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ORIGINAL RESEARCH

Do family history and gender influence the risk of dermatophyte infection? A cross-sectional study at a tertiary care facility

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ABSTRACT

Background and objective: Dermatophytes, categorized into *Trichophyton, Epidermophyton, and Microsporum*, are hyaline molds with protease enzymes that enable skin colonization, invasion, and infection of the outer layers, hair shaft, and nails. The objective of this study is to find out the association of family history and gender with dermatophyte infection. **Material and method:** A cross-sectional investigation involved 404 clinically suspected dermatophytosis cases at Maharaja Yashwantrao Hospital, Madhya Pradesh. Samples were sent to the Department of Microbiology between December 2022 and January 2023, with permission from both scientific and ethical committees.**Result:** In the present study, a total of 404, clinically suspected cases of dermatophytosis were included. Out of which, 204 (50.5%) were females and 200 (49.5%) were males. Out of 404 cases, 205 (50.7%) dermatophytes were isolated, in which 112 (54.6%) were *Trichophyton rubrum*, 92 (44.8%) were *Trichophyton mentagrophytes* and 1 (0.48%) was *Microsporumgypseum*.**Conclusion:** The study found that dermatophyte infection is more common in males due to outdoor activities and labour work, but no significant association was found between family history and infection.

Key words: Dermatophytosis, family history, DTM, KOH

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INTRODUCTION

Dermatophytes are hyaline, septate molds, and they are categorized into three primary groups based on their physical features [1]. This group encompasses *Trichophyton*, *Epidermophyton*, and*Microsporum*. These fungi possess the capability to create a protein-digesting enzyme known as protease. This enzyme breaks down keratin, facilitating the colonization, invasion, and infection of the skin's outer layer, the hair shaft, and the nail [2].These types of fungi can be divided into three categories based on where they usually live:anthropophilic, zoophilic, and geophilic. Each category comes from a different source: humans, animals, and soil, respectively [3]. The signs and symptoms differ based on the specific fungus causing the infection and how the infected person's immune system reacts; they can persist for a few months to many years, and the symptoms might be silent or include only itching [4].Geographical location, age, and gender are important factors that affect how common these illnesses are [5]. Postpubertal hosts are typically affected by dermatophytosis more frequently. Men are usually affected more frequently than women because of the much higher occurrence of tinea cruris, tinea pedis, and tineaunguium in men as well as the fact that working outside exposes men to hot, humid, and sweaty circumstances that are favourable to the growth of dermatophytes [6]. Family member and individuals in near contact with these individuals could also be infected from them.The objective of this study is to find out the association of family history and gender with dermatophyte infection

MATERIAL AND METHODS

This cross-sectional investigation centred on dermatophytosis cases that were clinically suspected. A total of 404 patients who were suspected of having

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a dermatophyte infection visited the outpatient clinic of the dermatology, venereology, and leprosy section of Maharaja Yashwantrao (M.Y.) Hospital, which is connected to Mahatma Gandhi Memorial Medical College (MGMMC), in Indore, Madhya Pradesh. These samples were sent to the Department of Microbiology between December 2022 and January 2023. Both the scientific and ethical committees gave their permission prior to the study starting.

Collection of Samples: In accordance with established guidelines [7], the site was meticulously clean with 70% ethanol. The samples were obtained from the active zone surrounding the affected region, which marks the outer limit of the contamination.**Skin:** Smooth skin lesions showing signs of active inflammation were carefully scraped from the outer edges; if the inflammation was not visible, the entire lesion was scraped. The most efficient technique for collecting involved using a sterile scalpel to extract epidermal scales near the advancing borders of the lesions.**Nails:** Samples were collected from the base of the nail and the underside of the nail plate, particularly around the edges of the affected area, using a small curette or scalpel blade after the nails had been trimmed for cases of distal subungual onychomycosis. **Hairs**: Hair roots and crusts were removed from the infected area or its edges for large lesions, ensuring that the root was included, and any lesions that were oozing were swabbed.

Direct microscopy of the specimens: The samples collected underwent a KOH wet mount procedure. A 10% KOH solution was utilized for the skin and hair samples, which were left for a duration of 10-15 minutes, and a 40% KOH solution was reserved for the nail samples, which were stored throughout the night. A minimal quantity of the sample was transferred to a drop of KOH positioned on a glass slide, followed by the application of a cover slip.

