disk diffusion method.
Methods: Sampling was conducted between from 2011 to 2014 years. Three hundred and eighty four patients who suspect to invasive fungal infections were enrolled in the study. Clinical specimens were studied for direct microscopic examination and culture. The antifungal activity test for *Candida* species isolated from BAL samples was performed by using disk diffusion, according to *CLSI* documents M44-A2.
Results: Eighty seven (%22.66) patients were showed symptoms, signs and predisposing factors for pulmonary fungal infections. The isolated species were identified as follows: *C.albicans,* 31 (67.39%); C. *glabrata*, 9 (19.56 %)*; C.krusei*, 3 (6.5%); *C. parapsilosis,* 2 (4.3%); and *C. tropicalis* , 1 (2.25%). In this study, resistance to antifungal agents were seen Ketoconazole, 2 (4.38%), Clotrimazole 1 (2.17%) and Fluconazole, 4 (8.69%).
Conclusion: The results showed that some isolates of *C. albicans*

and non-albicans were resistant to systemic medication like fluconazole and ketoconazole. Thus, using of disk diffusion method is helpful for early screening of patient's treatment with suspected candidiasis.

Isolation and Identification of Fungi that Infect Fruit Trees: Molecular Investigation

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Objectives: Fruits dried either naturally or by using device might be contaminated with some microorganisms including fungi. These fungi not only lead to corruption and loss of products, but also produce toxins such as aflatoxin. The aim of this study was to isolate and identify contaminating fungi causing toxin.
Methods: Different kinds of cherries, apricots, currants, figs, berries (from Shahmirzad, Mehdishahr, Semnan) were collected from different shops and brought to the laboratory for culture in SDA (25 sample). After the purification, samples were cultured for morphological identification. Moreover, the isolated species were identified through the amplification of ITS region using universal primers.
Results: *Aspergillus*, *Rhizopus*, *Fusarium*, *Humicola*, *Scopulariopsis* and *Mucor were* identified by their morphological characteristics. Moreover, *Aspergillus flavus*, *Mucor racemosos*, *Mucor circineloides*, *Fusarium exicpryum*, *Rhizopus eriza* were identified by molecular methods of the examined fruits, berries and figs were found to be more contaminated, while no fungi were isolated from cherry samples.
Conclusion: As noted, two samples were contaminated with *Aspergillus flavus*, the fungus toxin-forming properties endangers the liver. The very important point is that fungal toxins such as aflatoxin in nuts might be found in dried fruits. Due to high fungal contaminations in the examined fruits, especial rules and regulations must be issued by health officials to help maintain the food safety and standards of the community.

Overexpression of the ERG11Gene in Azole-resistant Clinical Isolates of *Candida krusei*

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Objectives: *Candida* species are the most common cause of local and systemic opportunistic infections having led to morbidity and mortality during the last few decades. The main mechanisms of Azole resistance in *Candida krusei* include alterations in the gene encoding the target enzyme of *ERG11* or over expression of *efflux* pump genes. This study aimed at investigating the RNA expression of *ERG11* in azoles-resistant strains of *C. krusei*.
Methods: The *ERG11* mRNA expression was evaluated in four fluconazole- and itraconazole- resistant *C. krusei* species isolated from clinical samples in Iran using a semi-quantitative RT-PCR.
Results: The expression levels of mRNA were comparatively examined in all four isolates. It was observed that *ERG11* expression levels varied among the four representative isolates of *C. krusei*. Although DNA sequencing showed no genetic changes in the *ERG11*, one heterozygous polymorphism was found in only two out of the four isolates. This polymorphism occurred in the third base position of codon 313 for Thr (ACT>ACC).
Conclusion: Even though the above mentioned polymorphism led to the generation of a new Ear1 restriction site, it seems that there was no significant correlation between *ERG11* polymorphism and azole resistance in *C. krusei*. Our findings are consistent with the results of previous studies and may provide further evidence for the genetic heterogenecity and complexity of the ergosterol biosynthetic pathway or *efflux* pumps.

