

Original Research Article

Clinical patterns and epidemiological characteristics of dermatophyte infection in Malwa region of Punjab

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ABSTRACT

Background: Although dermatophytes are found throughout the world, the most prevalent strains and the most common sites of infection vary by region. Hot, humid climates and overcrowding predispose populations to skin diseases; including tinea infections. This study highlights the clinical pattern and epidemiological characteristics of dermatophyte infection in the Malwa region of Punjab.

Methods: A cross sectional prospective study was carried out over a period of two years depending on pre-structured questionnaire on a total of 272 patients clinically suspected cases with dermatophyte infection. Socio-demographic and clinical information was collected and sample was taken. The collected samples were subjected to direct microscopy with potassium hydroxide and cultured on Sabourauds dextrose agar to identify the fungal species

Results: A total of 272 patients were included in the study in which 147 were males and 125 were females. Occupation wise housewives were the most affected group constituting 114 cases. *Tinea corporis* was the most common type found in 159 cases and *Trichophyton mentagrophytes* was the most common isolated fungi. Maximum number of dermatophyte cases was in the age group of 21-30 years with 69 cases.

Conclusions: In current research we observed that hot and humid environment of Malwa region of Punjab increases the prevalence of fungal infection especially in the month of June to September and the occupation of people also plays an important role in prevalence of infection. We also observed that dermatophyte fungal infection is more common in adult males as compare to females.

Keywords: Dermatophyte, Tinea, Prevalence, Trichophyton

INTRODUCTION

Dermatophytes are one of the most common cause of skin infection in tropical and subtropical countries. These fungi are responsible for largest number of superficial mycoses as they infect only uppermost layer of skin because fungi are unable to penetrate deeper tissue/organ.

Dermatophytes are classified on the basis of genus-*Trichophyton* (causes infection of skin, hair and nail) have 24 valid species, *Epidermophyton* (causes infection

of only skin) have only 2 species and *Microsporum* (causes infection of skin and hair) have 16 valid species. On the basis of habitats, they are classified into anthropophilic (humans), zoophilic (animals), and geophilic (soil). And lastly on the basis of anatomical site dermatophytes are classified clinically into *Tinea capitis* (head), *Tinea corporis* (on glabrous skin), *Tinea cruris* (on groin area), *Tinea unguium* (on nail), *Tinea pedis* (on feet), *Tinea faciei* (on face) and *Tinea manum* (on hand).¹

The infection can easily spread by direct contact from infected animals and humans and can also spread by indirect contact through fomites like clothes, bed sheets, towels, comb etc. The prevalence of different species of dermatophyte varies according to the geographical region and socio-economic status.² Dermatophyte lesions on different body parts usually occur as itchy, red, scaly lesion with irregular borders and clear central area. This is also called as *Tinea* or ring worm due to its appearance and not because it is caused by any worm.³ In recent years due to changes in climate conditions like high temperature and humid weather, changes in lifestyle like wearing tight clothes and increased use of antibiotics has increased the prevalence of dermatophyte infection. The infection is not life threatening but it is important for public health problem.⁴

The dermatophyte enters the body through the injured skin, scars, burns and deposit arthrosporic which causes the infection. A dermatophyte spore invades the uppermost, non-living, keratinized layer of the skin the stratum corneum, produce exo-enzymes and induces inflammatory reaction at the site of infection. The symptoms of inflammatory reaction are redness and swelling which are seen at the site of infection. The infection spread via inflammation from one site to another site and this movement of pathogen forms the ringed lesions around the infection site.⁵ Mostly dermatophytes are unable to enter the deep layer of skin but in case of immunosuppression like patients with human immunodeficiency virus and patients on chemotherapy allow the dermatophyte to infect the subcutaneous tissue.⁶

This study aims at determining the epidemiological features of dermatophyte infection in Malwa region of Punjab where climatic conditions especially in summer are favorable for dermatophytes. The prevalence and incidence of infection of dermatophytes have increased considerably. Many data have been published on prevalence of dermatophyte from various region of India but not much from Punjab especially from Malwa region. Hence, conducting further studies to know the actual magnitude of dermatophytosis as well as the spectrum of its etiological agents among the population of Malwa region was necessary. Investigation of the prevalence of fungal dermatitis will provide further insight into the epidemiological situation in the region.