Fungal culture: The organism was isolated using Sabouraud dextrose agar that had chloramphenicol (0.05%) added, or Dermatophyte Test Media (DTM). The remaining skin, hair, and nail samples were placed directly onto the agar and checked every other day for signs of growth. Both SDA and DTM plates were monitored for 4 weeks and 2 weeks, respectively. Additional analysis was conducted on the appearance of the colonies, microscopic features, and specific biochemical tests to identify the type of dermatophyte species.

Statistical analysis

The data were analysed using SSPS version 22. Frequencies and percentages were used to describe the categorical variables in this study. The results were presented as proportion ratios with a 95% confidence interval. Statistical significance was set if p-value <0.05.

RESULT

In the present study, a total of 404, clinically suspected cases of dermatophytosis were included. Out of which, 204 (50.5%) were females and 200 (49.5%) were males. Out of 404 cases, 205 (50.7%) dermatophytes were isolated, in which 112 (54.6%) were *Trichophyton rubrum*, 92 (44.8%) were *Trichophyton mentagrophytes* and 1 (0.48%) was *Microsporumgypseum*.

Table 1: The distribution of patients is based on age groups and gender.

Age in years	Male	Female	Total	%	Chi-square
0-10	10	6	16	3.9	= 27.205
11-20	30	19	49	12.1	
21-30	57	50	107	26.5	
31-40	49	87	136	33.6	
41-50	45	23	68	16.8	**p- value**
51-60	6	13	19	4.7	<0.0001
61-70	2	6	8	1.98	
>71	1	0	1	0.24	
Total	**200**	**204**	**404**	**100**	

A chi-square test was fitted to the above table, where the value of chi-square ($\chi 2$) was 27.205 with 7 degrees of freedom.

The p-value is <0.0001.

The test was found to be statistically significant with a p-value < 0.05. This indicates that the prevalence of dermatophytosis in males and females is significantly different. In the adult age group (31–40 years), females (64%) are more affected than males (36%).

Table 2: Distribution of patients according to family history

Family history	Cases	Culture positive	Percentage of cases (%)
Present	160	79	40
Absent	244	126	60

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The chi-squared test for the provided data results in a chi-squared value of approximately 0.118 and a p-value of approximately 0.731. This indicates that there is no statistically significant association between family history and cultural positivity in cases of dermatophytosis ($p > 0.05$).In our study, family history was supportive in 160 (40%) of patients.

DISCUSSION

The current investigation was carried out in the Microbiology Department of the Mahatma Gandhi Memorial Medical College, tertiary care facility, Indore. A total of 404 suspected cases of dermatophyte infections were observed. As regards gender prevalence, the maximum number of cases belonged to the males. This is in accordance with the findings of the following studies.In the present study, males 106 (51.7%) were slightly more commonly affected than females 99 (48.3%). Male to female ratio was 1.07:1, which is comparable with other studies done by Vijay Nanoty*et al*. [8], and SahebraoMundhe*et al.* [9] Male predominance could be due to the fact that males were more commonly involved in outdoor physical activities and labour work, which leads to excessive sweating making a favorable environment for fungal infections.In our study, out of 404 patients, 160 (40%) had a family history of dermatophytosis. A similar finding was seen in the study of Kumar et al, [10] where a family history of superficial dermatophytosis was present in 41.6%. Just like scabies, they also show a familial tendency to spread. Probably due to direct physical contact, things like sharing of beds, linens, and clothing were common among family members. The association of family history with dermatophytosis varies among studies, but recent data indicate a notable connection. For instance, a multicentric study conducted across several Indian cities found that 20.8% of patients with dermatophytosis had a family history of skin diseases [11]. In study done by Dalei *et al.* 2023, Odisha, a family history of dermatophytosis was present in 27% of cases [12].

CONCLUSION

We have concluded that the dermatophyte infection occurs slightly more commonly in the male population, which might be due to the fact that males are more commonly involved in outdoor physical activities and labour work. Moreover, most people have a family history of dermatophyte infection, but there was no significant association between family history and dermatophyte infection in this study.

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