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Epidemiology and prevalence of superficial fungal infections among dormitory students in Tehran, Iran

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Abstract:

Superficial fungal infections are one of the most prevalent skin diseases worldwide. According to clinical reports, dermatophytosis has been the most prevalent form of superficial infections. It is well documented that the epidemiology of skin infections might change over time. The aim of this study was to evaluate the epidemiology and prevalence of superficial fungal infections in dormitory students living in Tehran province. For this purpose, a total of 1441 male students, living in the dorms were investigated. The results showed that the prevalence and incidence of disease among dormitory students living in Tehran were 9.16 and 2.77% respectively, while *Trichophyton rubrum* was the most frequently isolated species (30.34%). Tinea cruris and Tinea corporis were the dominant clinical forms of the disease. Furthermore, *Malassezia* species accounted for 33.3% of infected cases. It could be concluded that although the prevalence of dermatophytosis is quite low among students but since this disease is highly contagious, more attention should be made to prevent the occurrence of dermatophytosis among dormitory students.

Keywords: Superficial fungal infections, dormitory, epidemiology, dermatophytosis.

Introduction

Despite numerous advances in health and medical sciences, superficial fungal infections have retained their position as one of the most important skin diseases (Bouchara *et al*., 2008; Ngwogu and Otokunefor, 2007). Dermatophytes are the most prevalent fungi species involving skin, hair and nails (Guarner and Brandt, 2011). Dermatophytosis or Tinea varies from chronic mild non inflammatory to acute severe inflammatory lesions in different hosts. Humidity in high rates, over-population and poor hygienic conditions are common risk factors for dermatophytosis (Ngwogu and Otokunefor, 2007; Rassai *et al*., 2011; Rezaei-Matehkolaei *et al*., 2013).

There is a direct relationship between the intensity of host response and speed of infection disposal (Hube *et al*., 2015; Venturini *et al*., 2012).

Dermatophytes belong to three genera including *Microsporum*, *Epidermophyton* and *Trichophyton*. They are usually spread through contact with infected humans (anthropophilic), animals (zoophilic) and soil (geophilic) (Jackson, 1999; Cafarchia *et al*., 2013). The clinical signs of dermatophytosis depend on the affected region of the body; however, pruritis is the most observed symptom in human (Falahati *et al*., 2003; Khosravi *et al*., 1994). The aim of this study was to evaluate the prevalence and epidemiology of dermatophytosis in dormitory students.

Materials and Methods

Individuals: A total number of 1441 male students between the ages of 18-30 were used for this study between May and June 2013. Students were examined and any clinical signs and/or lesions indicating the presence of dermatophytosis including ring worm like lesions, pruritis, skin inflammation, nail abnormalities etc were sampled. Wood's lamp was also used to distinguish some of the positive cases.

Questionnaire preparation: A questionnaire was made for each individual to record data. It included information on age, education, place of birth, number of family members, history of living in dorms, blood type etc.

Specimen collection: Infected skin/nail was cleansed with 70% alcohol before sampling. Samples were collected by gently scraping the affected areas. Specimens were kept in sterile Petri dishes and transferred to the laboratory for further examination.

Microscopic examination and culture: Skin or nail scales were examined for dermatophyte hyphae, arthroconidia and yeasts by using 10% KOH. Specimens were then cultured on Sabouraud's Dextrose Agar (Merck, Germany) containing chloramphenicol (50 mg/l, Sigma) and/or cyclohexamide (500 mg/l, Sigma); and were kept at 28°C for four weeks. Cultures were studied for fungal growth every 24 h.

Identification of fungal species: Fungi colonies grown on the media were examined macroscopically for colony morphology, texture, surface pigmentation and pigmentation on the reverse. Microscopic examination of colonies was done using lactophenol cotton blue staining. Fungi were examined for hyphal structure, macro and micro conidia presence and appearance. Slide cultures were further used to study fungi morphology. Chemical tests like urea hydrolysis were done to distinguish between Trichophyton species.

Results

This was a cross sectional study on dormitory students living in Tehran province. Students participated voluntarily and several dormitories were inspected. Among the 1441 cases, 360 were clinically identified having superficial fungal infections; however, only 132 cases were confirmed having dermatophytosis and/or pityriasis versicolor after mycological examinations. Regarding the questionnaire records, students' self-awareness about fungal infections had positive impact in disease prevention. The prevalence and incidence of disease among dormitory students living in Tehran was 9.16 and 2.77% respectively.