Evaluation of Antifungal Susceptibility of Some Produced Films and Nanofibers against *Candida albicans*

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Objectives: In recent years, the application of nanotechnology in medical sciences has significantly improved. Increasing attention has been paid to the production of nanofibers based on natural polymers as biomaterials, which have intrinsic antimicrobial properties. As these materials might improve the quality of healing rate, in this study we synthesize and determine the antifungal activity of film and nanofiber incorporated with antifungal drugs as wound dressing.
Methods: The chitosan-polyvinyl alchole (PVA)-gelatin electrospun nanofibers and films containing two common antifungal drugs, miconazole and ketoconazole, were prepared. Also, film and nanofibers without antifungal drug were used as the control group .In order to evaluate the antifungal activity of these produced materials against *Candida albicans,* as the most common yeasts, disc diffusion test was done based on CLSI M44A protocol.
Results: The synthesized film and nanofiber diskes exhibited a good antifungal activity against the tested yeast in comparisons with commercial disc (HiMedia) containing higher concentration of antifungal drugs.
Conclusion: Film and nanofiber containing antimicrobial agents can be substitutes for routine dressing to promote wound healing and prevent or treat the fungal infections.

Evaluation of 98 Cases of Mucormycosis in Iran; A Systematic Review

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Objective: Mucormycosis is an uncommon, invasive and opportunistic disorder caused by non-septated filamentous fungi belonging to the order Mucorales. Disease spectra differ regionally with prevalent climatic conditions. Knowledge on epidemiology and associated predisposing factors and outcome of the disease in the arid climate of the Middle East are urgently required.
Cases: The present study evaluated 98 cases of mucormycosis over the last three decades in Iran during 1990-2015. The mean age of patients was 39.8±19.2 years old. Overall mortality was 40.8%; the highest rate was in patients with disseminated infection (75%), while the rhinocerebral type was significantly lower (45.8%) and observed mainly in patients with uncontrolled diabetes (72.9%). Diagnosis was based on either histopathology (85.7%), microscopy (12.3%) or by culture (2.0%). Due to the species level, *Rhizopus* species were predominantly identified (51.7%), followed by *Mucor* species (17.2%).
Conclusion: Because of the high mortality rate of mucormycosis, early diagnosis and treatment may increase survival rates of mucormycosis significantly. Detailed monitoring and awareness of this life-threatening disease is compulsory.

Candidemia: Report of Six Cases in Kashan

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Objective: Candidemia is the fourth most common microbial bloodstream infection, with *C. albicans* being the major causative species with high mortality in the health care setting. Most cases of candidemia develop in high risk patients. Malignancy is one of the major risk factors for invasive candidemia among patients. To improve the outcome of these patients, early diagnosis and prompt therapy is essential. Though a better infection control strategy may minimize the incidence in general, early diagnosis of candidemia remains a major challenge.

Cases: Here, we report on six cases of candidemia in a tertiary care hospital in Kashan. With regard to predisposing factors, previous antibiotic use, venous catheterization, diabetes, prematurity, cancer, chemotherapy, rupture of the liver, and multiple trauma were the leading concomitant diseases (n=1). Duration of hospitalization was from 12 days to 2 months. Species identification of these isolates was confirmed by sequencing of the ITS rDNA region. *C. albicans* was the predominant species (n=4) followed by *C. parapsilosis* (n=1) and *C. fermentati* (n=1). Three patients expired and the rest of them have not been specified. Susceptibility testing was also performed according the document M27-A3 from the Clinical and Laboratories Standards Institute (CLSI) against amphotericin B, fluconazole, posaconazole and caspofungin. All of tested species were susceptible to all tested antifungal agents except one isolate which was fully resistant to posaconazole (MIC: >32 µg/ml), sensitive to fluconazole (MIC: 8 µg/ml), amphotericin B (MIC: 0.047 µg/ml) and caspofungin (MIC: 2 µg/ml).
Conclusion: The epidemiology and choice of therapy for candidemia are rapidly changing. Supplementary study is necessary to differentiate host factors and differences in virulence among candida species and to conclude the best therapeutic regimen.

Antimicrobial Properties of *Oliveria* Decumbens Vent. Extract with Agar Well Diffusion and Resazurin Microtitre-Plate Methods

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Objective: Antimicrobial potential of the ethanolic extract of *cc* was assayed against five bacterial strains such as *Staphylococcus aureus, Entrococcus faecalis, Escherichia coli, Klebsiella pneumonia* and *Pseudomonas aeruginosa and three candida species such as Candida albicans, C. glarate and C. tropicalis.*
Methods: Selected Plant extract was prepared by using maceration. Minimum inhibitory concentration of the extracts was determined by resazurin based Microtiter dilution assay for fungi and well diffusion agar method for bacteria.
Results: The ethanolic extracts of *Oliveria decumbens* leaves were found to be moderate antimicrobial potential, but it was the highest antimicrobial activity against *Staphylococcus aureus* with MIC 1.25 mg ml^{-1}. Also the ethanolic extracts of *Oliveria decumbens* leaves were found to be 2.5-5.0 mg ml^{-1} against *Candida* spp.
Conclusion: It was observed that the leave ethanolic extracts of *Oliveria decumbens* could be potential reservoir of bioactive compounds, and that resazurin can be used as a good growth indicator for different microbial pathogens.

