Tr. J. of Medical Sciences
29 (1999) 181-185

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The Dermatophytic Flora Ratio of Dermatophytes

Received: April 15, 1997

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Abstract: This paper describes the mycological examination of patients admitted to the department of dermatology of Kahramanmaraş State Hospital. One hundred and seventy samples of finger nails, hairs and skin were collected from patients suspected of having fungal diseases and were examined under a light microscope after being treated with 15–20% KOH solution. It was observed that 68 of the 170 samples contained fungal hyphae and arthrospores, while 62 samples were free of these. Forty samples were observed to have *Malasezia furfur.* The samples containing *M. furfur* were not subjected to a culture medium. Of the 130 cultured samples, 68 had dermatophyte; 7 had *T. rubrum* + *Candida sp* and 16 had *Candida sp.* samples displayed no reproduction. In the 86 samples which displayed reproduction in culture media, the distribution of the fungal species was found to be as follows: 48 had *T. rubrum*, 5 had *T. mentagrophytes*, 4 had *M. canis,* 3 had *E. floccosum,* 2 had *T. violaceum,* 1 had *T. verrucosum,* 7 had *T. rubrum* + *Candida sp.,* and 16 had *Candida sp.*

Key Words: Dermatophytic Flora, Ratio of Dermatophytes.

Introduction

There are many different fungal flora around the world. These variations are caused by different climatic conditions, life styles, working conditions and socio–cultural and socio–economic factors. Factors such as ease of transport and extended social interactions are the primary causes of the spread of fungal diseases.

The determination of the etiology, the factors which cause the spread of fungae and other related aspects are of the utmost importance in preventing the contamination and spread of fungal diseases. Dermatophyte infections are frequently localised and prevail in tropical regions and in countries with low socio–economic levels.

Fungal diseases are very common in humans and animals. It is estimated that there are approximately 100.000 fungal species in the word. Only 100 of these cause infections and diseases in humans and animals. The localisation and the infectious features of these species vary form region to region. Some of the fungal species which cause systemic infection in animals cannot be passe to humans on vice versa. Under these conditions, if the primary factors of the spread and contamination of fungal diseases are eliminated, it may be possible to break the epidemic cycle (1).

Fungi are generally opportunistic pathogens and cause infections only under certain conditions, such as colonisation, contamination in non–flora regions and changes in the physiological conditions of the body (sweating and change of pH).

Species which cause infections in people having weak physical resistance are particularly of interest. Fungi cause toxic and allergic reactions as well as parasitic disease. Allergic reactions related to fungi may results in serious conditions. Inhalation of fungal species such as *Aternaria, Helminthosporium, Penicillium* and *Aspergillus* is known to cause epileptic seizures (2–5).

Skin fungi are very similar organisms as regards their morphology and the diseases they cause. They are known as 'dermatophytes'. They only cause diseases in skin, nails and hair and do not spread to inner tissues or organs. People infected with dermatophytes constitute 10% of

the total of patients admitted to dermatology clinics with fungi–related problems (6). It has been conclusively proved that each region has its own unique dermatophyte flora which changes very little with time (7–14).

The aim of this study was to determine the dermatophyte flora of the Kahramanmaraş region due to the high prevalence of fungal diseases and the related data is expected to shed light on future research.

Materials and Methods

The study was carried out between September 26, 1994 and November 30, 1995, using the hair, nail and skin specimens of 170 people from military troops, schools and other places who were suspected of having fungal diseases and who had been admitted to the dermatology clinic of Kahramanmaraş State Hospital.

Samples from lesions located on the skin were scraped into petri dishes. In the case of nail lesions the scraping process was continued until the intact tissue appeared. Hair specimens were collected with the use of sterile tweezers.

The specimens were first examined by microscope. They were then placed in Saburaud Dextrose (SDA, Oxoid) and Potato Dextrose Agar (PDA, Difco) nutritious media in order to obtain pure cultures. The colonies were identified according to the literature (15, 16).

Microscopic Investigation: The samples were placed on lamels and the preparation was completed by dropping 15% KOH on to them. The samples were examined for the presence of spores and arthrospores using direct microscopic investigation.

The Determination of Fungi: The samples were put into cultures where they could germinate freely. Sabouraud Dextrose Agar (SDA) was used for the initial isolation of the dermatophytes and other pathogenic fungi.

Macroscopic Investigation of Colonies: Slow–growing fungi form small colonies *(T. verrucosum, T. violaceum, T. scheoenlii etc).* The surface appeared heterogeneous and wavy or homogenous. The dermatophytes were shown clearly by the surface pigment in the culture, which revealed their capacity to germinate at room temperature and at 37 °C (17, 18).

Results

The distribution of the superficial infections in the 170 patients examined in this study is given in Table 1.

Table 1. The distribution of the superficial fungal infections according to infection site.

Location	n	(%)
Tinea pedis	93	(54.70%)
Tinea corporis	5	(2.94%)
Tinea unguium	10	(5.88%)
Tinea unguinalis	10	(5.88%)
Tinea manum	7	(4.11%)
Tinea capitis	5	(2.94%)
Tinea versicolor	40	(23.52%)
Total	170	(100%)

The fungal hyphae and arthrospores were examined by mixing the samples taken from the infected region with 20% KOH solution. The result are in shown in Table 2.

