International Journal of Research in Dermatology
Hosthota A et al. Int J Res Dermatol. 2018 Nov;4(4):508-513
http://www.ijord.com

DOI: http://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20183860

Original Research Article

Clinical profile and risk factors of dermatophytoses: a hospital based study

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Received: 16 August 2018
Revised: 04 September 2018
Accepted: 05 September 2018

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ABSTRACT

Background: Dermatophytoses are superficial mycoses which represents most common community health problem across the globe. Surveillance studies are required to understand the changing epidemiology and prevalence of causative agents to decide on appropriate therapy. This study aims to evaluate the clinical types, etiological agents and probable risk factors of dermatophytoses.
Methods: It was a cross sectional study of 150 clinically suspected cases of dermatophytoses during six months. Sociodemographic details, clinical history and detailed examination were collected from all the subjects. Skin scrapings were sent to microbiology for direct microscopy and fungal culture.
Results: Among the 150 subjects enrolled, males outnumbered females. Infection was mostly prevalent in the age group of 21-30 years (37.3%). Tinea cruris was the commonest clinical type (50%) followed by Tinea corporis (18.4%) and Tinea unguium (11.9%). Tricophyton rubrum was the aetiological agent isolated in majority (33%), followed by Tricophyton mentagrophytes (20%). The major risk factors of dermatophytoses were poor hygiene (32.1%), topical steroid usage (23.9%) and diabetes mellitus (20.1%).
Conclusions: The present study has provided recent data on etiological agents of dermatophytoses and risk factors in our area. It is essential to develop measures for prevention, control of dermatophyte infections and establishment of therapeutic strategies.

Keywords: Dermatophytoses, Risk factors, Dermatophytes

INTRODUCTION

Superficial mycoses are infections of skin, hair and nail caused by dermatophytes, yeasts and non-dermatophyte molds.[1] It is estimated that superficial fungal infections affect roughly 20-25% of the world population.[2] Among these, dermatophytes are responsible for the largest number of cases; hence it is of community health concern.[1] Dermatophytes are a group of fungi which cause lesions commonly referred to as "ringworm" or "tinea". They comprise of three genera *Microsporum*, *Trichophyton*, and *Epidermophyton*.[3,4] Disease transmission occurs by direct contact with infected humans /animals or indirectly by contaminated fomites.[5] The clinical diagnosis of this infection can be established by typical manifestations and distribution of lesions. Occasionally direct examination and culture is performed for diagnostic confirmation and management.[3]

There is increase in prevalence of these infections in recent years due to inappropriate usage of higher antibiotics, immunosuppressive drugs, change in lifestyle and climatic conditions. The severity of these infections depends on the etiological agent and immune status of the

patients. Various studies related to dermatophyte infections have reported differences in the incidence and the etiological agents in different geographical locations. Their incidence and their epidemiological characteristics depend on social, geographical and environmental factors which may change with the passage of time.[6-8]

Skin infection due to dermatophytes has become a significant health problem affecting children, adolescents and adults.[9] It is important to constantly review the causative agents and its distribution to avoid resistant, recurrent dermatophytoses and also for optimal management strategies. Therefore this study was undertaken to assay the various clinical presentation, causative agents and risk factors of dermatophytoses.

METHODS

This was a descriptive, prospective, cross-sectional, observational study hospital based study. The study population included 150 consecutive clinically suspected cases of dermatophytoses of all age groups and both sexes attending the Dermatology outpatient department of The Oxford Medical College, Hospital and Research Centre, Bangalore during 6 months period from December 2015 to May 2016. Patients under antifungal treatment for >4 weeks and non-dermatophytic fungal infections were excluded from the study. The written informed consent was taken from the subjects and from their parents who were below 18 years of age. This study was approved by the ethical committee of the institute. Data collection was done using a pre-structured and pre-tested proforma. Relevant clinical history and detailed examination of the lesion was done under good illumination. Baseline investigations were performed to rule out any predisposing conditions. Skin scrapings were sent to microbiology for direct microscopy and fungal culture.