Susceptibility of *Candida albicans* and *Candida dubliniensis* to Photodynamic Therapy Using Four Dyes as the Photosensitizer

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Objectives: Oral candidiasis is the most common opportunistic infection affecting the human oral cavity. The purpose of this study was to evaluate photosensitization effects of four distinct dyes on standard suspension *of Candida albicans (C.albicans)* and *Candida dubliniensis (C.dubliniensis)* and biofilm of *C.albicans,* considering the obtained optimum dye concentration and duration of laser irradiation.
Methods: In this in vitro study, colony forming units (CFU) of two sets of four groups of Laser plus Dye(L+D+), Dye(L-D+), Laser(L+D-) and No Laser, No Dye (L-D-) were assessed individually with different Methylene Blue concentrations and laser irradiation period. The photodynamic therapy effect on standard suspension of Candida species (using Methylene Blue, Aniline Blue, Malachite Green and Crystal Violet) were studied based on the obtained results. Similar investigation was performed on biofilm of *C.albicans* using the spectral absorbance. Data were imported to SPSS and assessed by statistical tests of Analysis of Variance (ANOVA) and Tukey Test. (α= 0.05)
Results: CFU among the different dye concentration and irradiation time decreased in dose- and time-dependent manner (P>0.05), all of which were significantly lower than the control groups (P<0.05). Among the examined photosensitizers, there was no statistically significant difference (P>0.05), though all of them significantly decreased CFU compared with the control groups(P<0.05). In L+D- and L+D+ groups, biofilm was significantly destroyed more than that of L-D-.(P<0.05)
Conclusion: Photodynamic therapy might be used as an effective procedure to treat *Candida* associated mucocutanous diseases and to kill biofilm in the infected surfaces such as dentures.

Comparing Antioxidant Activity of Pigment Extracted from *Rhodotorula mucilaginosa* and Its Strains Treated with Mutagens

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Objectives: In addition to colored appearance for foods, microbial pigments can show antioxidant activity. *Rhodotorula mucilaginosa* is an obligate aerobic yeast that contains a high concentration of carotenoid pigments. The aims of this study were to (1) assess antioxidant activity of pigments extracted from *Rhodotorula mucilaginosa*; (2) evaluate the effect of mutagenic substances on antioxidant activity of these pigments.
Methods: A colony of *R. mucilaginosa* was cultured in YPG broth and incubated at 30 °C overnight. Then, cells were harvested by centrifugation at 10,000 rpm for 10 min and washed. Cells were ruptured 3 times with 12 mL acetone and broken using homogenizer. Then the suspension was centrifuged and the supernatant collected. The supernatant (contain pigments) was powdered. Ethyl methane sulfonate (EMS) (50-300 µg/mL) and UV irradiation (at 254 nm, for 15-30 min) were used to create mutation in the cells. DPPH (2,2-diphenyl-1-picrylhydrazyl) method was used to evaluation antioxidant activity of *R. mucilaginosa* pigments. Briefly, 1 mL of the pigments dissolved in acetone was added to 4 mL of 0.1 mM DPPH in a solution of 95% methanol. Absorbance at 517 nm was measured spectrophotometrically after 30 min incubation.
Results: Giving the results, antioxidant activity was observed for pigments extracted from all strains of *R. mucilaginosa* (treated and untreated with mutagens), so that this activity was measured more than control (β-carotene). The antioxidant activity for the strain treated with EMS was measured significantly more than the other strains. This increased antioxidant activity is probably due to further increasing of carotenoids at the presence of EMS.
Conclusion: Pigments of *R. mucilaginosa* had high antioxidant activity and can substitute some synthetic pigments and antioxidants. Antioxidant activity of pigments extracted from *R. mucilaginosa* was increased by *R. mucilaginosa* growth at the presence of mutagens.