METHODS

The present study has been conducted in the centre for interdisciplinary biomedical research, Adesh university, Bathinda, in the period of June 2017 to December 2018.

All patients visiting the outpatient department of dermatology, presenting with clinical diagnosis of dermatophyte infection, giving consent were included in the study. Patient unwilling to give consent were excluded from the study.

The study was carried out after the approval of the institutional research committee and ethical committee of the Adesh university, Bathinda. A questionnaire was used to record the demographic details of all patients including the age of onset, duration of disease, site of onset, rate of progression, associated symptoms, and family history. Information was also noted regarding any precipitating factors, previous treatment taken, drug intake prior to the onset and associated cutaneous or systemic diseases. After the detailed history and written and oral consent from the patients, a clinical examination of patients was done in proper light and the site of the lesions, number of lesions, types of lesions, presence of inflammation at the site and edges of lesion was seen and noted.

The statistical analysis was performed using the SPSS software version 20.0. Continuous variables were presented as measures of central tendency such as mean and standard deviation and categorical variables were presented as absolute numbers and percentage. Categorical variables were analysed using the chi square test. For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

The patients were classified based on clinical material collected from different sites of infection as *Tinea corporis* (non-hairy skin), *Tinea cruris* (groin), *Tinea pedis* (feet) and *Tinea faciei* (face). Skin was decontaminated with 70% alcohol to remove surface dirt, bacterial contamination and any opportunistic fungi that may be present at the surface of the lesions. Skin sample was collected from erythematous, peripheral, actively growing margins of lesions in a sufficient amount in 2 ml Eppendorf by using blunt edge of a sterile surgical blade.

One portion of sample was used for direct microscopic examination using 10% KOH and examined under 40x and 100x (oil immersion) objectives (Olympus CX31RTSF). The sample was placed on the clean slide after teasing with forceps and few drops of 10% KOH were added, cover slip was placed over it and the sample was pressed properly and examined under low and high-power objectives. The detailed examination was done for fungal hyphae, spores, and budding cells.

Other portion of the sample was used for the culturing of skin samples. SDA media with gentamycin (20 mg/ml) was used for the growth of dermatophytes from skin and incubated at 28°C for 7-15 days. After the growth of the fungi, the cultures were examined to study the colony morphology based on following characteristics: Colony characters on observation like the colour and consistency and colony characters on reverse like presence/absence of pigment, appearance, ability to diffuse not and microscopically by lacto phenol cotton blue mount for the presence of vegetative hyphae, microconidia and macroconidia.

RESULTS

A total of 272 patients were included in the study in which 147 (54%) were males and 125 (46.6%) were females. Among the 272 skin dermatophytes, *Tinea corporis* was the most common type found which was present in 159 (49.68%) cases, followed by *Tinea cruris* with 97 (30.31%) cases. Others clinical types were *Tinea faciei* with 11 (3.4%) cases and *Tinea pedis* with 5 (1.5%) cases (Table 1).

Out of 272 patients' maximum number of dermatophyte cases were 69 (25.3%) in the age group 21-30 years and 65 (23.8%) in 31-40 years age group, followed by 50 (18.3%) patients in the age group 41-50 years. The prevalence was low in two extremes of age; below 20 years with 35 (12.8%) cases and above 50 years with 53 cases (Table 2).

Table 1: Age and sex wise distribution in relation to clinical type.