Table 1. The results of the direct microscopic investigation.

	n	(%)
Pozitive	68	(40%)
Negative	62	(36.47%)
M. furfur	40	(23.52%)
Total	170	(100%)

130 of the total 170 samples taken from the infected patients were placed in a culture medium after being examined under the microscope. Examination of the cultures after 3–4 weeks revealed that there was growth in 86 (66.15%) but no growth in the other 44 (33.86%).

Table 3. The distribution of the results of 130 cultures according to sex.

Culture	Female n(%)	Male n(%)	Total n(%)
Propagation	12 (9.23%)	73 (56.15%)	85 (65.38%)
Non–propagation	11 (8.46%)	34 (26.15%)	45 (34.61%)
Total	23 (17.69%)	107 (82.30%)	130 (100%)

The most important cause of superficial fungal infection was *T. rubrum*, observed in 48 (36.92%) of the samples. This was followed by *Candida. sp* in 16 samples (12.30%) *T. mentagrophytes* in 5 (3.84%) and *M. canis* in 4 (3.07%) cases.

Table 4. The distribution of the fungal species detected in the cultures in the total number of samples.

Fungal Species	n	(%)
Trichophyton rubrum	48	(36.92%)
Trichophyton mentagrophytes	5	(3.84%)
Trichophyton violaceum	2	(1.53%)
Trichophyton verrucosum	1	(0.76%)
Epidermophyton floccosum	3	(2.30%)
Microsporum canis	4	(3.07%)
Candida sp	16	(12.30%)
Candida + T. Rubrum	7	(5.38%)
Non–propagated	44	(33.84%)
Totol	130	(100%)

The distribution of isolated dermatophytes and *Candida sp.* was as follows: *T. rubrum* in 48 samples (57.14%), *T. mentagrophytes* in 5 (5.95%), *M. canis* in 4 (4.76%) *Candida sp. + T. rubrum* in 7 (8.33%) and *Candida sp.* in 16 (19.04%) samples.

The prevalence of dermatophytes and *Candida. sp* according to gender was as follows: in women: *T. rumrum,* 43.33%; *Candida. sp,* 3.75%; *E. floccosum,* 2.80%; *T. violaceum,* 1.86%; *T. veerucosum,* 0.93%; *Candida. sp. + T. rubrum,* 4.48%; and *Candida. sp*, 4.60%.

Table 5. The distribution of 130 cultured dermatophyte species according to infection site.

Infection Site	(n=93) T. pedis (%)n	(n=10) T. inguinal (%)n	(n=10) T. unguium (%)n	(n=7) T. manum (%)n	(n=5) T. corporis (%)n	(n=5) T. capitis (%)n	(n=130) Total (%)n
T. rubrum	39 (41.95%)	5(50%)		1(14.30%)	1(20%)	1(20%)	48 (36.92%)
T. mentagrophy	4 (4.30%)		1 (10%)				5 (3.84%)
M. canis	1 (1.07%)					3 (60%)	4 (3.07%)
E. floccosum	1 (1.07%)	1 (10%)	1 (10%)				3 (2.30%)
T. violaceum					1 (20%)	1 (20%)	2 (1.53%)
T. verrucoum					1 (20%)		1 (0.76%)
Cn.sp+T. rub.				1 (14.28%)			7 (5.38%)
Candida sp.	12 (12.90%)	1 (10%)	1 (10%)				16 (12.30%)

Results and Discussion

There have been many studies of the ethiology of superficial fungal diseases. The clinical symptoms of fungal infections can easily be confused with the symptoms of other dermatological diseases. Although highly prevalent in Turkey, dermatophytes are generally clinically diagnosed due to the lack of adequate laboratories (9).

Although the present data is in good agreement with previously published results in many aspects there are some variations related to climatic and regional changes. In the present study, the etiology of dermatophytosis was investigated as regards age, gender and localisation. Most of the dermatophytes were isolated in the 16–30 age group, predominantly made up of males. As regards localisation, they were mainly isolated in age group tinea pedis and tinea versicolor. Lesions in tinea capitis were most common in the under–15 and lessions lesions in tinea pedis were prevalent in middle–aged and elderly people.

Aşçı (9) and Kilik et. al. (10) isolated *Corynobacterium minuttisima* in addition to other species in studies carried out in Elazığ and Kayseri. Kuştimur (12), on the other other hand, observed that T. mentagrophytes were predominant in his study in the Ankara region, in contrast to our region.