Evaluation of Antimicrobial Activity of *Rhodotorula mucilaginosa* Pigments on Some Pathogenic Bacteria

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Objectives: Nowadays, hazards of synthetic additives and preservatives have been identified, so researchers are looking for natural and safe alternatives for them. Microbial pigments are considered as natural pigments. *Rhodotorula* is a genus of unicellular-pigmented yeasts, part of the division Basidomycota. It is identifiable by distinctive orange/red colonies when grown. The aim of this study was to evaluate antimicrobial effect of pigments of *Rhodotorula mucilaginosa* on some pathogenic bacteria.
Methods: Sample preparation was done by transferring a single colony *R. mucilaginosa* from the stock culture on YPG agar to 50 mL YPG broth and incubated at 30 °C overnight. After cultivation, cells were harvested by centrifugation at 10,000 rpm for 10 min and washed 3 times with distilled water. Cells were ruptured 3 times with 12 mL of acetone and broken using homogenizer. Then the suspension was centrifuged and the supernatant collected. The

supernatant (contain pigments) was powdered using freeze-dryer. Antimicrobial activity was evaluated by the disc diffusion method and the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) was determined by using the agar dilution method.
Results: Pigments of *R. mucilaginosa* was effective on the growth of all the tested bacteria, so that *Bacillus cereus* and *Salmonella enteritidis* had the lowest and highest sensitivity to this pigment, respectively. The highest MIC and MBC among the tested bacteria were observed for *S. enteritidis* and *Escherichia coli*, respectively; whereas MBC was not observed for *S. enteritidis* at concentrations of the tested pigment.
Conclusion: Gram-positive bacteria were more sensitive than Gram-negative bacteria against the antimicrobial activity of pigments of *R. mucilaginosa*. According to the results, pigments of *R. mucilaginosa* can be used as an inhibitor of bacterial growth.

Polymorphisms in the Dectin-1 Gene, Related to Susceptibility to Recurrent Vulvovaginal Candidiasis

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Objectives: Vulvovaginal Candidiasis (VVC) is a frequent disease affecting approximately more than 75% of child-bearing women at least once in their lifetime due to the overgrowth of opportunistic yeast-like fungus *Candida*. It has been hypothesized that genetic factors play an important role in the susceptibility to RVVC. Although RVVC is common in otherwise healthy individuals, several risk factors have been reported to contribute to the susceptibility to RVVC. A polymorphism in the gene for human Dectin-1 Y238X, which results in an early stop codon and leads to abrogated Dectin-1 expression, has been identified in patients with RVVC. This study aimed to investigate whether Human Dectin-1 Y238X Gene Polymorphism plays a role in RVVC pathogenesis.
Methods: 25 patients diagnosed with RVVC according to their symptoms and clinical examination were included as the test group, while 25 women who did not have previous RVVC history and diagnosis and did not have vaginal discharge and itching in the past year were included in the control group. Blood samples were obtained from patients & control group to investigate the Dectin-1 Y238X gene polymorphism using Bi-PASA.
Results: *Candida albicans* was the most common species isolated from the specimens. The analysis revealed that all of the patients were wild type homozygous for DECTIN1 Y238X polymorphisms and none of the individuals showed a heterozygous or mutant homozygous Dectin-1 polymorphism. No significant correlations were observed between the susceptibility to RVVC and Dectin-1 Y238X polymorphism.
Conclusion: Defective surface expression of Dectin-1 due to the Tyr238X mutation results in the lack of β-glucan recognition and an impaired cytokine response by monocytes and macrophages. This study was the first investigation and suggests that there is no correlation between this polymorphism and RVVC. Additional studies are warranted to assess systematically the role of host genetic variation for susceptibility to RVVC.

Synthesis of 2-Amino-4*H*-Benzochromene Derivatives in the Presence of Nano-$Ticl_4.Sio_2$, Antifungal Activities Evaluation and Docking Studies of Them