Species	<i>T. corporis</i> (on glabrous skin)		<i>T. cruris</i> (on groin area)		<i>T. faciei</i> (on face)		<i>T. pedis</i> (on feet)	
Age (Year)	M	F	M	F	M	F	M	F
0-10	-	1	-	-	2	-	-	-
11-20	12	3	14	1	1	-	1	-
21-30	19	22	15	6	3	1	-	2
31-40	11	24	17	9	3	-	-	1
41-50	10	22	10	8	-	-	1	-

Table 2: Age and gender wise distribution of 272 clinically suspected cases.

Age (year)	Male	Female	Total	Percentage (%)
0-10	2	1	3	1.1
11-20	28	4	32	11.7
21-30	38	31	69	25.3
31-40	31	34	65	23.8
41-50	20	30	50	18.3
51-60	19	16	35	12.8
61-70	9	9	18	6.6
Total no. of patients	147	125	272	100

Table 3: Occupation wise distribution of dermatophytes cases in skin.

Occupation	Male	Female	Total (%)
House wives	0	114	114 (41.9)
Agriculture	49	0	49 (18.0)
Students	32	6	38 (13.9)
Army men	28	0	28 (10.2)
Professionals	13	5	18 (6.6)
Labour	11	0	11 (4.0)
Business class	14	0	14 (5.1)
Total	147	125	272

Table 4: Species wise distribution of cases.

Species	Male	Female	Total	Percentage (%)
<i>T. mentagrophytes</i>	59	56	115	42.2
<i>T. rubrum</i>	41	25	66	24.2
<i>E. floccosum</i>	20	22	42	15.4
<i>T. tonsurans</i>	7	8	15	5.51
<i>M. gypseum</i>	3	5	8	2.9
<i>T. verrucosum</i>	6	1	7	2.5
<i>M. canis</i>	2	2	4	1.4
<i>Aspergillus flavus</i>	4	1	5	1.8
Negative	5	5	10	3.6
Total	147	125	272	100

In this study, male was more affected with dermatophyte infection as compare to female but occupation wise housewives were the most affected group constituting 114 (41.9%) cases followed by agriculture worker constituting 49 (18.0%) cases, students with 38 (13.9%) cases, army personnel in 28 (10.2%) cases, 18 (6.6%) cases were from government, 14 (9.5%) cases were of private professional's business class and 11 (7.4%) cases of labor class (Table 3).

Trichophyton mentagrophytes was the most common isolated fungi, reported in 115 (42.2%) cases followed by *Trichophyton rubrum* (24.2%), *Epidermophyton floccosum* (15.4%), *Trichophyton tonsurans* (5.51%), *Microsporum gypseum* (2.9%), *Trichophyton verrucosum* (2.5%), and *Microsporum canis* (1.4%). *Aspergillus flavus* was also found in 1.8% cases and 10(3.6%) cases were observed negative (Table 4).

DISCUSSION

Dermatophytes are a unique group of moulds which are able to penetrate keratinized tissue in man and animals, causing infection of skin, hair and nail commonly known as 'Tinea' and 'ringworm'. Fungal infection is mostly found in tropical countries with suitable climate, economic and social conditions such as high and humid temperature, poverty, overcrowding and living conditions. This study highlights the clinical pattern, predisposing factor, dermatophyte species distribution of different dermatophytes in Malwa region of Punjab.

The present study involved mycological analysis of 272 cases of skin dermatophytes. The material was collected from the lesion, one portion was used for direct KOH examination and another was for culture inoculation on SDA medium.