Direct microscopic examination was

positive in 90.1% of infected cases, while etiologic agents were isolated from 84.1% of cultured samples (Table 1). Specimens positive in one of these examinations were considered infected. Regarding geographical distribution, dermatophytosis was more prevalent among students from southern regions of Iran (Table 2). Tinea cruris was the most common form of dermatophytosis (23.5%) followed by Tinea corporis (22%) and Tinea pedis (13.6%). No nail infections were identified in this study.

According to blood groups, students with blood type A were more susceptible to dermatophytosis than other blood types (41%). No relationship between the prevalence of dermatophytosis and body mass index (BMI) was seen. *Trichophyton rubrum* was the most identified etiologic agent (30.34%); followed by *T. verrucosum* (24.72%), *T. mentagrophytes* (21.35%), and *Epidermophyton floccosum* (14.61%) (Fig.1).

Interestingly, *Malassezia* species were isolated from 33.33% of infected individuals. *M. sympodialis* was the most common agent (40.9%) followed by *M. globosa* (31.8%), *M. pachydermatis* (15.9%) and *M. sloofiae* (9.1%).

Table 1. Frequency of positive and negative results in normal specimen examinations

Test	Results	
	Positive	Negative
Direct Microscopic Examination (DME)	119 (90.15%)	13 (9.85%)
Culture	111 (84.1%)	21 (15.9%)

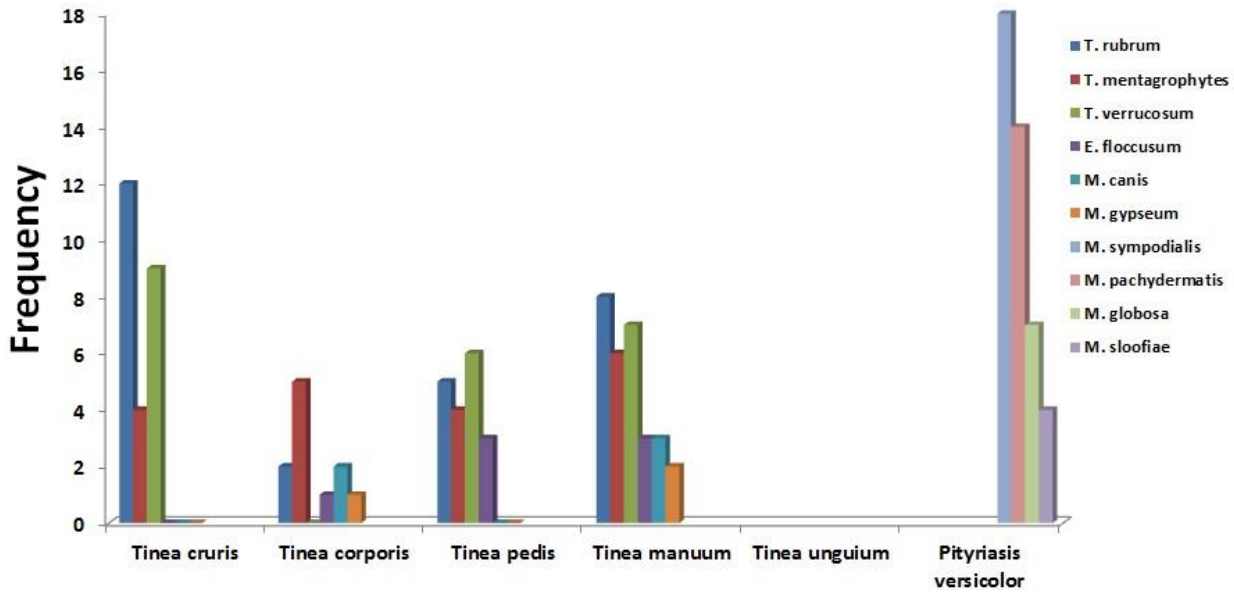

Fig. 1. Frequency of dermatophytes and non-dermatophytes agents in clinical lesions