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Objectives: *This paper reports the preparation, characterization and catalytic application of nano-TiCl4.SiO2 as efficient catalyst for the preparation of 2-amino-4H-benzochromenes (2-amino-4H-benzo[b]pyrans. Moreover, antimicrobial activities of these* new compounds were determined.
Methods: *Nano-TiCl4.SiO2 as a solid Lewis acid has been synthesized by reaction of nano-SiO2 and TiCl4. The structure characterization of this acid has been studied by XRD, TGA, SEM and TEM.* All the compounds were screened for antimicrobial activity. The antifungal activities of the synthetic compounds against nine American Type Culture Collection (ATCC) strains of fungi, including *A. flavus, A. fumigates, A. clavatus, Epidermophytonfloccosum, Microsporumcanis, T. rubrum, C. albicans, C. glabrata, C. dubliniensis, C. tropicalis, and C. neoformans.* MICs (Minimum Inhibitory Concentration) and MFC (Minimum Fungicidal Concentration) ofthese compounds were determined according to the Clinical and Laboratory Standards Institute (CLSI).
Results: Of the synthetic compounds, 2-amino-4-(3,4-dimethoxyphenyl)-4H-benzo[f]chromen-3-carbonitrile (C4) and 2-amino-4-(4-isopropylphenyl)-4H-benzo[f]chromen-3-carbonitrile (C3) exhibited a strong inhibitory activities against *Epidermophyton floccosum* following 2-amino-4-(4-methyl benzoate)-4H-benzo[f]chromen-3-carbonitrile (C9), respectively.
Conclusion: We have demonstrated a simple method for the synthesis of 2-amino-4H-benzochromenes with using nano-TiCl4.SiO2 as eco-friendly and efficient catalyst under solvent-free condition. Short reaction times, high yields, a clean process, simple methodology, easy work-up and green conditions are some advantages of this protocol. Some of the synthetic compounds might be a good candidate for further studies to elucidate their activity and toxicity as a novel antifungal drug.

Medicinal Plants with Antifungal Activity

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Objectives: Fungal infections are among the most common skin diseases, some forms of which may be recurrent or refractory. There are many antifungal drugs in modern medicine, but drug resistance and complications are two major limitations. The current study aimed to introduce fifteen medicinal plants with antifungal properties.
Methods: This study was a review article using PubMed and Scopus databases and Iranian traditional medicine resources.
Results : According to human or animal studies curcumin, Myrtus communis, Lawsonia alba ,Zattaria multiflora, Zingiber officinale, Allium sativum, and some other plants have antifungal properties .In the Iranian traditional medicine sources, some properties of these plants forthe treatment of skin diseases like dandruff have been mentioned.
Conclusion: With further studies to prove the effectiveness and safety, these medicinal herbs may be used forthe treatment of fungal infections.

***Aspergillus tubingensis* a Common Black Aspergilli in both Clinical and Environmental Isolates in Iran**

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Objectives: *Aspergillus tubingensis* is a member of the black Aspergilli belonging to the *Aspergillus* section *Nigri,* which includes species that morphologically resemble *Aspergillus niger*. Molecular Analyses revealed that apart from *A. niger*, other black aspergilli including *A.tubingensis,*are morphologically similar to species related to *A. niger and* cannot be distinguished . Clinically, identification of section *Nigri* clinical isolates to the species level may be important given that different species have dissimilar susceptibilities to antifungal drugs. Thus, identification up to the species level can may influence the choice of appropriate antifungal therapy and, provide important information about the epidemiology of sections *A.* Nigri number of different techniques have been developed for the classification and identification section *Nigri*. Among them, molecular tools are the gold standard, as the

sequencing of the β-tubulin gene. The combination of methods appears to provide better discriminatory power. Therefore, this study applied morphological analyses, sequence analyses of the β-tubulin genes, RFLP analyses and examination of Ehrlich.
Methods: A total of 149 clinical and environmental strains of black aspergilla were collected and subjected to preliminary morphological examination. Total genomic DNAs were extracted and PCR was performed to amplify partial β-tubulin gene. RFLP analysis of β-tubulin PCR products by a single enzyme was used for 117 isolates to evaluate its usefulness as an inexpensive molecular method to identify the most common species of black *Aspergillus*.
Results: The BLAST analysis of the sequences indicated that 28 (53.8%), 21 (40.3%) were *A.tubingensis, A. niger*respectively and for about 6% isolates were other species. Ehrlich test was performed on some, example of *A. tubingensis* and *A. niger* isolates as the most abundant species in our study. The test yielded a yellow reaction (positive) for *A. niger*and no color (negative) for *A.tubingensis.*
Conclusion: *Aspergillus niger* and *A. tubingensis* isolates were analysed using various methods.Our results indicated that *A. niger* is no longer the dominant black *Aspergillus*; instead, *A. tubingensis* comprises more than half of the strains which have usually been considered as *A. niger.*

Black *Aspergillus* Species Isolated from Clinical and Environmental Samples in Iran