In current study the most affected age group found was 21-30 years with 69 (25.3%) cases followed by the age group 31-40 years with 65 (23.8%) cases. The prevalence was low in two extremes of age; below 20 years with 35 (12.8%) cases and above 50 years with 53 (19.4%) cases. Kumar in his study reported that the occurrence of *Tinea* infection was very common in age group 21-30-year (55%), followed by 31-40 years (24%), 41-50 years (12%) and 11-20 years (9%) age group which was similar as observed in present study.⁷ Khade et al also reported that majority of cases of dermatophytes were in the age group of 21-30 years.⁸

Dabas et al reported that dermatophyte infection is more prevalent in males than females and mean age of patient was 31.2 years. This may be because this age group is more involved in outdoor activities involving physical labour and agriculture occupation.⁹ In present study also we found that male (54%) were more prone to have fungal infection than females (46.6%) and main occupation of males was farming where they were regularly exposed to infection through animals and soil

which are main source of dermatophyte infection and female were mostly house wives who did not only involve with farming activities but also had direct contact with domestic animals. Janagond et al also reported that men were more commonly affected with dermatophyte infection than women in which 48% patients were students and 26% were involved in agriculture activities.¹ Sumathi et al reported same that males were more prone to have dermatophyte infection as compare to female.¹¹

In present study we found that *Tinea corporis* (49.68%) was the major clinical type of infection followed *Tinea cruris* (30.31%), *Tinea faciei* (3.4%) and *Tinea pedis* (1.5%). Kannan et al reported that the prevalence of fungal infection worldwide is 20-25% and *Tinea corporis* was more common fungal infection followed by *Tinea cruris*.¹¹ This same fact was reported by Konda et al that more common clinical site was *Tinea corporis* followed by *Tinea cruris* and *Tinea unguis*.¹²

Divya et al reported that in combination *Tinea corporis/Tinea cruris* were more common which infected multiple sites (39%) followed by *Tinea cruris* (33%).¹³ Thakur et al also stated the same that *Tinea corporis* (61.20%) was commonest clinical type followed by *Tinea cruris* (24.34%) and this fact was in agreement with the report of Doddamani et al.^{13,14}

Sharma et al stated that the prevalence of *Tinea corporis* is reported high in many studies especially in India. Certain body parts are exposed more commonly than other body parts like the hand which can get in contact with another part which help the spread the infection. *Tinea corporis* presents in many morphological forms from single to multiple variably sized lesions. This disease easily gets transmitted from one member of family to other members by direct contact or by through fomites like sharing clothes, towels, bed linen etc.¹⁵

Out of 272 cases of skin *Trichophyton mentagrophytes* (40.3%) was the most common isolated species followed by *Trichophyton rubrum* (24.2%), *Epidermophyton floccosum* (15.4%), *Trichophyton tonsurans* (5.51%), *Microsporum gypseum* (2.9%), *Trichophyton verrucosum* (2.5%) and *Microsporum canis* (1.4%). Pathania et al also observed that *Trichophyton mentagrophyte* (40%) was the most common species followed by *Trichophyton rubrum* (32.2%).¹⁶ Bhatia and Sharma, conducted a study in Himachal Pradesh where *Trichophyton mentagrophytes* was the common isolated species (63.11%) followed by *Trichophyton rubrum* (35.1%) and *Mycosporum gypseum* (1.35%).¹⁷ Similarly Devrari et al also reported that *Trichophyton mentagrophytes* was the most common etiological agent followed by *Trichophyton rubrum*.¹⁸ Adekhandi et al reported same.¹⁹

CONCLUSION

This study marks an increasing trend in dermatophyte infection in the Malwa region of the Punjab and also

highlights the social and environmental factors including climatic conditions of the region, lack of personal hygiene, age, gender and occupation of the patient. Hot and humid environment of Malwa region of Punjab has played a major role in increasing the prevalence of fungal infection especially in the month of June to September and the occupation of people also plays an important role in increasing the prevalence. In this research it was also observed that adult males are more affected as compare to females and dermatophyte fungal infection can easily get transferred from infected person to healthy individual by direct contact and from their clothes and fomites.

Because of the psychological effects and high morbidity in terms of loss of working days and treatment dermatophyte infection is a public health problem. Therefore, to obtain a true representation of the overall disease pattern of the region more such types of studies should be conducted.