The distribution of dermatophytes according to infection site is: in, tinea pedis; *T. rubrum*, 41.95%; *T. Mentagrophytes*, 4.30%; *M. canis,* 1.07%; *E. floccosum*, 11.07%; *Candida sp. + T. Rubrum*, 6.45%; *Candida sp.,* 12.90%; in tinea inguinalis; *T. rubrum* 50%; *E. floccosum*, 10%; *Candida sp.,* 10%; in tinea unguium: *T. mentagrophytes*, 10%; *E. floccosum*, 10%; *Candida.sp*, 20%; in tinea manum: *T. rubrum*, 14.30%; *Candida. sp*

+ *T. rubrum*, 14.28%; *Candida. sp*, 10%; in tinea corporis: *T. rubrum*, 20%; in tinea capitis: *T. rubrum*, 20%; *M. canis*, 60%; *T. violaceum*, 20%. In addition, *Malasezia furfur* was detected at a rate of 40% under direct miscoscopy (Table 5). The results were found to be in good agreement with those of previous studies (9, 11–13).

Studies carried out on the rate of infection from initial superficial fungal infections show that it varies widely with gender. Some studies claim that *T. rubrum, T. mentagrophytes, E. floccosum* are the prevalent pathogens in males while others have shown that *T. rubrum, E. floccosum* and *M. canis* are much more dominant. In women, fungal diseases in the nails were common (9, 12, 17).

Ural et. al. (18) demonstrated the prevalence of *T. Schönleini* in patients having tinea capitis in the İzmir Region. Temizer et al. (14) isolated *T. tonsurans* and *M. gypseum* in the Eskişehir region. In this study, the distribution of 86 dermatophyte species grown in culture was as follows: *T. rubrum* in 48 (36.92%), *T. mentagrophytes* in 4 (3.07%), *E. floccosum* in 2 (1.53%), *T. violaceum* in 1 (0.76%) and *Candida. sp* + *T. rubrum* in 16 (12.30%) cultures.

Kölemen and Kürkçüoğlu (19) also demonstrated the prevalence of species. 1227 dermatophytes were isolated and identified *T. rubrum* (39.9%), *T. mentagrophytes* (21.1%), and granulosum–type (9.4%), and interdigitale –type (11.7%) species caused the majority of infections. The incidence of *T. verrucosum*, *E. floccosum, M. canis, T. violaceum*, and *T. schoeenleinii* were 11.4%, 9.8%, 5.7% and 3.4% respectively.

In the present study, T. rubnum, 37.40%, T. mentagrohytes, 14.67%, M. canis, 3.75%, E. floccosum, 2.80%, *T. violaceum*, 0.93%, *T. verrucosum*, 0.93%, *Candida sp.* + *T. rubrum,* 4.68% and *Candida sp.,* 5.60%, were isolated in greater numbers in males than in females. It was observed that there was a statistically significanty difference between the results obtained for each gender.

Dermatophytic infections also vary with age. For instance, tinea capitis is a childhood disease since the fatty acid formed during the maturation period causes changes in pH and prevents this infection. Tinea pedis, on the other hand, is a disease observed mainly in young and middle–aged people. Other infections can be seen in all age groups.

Aşçı (9) found propagation in 206 (20.14%) and no propagation in 199 (8.88%) of 399 samples which he defined as positive. These figures were 20 (11.96%) and 604 (59.04%) in 624 samples defined as negative under direct microscopy.

In the present microscopic study of fungal species, 74 samples were defined as positive (56.92%), of which 68 displayed growth (52.30%) and 60 displayed no growth (4.61%). 18 (13.85%) of the 56 samples defined as negative (43.07%) showed growth and 38 (29.23%) showed no growth under microscopic investigation. The following results were also obtained:

1. The investigation of 20% KOH solutions of 170 skin, nail and hair samples under the microscope revealed fungal spores in 74 (56.92%) and no fungal element in 56 (43.07%) of them.

2. Of the 130 cultured samples, 63 produced dermatophytes (84.46%), 7 produced *Candida.sp* + *T. rubrum* (5.28%) and 16 produced *Candida. sp* (12.30%). Forty samples determined to be *Malezia furfur* were not placed in a culture medium.

3. The distribution of fungal species in 86 dermatophyte species was as follows: *T. rubrum*, 57.14%; *T. mentagrophytes,* 5.95%; *E. floccosum*, 3.57%; *M. canis,* 4.76%; *T. violaceum,* 2.38%; and *T. verrucosum,* 1.19%. *T. rubrum* and *Candida. sp* were determined as being most frequent in dermaphytosis infections.

4. The distribution of fungal species grown in culture was: In tinea pedis, *T. rubrum*; in tinea inguilais, *T. rubrum*; in tinea unguium, *Candida sp*; and in tinea capitis, *M. canis.*

5. The prevalence of these species according to gender was as follows: in males: *T. rubrum,* 37.40%; *T. mentagrophytes*, 4.67%; *M. canis,* 3.75%; *E. floccosum*, 2.80%; *Candida. sp* + *T. rubrum,* 4.68%; *Candida. sp,* 5.60%; *T. verrucosum*, 0.93%; *T. violaceum*, 2.80%; *Candida. sp,* 5.60%; and *M. furfur* 61.70% in females: *T. rubrum*, 43.47%; *Candida. sp* + *T. rubrum,* 8.70%; and *M. furfur*, 59.87%. The results for culture growth according to gender were found to be statistically significant ($P<0.05$).

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