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Objectives: Identification of black *Aspergillus* species at the species level is critical to identifying appropriate therapy and to unraveling their epidemiology. Traditional identification of black aspergilli by morphological examination of the colonies is unreliable. This work aimed to identify the species distribution of clinical and environmental isolates of black aspergilli based on β-tubulin gene analysis, a simple restriction fragment length polymorphism (RFLP) analysis, and the Ehrlich test.
Methods: A total of 149 clinical and environmental strains of black aspergilli were collected and subjected to preliminary morphological microscopic examination. Total genomic DNAs were extracted and PCR was performed, amplifying 500—550 base pairs (bp) of the β-tubulin gene. Species were delineated by comparison of high quality sequences with β-tubulin sequences deposited in GenBank. In order to distinguish the most common species, PCR amplicons of 117 black *Aspergillus* strains were identified by a simple PCR-RFLP analysis.
Result: Using β-tubulin sequences, five species were found among 52 tested isolates, including 28 (53.8%) *A. tubingensis*, 21 (40.4%) *A. niger*, and three different isolates representing *A. uvarum*, *A. awamori*,and *A. acidus*, respectively (5.8%). Restriction fragment length polymorphism (RFLP) of the β-tubulin PCR products using the restriction enzyme *Tas*I successfully and rapidly distinguished *A. tubingensis* and *A. niger* as the most common species among the clinical and environmental isolates. Although tardy, the Ehrlich test was able to differentiate *A. tubingensis* and *A. niger* according to the yellow color reaction specific to *A. niger*.
Conclusion: *A. tubingensis* and *A. niger* are the most common black *Aspergillus* in both clinical and environmental isolates in Iran. However, species such as *A. uvarum*, *A. awamori,* and *A. acidus* were also found. PCR-RFLP using *Tas*I digestion of β-tubulin DNA enables rapid screening for the common species, *A. tubingensis* and *A. niger*.

Antifungal Activity of Producing Biosurfactant by *Rhodotorula* Species in Vitro

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Objectives: Biosurfactants are amphiphilic surface-active compounds that are produced by several microorganisms such as bacteria and fungi. Recent studies shows that some of the biosurfactants produced by microorganisms have antibacterial, antifungal and antiviral activities. The main aim of the present study was to determine antifungal activity of producing biosurfactant by the strains of *Rhodotorula* in vitro.
Methods: In the present study, the anti-fungal activity of the crude biosurfactant produced by *Rhodotorula* against several fungi was determined by direct spotting method in plates. A standard suspension of fungal elements was prepared and inoculated on the surface of culture media as lawn. Different serial dilutions of biosurfactant in DMSO was prepared. Several methods including spotting, disk diffusion and well diffusion were used for the detection of MIC. All plates were incubated at appropriate temperature and the lowest concentration which inhibited the visible fungal growth was considered as the MIC value.
Results: In the present study, MIC for several species of *Candida albicans*, *Aspergillus niger*, *A. flavus*, *Alternaria*, *Rhizopus* and *Syncephalastrum* were detected. Our results showed that biosurfactant produced by *Rhodotorula glutinis* has the best effect against tested organisms at the range of 10-40 µl.
Conclusion: In conclusion, in this study we have demonstrated the anti-fungal properties of the crude biosurfactant produced by *Rhodotorula* against several pathogenic and nonpathogenic yeasts and filamentous fungi. Our results suggest the possible use of this biosurfactant as an alternative antifungal agent in the medical field.

Identification of non-*Cryptococcus* Yeasts Isolated from Pigeon Dropping

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Objectives: Invasive fungal infections cause considerable morbidity and mortality in immunocompromised hosts. Birds could be considered as the reservoir for pathogenic fungi and Pigeon droppings have potential for spreading these fungi to the environment. *Cryptococcus* species are important fungi in pigeon dropping but there are many pathogenic yeasts which could be important for humans' health. The main objective of this study was the Identification of non –*Cryptococcus* yeasts associating with pigeon dropping in Shiraz, southern Iran.
Methods: A total of123 non-*Cryptococcus* yeast from pigeon dropping were included in our study. Identification of the isolates was performed based on conventional and molecular methods using DNA sequence analysis of ITS (internal transcribed sequences) gene. Genomic DNA was extracted by boiling method, and ITS region of rDNA was amplified by PCR method. The PCR product s were sequenced and the data compared with those of the databases of National Center for Biotechnology Information website using the Basic Local Alignment search Tool.
Results: The identified yeasts belong to seven genera as: *Candida, Trichosporon, Rhodotorula, Saccharomyces, Rhizoctonia, Rhodosporidium* and *Meyerozyma.*
Candida albicans 8, *Rodotorolarubra* 24 and *Trichosporonasahii* 13 were the most common species ofthese three genera. The other yeasts were identified as *Saccharomyces cerevisiea*, *Rhizoctoniasolani, Rhodosporidium kratochvilovae* and *Meyerozy macaribbica*.
Conclusion: Our study showed that several species of fungi associated with pigeon droppings that are important for humans' health. These fungi are important public health since they could spread and get transmitted to susceptible persons such as the elderly as well as immunocompromised patients.