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REFERENCES

- Janagond AB, Rajendrant T, Acharya S, Vithiya GRA., Charles J. Spectrum of dermatophytes causing tinea corporis and possible risk factors in rural patients of Madurai region, South India. National J Lab Med. 2016;5:MO29-32.
- Nagaral GV, Veerabhadra GG, Jagadevi SP. Prevalence of tinea corporis and tinea cruris in Chitradurga rural population. Indian J Clin Exp Dermatol. 2006;4:221-5.
- Yadav A, Urhekar AD, Mane V, Danu MS, Goel N, Ajit KG. Optimization and isolation of dermatophytes from clinical samples and in vitro antifungal susceptibility testing by disc diffusion method. J Microbiol Biotechnol. 2013;2(3):19-3.
- Hosthota A, Gowda T, Manikonda R. Clinical profile and risk factors of dermatophytoses: a hospital-based study. Int J Res. 2013;4(4):50894.
- Imo C, Za'aku JS. Medicinal Properties of Ginger and Garlic: A Review. Curr Trends Biomedical Eng & Biosci. 2019;18(2):47-52.
- Gupta A, Kaur S, Gill PK. Combination drug treatment in tinea infections of cutaneous soft tissues. J Med Health Res. 2018;3(1):16-23.
- Kumar S. Clinico Microbial Identification and Characterization of Dermatophytes and Mrsa in Jaipur. JECRC University. 2017.
- Khade AS, Burute SR, Deogude SS, Jadhav P, Ramanand SJ. A Study of Clinical Profile of Dermatophytosis with a Changing Clinical Pattern at a Tertiary Care Centre. J med sci cli res. 2017;6(05):622-70.
- Dabas Y, Xess I, Singh G, Pandey M, Meena S. Molecular identification and antifungal susceptibility patterns of clinical dermatophytes following CLSI and EUCAST guidelines. J Fungi. 2017;3(2):17.
- Sumathi S, Mariraj J, Shafiyabi S, Ramesh R, Krishna S. Clinic mycological study of dermatophytes. Int J Pharm Biomed Res. 2017;4:132-4.
- Kanaan ICS, Santos TBP, Ka, B. K., Souza AMVD, Cerqueira AMMD. Majocchi's granuloma-Case report. Anais brasileiros de dermatologia. 2015;90(2):251-3.
- Konda C, Surekha JK, Jahnavi I, Madhuri DS, Nagamani K. Isolation and Identification of Dermatophytes in a Tertiary Care Hospital. Int J Curr Microbiol App Sci. 2017;6(12):4088-101.
- Thakur R, Kushwaha P, Kalsi AS, Singh P. Tinea genitalis in a rural tertiary care hospital of Western UP India. Indian J Clin Exp Dermatol. 2018;4(4):266-73.
- Doddamani PV, Harshan KH, Kanta RC, Gangane R, Sunil KB. People's J Scient Res. 2018;6:10-3.
- Sharma R, Malik A. Activity of natural products derived essential oils against dermatophytes. World J Pharmacy Pharmaceut Sci. 2015;4:1203-9.
- Pathania S, Rudramurthy SM, Narang T, Saikia UN, Dogra S. A prospective study of the epidemiological and clinical patterns of recurrent dermatophytosis at a tertiary care hospital in India. Indian J Dermatol Venereol Leprol. 2018;84(6):678.
- Bhatia VK, Sharma PC. Epidemiological studies on dermatophytosis in human patients in Himachal Pradesh, India. Springerplus. 2014;3(1):134.
- Devrari, JC, Saxena V, Pai V. A mycological study of clinical samples from suspected mycoses in a tertiary care hospital. Asian J Pharmaceut Clin Res. 2018;11(4):267-70.
- Adekhandi S, Pal S, Sharma N, Juyal D, Sharma M, Dimri D. Incidence and epidemiology of onychomycosis in patients visiting a tertiary care hospital in India. Cutis. 2015;95(1):E20-5.

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