Table 2. Prevalence and incidence of superficial fungal infections in dormitory students used for this study in Tehran

	Province*								
	Khuzestan	Tehran	Esfahan	Sistan & Baluchistan	Bushehr	Hormozgan	Fars	Total	Percent (%)
Prevalence	34	8	17	3	6	60	6	132	9.16
Incidence	9	3	7	2	4	11	4		2.77

*Data from Provinces with no positive results are not shown

Discussion

In recent years, prevalence of fungal infections has increased and this is believed to proceed from growth in at-risk population (Guarner and Brandt, 2011). Dermatophytosis is considered as one of the major public health problems around the world (Bouchara *et al*., 2008; Falahati *et al*., 2003). Studies have reported that epidemiology and distribution of superficial fungal infections especially dermatophytes has changed over the past decades (Rassai *et al*., 2011). The study and identification of etiologic agents is important in providing basic data for epidemiological researches, clarifying changes in frequency, to assess interventions, and to discover emerging new pathogens (Rezaei-Matehkolaei *et al*., 2013). The aim of this study was to evaluate the prevalence and incidence of dermatophyte species among male dormitory students in Tehran, Iran.

Living in a dorm means using same bathroom and sharing objects. These factors have been considered as the risk factors for superficial fungal infections.

In this study, southern provinces including Bushehr, Khuzestan and Hormozgan had the most prevalence and incidence of superficial fungal infections (6.9 and 1.66%, respectively); high humidity and temperature in these provinces might act as the predisposing factor. Rassai *et al*. (2011) studied the epidemiology of dermatophyte infections in southwest Iran. In their study, Tinea cruris and Tinea corporis (39.25%) were the most common clinical presentations of dermatophytosis which is compatible with this study (Rassai *et al*., 2011). However, *E. floccosum* (39.25%) has been reported as the most isolated species while *T. rubrum* (30.34%) had the highest frequency in this study.

In a study carried out by Falahati et al. (2003), occurrence of dermatophytes in an area in Tehran was investigated; they reported a prevalence of 13.5% and incidence of 10.6 per 100,000 persons/ year and that *E. floccosum* was the most frequent etiologic agent (Falahati *et al*., 2003). Regarding the site of infection, in Falahati et al. (2003) study, Tinea corporis (31.4%) was the most common type of infection (31.4%) followed by tinea cruris (20.7%) and tinea manuum (15.4%). These findings suggest that the epidemiology of infection has changed within years and it could be due to changes in people lifestyle, health conditions etc.

Rezaei-Matehkolaei *et al*. (2012) investigated the molecular epidemiology of dermatophytosis by ITS-sequencing. Infection was observed in 35.4% of patients and Tinea pedis was the most prevalent type (43.4%) followed by tinea unguium (21.3%) and tinea cruris (20.7%). According to their results, *T. interdigitale* (40.5%) was the most common isolate followed by *T. rubrum* (Rezaei-Matehkolaei *et al*., 2013). In this study, nails were not infected with fungal.

In a 2012 study in India, Tinea corporis was the most prevalent clinical manifestation between different age groups (35.4%), however Tinea capitis was common among children under 12 years of age (16.57%). Dermatophytes were observed in 78% of samples and *T. rubrum* (32.8%) followed by *T. mentagrophytes* (29.2%) were the predominant pathogens (Balakumar *et al*., 2012). In other studies, between 1991-2005, *M. canis* was reported as the most frequent isolate followed by *T. rubrum*, *T. mentagrophytes* and *E. floccosum* (Casal *et al*., 1991; Dolenc-Voljč, 2005; Khosravi *et al*., 1994). The difference between the results of these studies and that of the present study, might suggest an alteration in the epidemiology of superficial fungal infections.

With respect to the results of this study and other investigations in previous years, it can be concluded that epidemiology of superficial fungal infections has changed during these years. There are lots of predisposing factors affecting epidemiology of dermatophyte infections such as geographic area, hygiene, occupation, climate, contact with animals etc. This study had focused on the occurence of superficial infections among dorm students. The results of this study suggest that living in dorms could be a risk factor for superficial fungal infections; however more studies are needed to determine the exact risk factor and the solution to prevent the incidence of these infections among dormitory students.

Conflict of interest

No conflict of interest

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