Anti-Dandruff Herbs in Traditional Iranian Medicine

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Objectives: Dandruff is a very common disorder of the scalp. It is caused by numerous factors in conjunction with *Malassezia* yeasts. Despite numerous products that are being marketed targetting this problem, still its growing incidence is still observed in the world. The anti-dandruff products can slow down the scalp flaking and have many disadvantages such as inducing hair loss, itching, irritation, nausea, headache and photosensitivity. Today, a myriad of research is in progress to produce herbal products for this problem. Traditional systems of medicine contain thousands of natural formulations proposed by ancient scholars that have been used by millions of people throughout the history. One of these systems of medicine is traditional Iranian medicine (TIM) about which thousands of books are available that contain formulations used by our ancestors for different medical problems.
Methods: Different terms in TIM could be associated with dandruff ,including "sa'afe", "sabuseh", and "hazaz".In this study, the traditional texts such as "Teb-e-Akbari", "Makhzan-al-Adviyeh" and"TohfatolMoemenin" were explored for the above terms and their related remedies. The plants were listed, identified and their antifungal effects were searched in modern data bases.
Results: Our exploration revealed that a total of 43 plants from 29 families had been used in traditional medicine for treatment of dandruff. The most frequent families were fabaceae and poaceae. Among these herbs, anti-fungal and anti- dandruff activity of 28 plants has been proven by modern research.
Conclusion: According to the results of this study, antifungal and anti-dandruff activity of some of the herbs, which were used for treatment of dandruff, are proven by modern research. These herbs have good potentials for further research on antifungal agents. These herbs could be used in pharmaceutical designing of antidandruff formulations.

Anti Fungal Activity of Silver Nano-Particles and Griseofulvin on *Trichophyton rubrum*

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Objectives: *Trichophyton rubrum* with worldwide distribution is a human dermatitis. The dermatophyte is one of the important factors in causing infections in humans. It also has been isolated from animal infection, but there are no reports of separating it from the soil. *T.rubrum* causes dermatophyte infection in the groin, foot and nail. Dermatophytosis is a contagious and common infection worldwide which is found especially in tropical and humid areas. Often in infections caused by *T.rubrum,* the treatment strategies are based on the use of griseofulvin and terbinafine but the chronic form of the infections are resistant to treatment and remain for a long time. Studies have shown that the silver nanoparticles may have antimicrobial activity. The purpose of this study was to evaluate the effects of silver nanoparticles and griseofulvin against the fungus *T.rubrum*.
Methods: The antifungal activity of silver nanoparticles and the drug against *T.rubrum* was investigated using agar dilution method in Sabouraud Dextrose Agar. Minimum inhibitory concentrations (MIC) and minimum fungicidal concentrations (MFC) were determined using microdilution in Sabouraude Dextrose Broth.
Results: The results of agar dilution method showed that the growth of *T.rubrum* is inhibited in >62.5ppm of silver nanoparticles and >250ppm of griseofulvin. In microdilution in Sabouraude Dextrose Broth Method, it was found that the MIC of silver nanoparticles is 62.5 ppm and MIC of griseofulvin is 250 ppm. Also the MFC of silver nanoparticles is 125 ppm and MFC of griseofulvin is 500 ppm.
Conclusion: The results obtained from in-vitro studies showed that silver nanoparticles can be more effective for the treatment of tinea or other infections caused by *T.rubrum* than grisefulvin in animals and humans, and silver nanoparticles can be a better candidate for the treatment of infections caused by the fungi *T.rubrum*.

Evaluation of Vaginal Candidiasis among Pregnant Women and Identification of *Candida* Species by Molecular Method

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Objectives: *Candida* species are the most common causative agents of vaginitis in women during their child- bearing age. Since the number of *Candida* species have inherent resistance to some antifungal drugs, accurate identification of *Candida* species is necessary in patients with vaginal candidiasis.
Methods: Fifty-two specimens of vaginal swabs obtained from patients suspected to vaginal candidiasis were cultured on Sabouraud dextrose agar. The DNA of colonies was extracted by phenol-chloroform method. The genomic DNA was amplified by PCR method and digested by *MspI* restriction enzyme, and finally the RFLP products were loaded on agarose gel.
Results: Of 52 specimens suspected to vaginal candidiasis clinically, 21 cases had positive culture. Of the 21 *Candida* cultures, the prevalence of different species included 18 (85.7%) *C. albicans* and 3 (14.3%) *C. albicans*/ *C. glabrata*.
Conclusion: Only 40% of pregnant women suspected to vaginal candidiasis had positive culture for *Candida*. *C. albicans* had the highest frequency among the pregnant women.

Evaluation of Fungal Biofilms Prevalence in Patients with Nasal Polyposis Using Histopathological, Mycological Findings and PCR Sequencing

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Objectives: Rhinosinusitis has been defined as a group of disorders characterized by inflammation of mucosa of the nose and paranasal sinuses. Chronic rhinosinusitis (CRS) is a common inflammatory disease in ENT practice and estimated to be in order of 16% of the adult populations. Of all the proposed etiologic agents in CRS, fungal agents remain the most controversial. The aim of this study was to evaluate the fungal biofilms prevalence rate in patients with nasal polyposis.
Methods: Sixty sinonasal specimens (31 cases as patient group and 29 cases as control group) were obtained in a 12- month period. All specimens were evaluated by histopathological examination with Hematoxylin and Eosin staining, direct examination on 20% potassium hydroxide, culture in Sabouraud dextrose agar containing chloramphenicol and PCR sequencing on the basis of ITS gene and panfungal primers.
Results: Of the sixty specimens; 4 (12.9%) were positive in direct examination, all of them were related to patients with sinonasal polyposis (NP). The culture results were positive in 5 (16.1%) patients with NP (4 *Aspergillus flavus* and one hyaline filamentous fungus), and one patient (3.4%) in the control group (one *Aspergillus flavus*). Histopathologic assessment showed bacterial biofilms in 7 specimens (22.6%) of patients with NP and one

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specimen (3.4%) in control group, without any specific pattern of fungal biofilms. In PCR analysis, 4 specimens (6.7%) had positive results, including 3 (9.7%) in patients with NP and one (3.4%) in control group. PCR Sequencing identified one *Cryptococcus magnus* and 2 *Penicillium chrysogenum* in the patients with NP, and one *Penicillium chrysogenum* in control group.
Conclusion: The results of this study showed that fungal agents did not the fundamental role in etiopathology of polyp formation in CRS. In addition, PCR method did not show any significant concordance with other methods.

5-Azacytidine, DNA Methyltransferase Inhibitor Causes Reduction of Aflatoxin Production and Conidiation in the *Aspergillus flavus*

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Objectives: *Aspergillus flavus* is a common saprophyte and opportunistic pathogen producing aflatoxin (AF) and many other secondary metabolites. 5-Azacytidine (5-AC), a derivative of the nucleoside cytidine, is widely used as an inactivator of DNA methyltransferase in studies on epigenetics and cancer biology. It is also used for studying secondary metabolism in fungi. In this study, 5-AC was applied to investigate the inhibition of AF biosynthesis in *A. flavus*.
Methods: To fulfill the mentioned purpose, a toxicogenic strain of *A. flavus* was treated by different concentration of 5-AC. Morphological characteristics, including spore formation, colony diameter, biomass weight were compared in the tested and control groups. In addition, production of AF in the examined concentrations was determined by HPTLC method. The effect of 5-AC on the expression of Aflatoxin-related genes, including Nor1, AlfR and Ver1 were determined by Real time PCR.
Results: Treatment of *A. flavus* with different concentrations of 5-AC resulted a fluffy aconidial phenotype. This change was dose-dependent but not hereditary. In addition, 5-AC inhibited the production of AF in dose-dependent manner. Moreover, 5-AC enhanced the expression ratio of alfatoxin related-genes, including Alf-R and Nor-1 in dose dependent manner while the expression ration of Ver-1 decreased accordingly.
Conclusion: The results suggested that methyl transferase have important roles in *A. flavus* growth and toxin production. Hence, methyl transferase inhibitors such as 5-AC might be used for preventing mycotoxin production or treatment of infection caused by *Aspergillus* species as well as for epigenetic remodeling studies in fungi.