Collection of samples

After cleaning the affected area with 70% ethanol, skin scrapings were taken with sterile scalpel from the active edge of the lesions. In case of nail infections, clippings and scrapings are taken from friable or discolored areas of hyperkeratotic nails. Hair clippings were taken is cases of scalp infection. Scrapings/clippings were sent to lab in small brown paper envelopes for easy visualization of specimens and processed for direct microscopy and culture techniques.

Statistical analysis

Microsoft Word and Microsoft Excel 2007 were used to process manuscript and tables. Results were analyzed using descriptive statistical methods like mean and percentages.

RESULTS

In our study data analysis showed that, of the 150 patients included, 92 were males (61.3%) and 58 (38.6%) were females. Infection was more common in the age group of 21-30 years (37.3%). Majority of the subjects were from lower socioeconomic status with rural backdrop. Family history of dermatophytoses was recorded in 72% of cases (Table 1).

Table 1: Sociodemographic details.

Variables		N=150	%
Age (in years)	Mean	21.10±4.35	
	0–10	05	03.3
	11–20	12	08.0
	21–30	56	37.3
	31–40	32	21.3
	41–50	26	17.3
	51–60	17	11.3
	>60	2	01.3
Gender	Male	92	61.3
	Female	58	38.6
Place	Rural	98	65.3
	Urban	52	34.6
Socioeconomic status	Low	86	57.3
	Middle	44	29.3
	High	20	13.3
Education	<10th	83	55.3
	>10th	49	32.6
	Illiterate	18	12.0
Occupation	Factory	54	36.0
	Agriculture	30	20.0
	Student	27	18.0
	Homemaker	21	14.0
	Driver	16	10.6
	Others	02	01.3
Family history	Present	108	72.0
	Absent	42	28.0

Duration of dermatophytoses ranged from 1 to 6 months in majority (52%). The predominant clinical type was Tinea cruris (50%), followed by Tinea corporis (18.4%), Tinea unguium (11.9%), and Tinea pedis (8.1%) (Table 2). Tinea capitis was more common among children and there were no considerable differences in the age distribution of the other dermatophytoses.

Among 150 clinically suspected cases of dermatophytoses, 92 (61.33%) were detected positive by direct microscopy and 86 (57.33%) by culture. The isolation rate of dermatophytes was 57.33% (86/150), with all three genera of dermatophytes being isolated as causative agents of infection.

Table 2: Clinical features of dermatophytoses.

Variables	N=150	%
Duration of disease (in months)		
<1	23	15.3
1-6	78	52.0
>6	49	32.6
Type of dermatophytoses		
T. cruris	92	50.0
T. corporis	34	18.4
T. unguium	22	11.9
T. pedis	15	08.1
T. faciei	11	05.9
T. capitis	07	03.8
T. manuum	03	01.6

The frequency of dermatophytes isolated in 86 culture positive patients from different sites is shown in Table 3. *Trichophyton rubrum* was the major isolate (33%) followed by *Trichophyton mentagrophytes* in 20%. *Epidermophyton floccosum* was isolated in only one sample. Patients presented with mixed infections (14 cases), samples were provided from two different sites but a single pathogen was isolated from both areas.

We evaluated the risk factors associated with dermatophytoses. Poor hygiene was noted in 32.1%, topical steroid usage in 23.9% and diabetes mellitus in 20.1%. However other factors like trauma, smoking, hypertension and animal exposure did not have any impact (Table 4). Overlapping of risk factors was noted in nine cases.

Table 3: Dermatophytes species found in different clinical types.

Clinical type	T. rubrum	T. men*	T. vio#	T. tons^	M. gypseum	M. canis	E. flocossum	Total	%
T. cruris	18	10	05	05	04	01	-	43	50.0
T. corporis	10	04	01	-	-	02	-	17	19.8
T. unguium	4	01	02	03	-	-	-	10	11.6
T. pedis	01	03	02	-	01	-	-	07	08.1
T. faciei	-	01	03	-	-	-	01	05	05.8
T. capitis	-	-	01	02	-	-	-	03	03.5
T. manuum	-	01	-	-	-	-	-	01	01.2
Total	33	20	14	10	05	03	01	86	100

*T mentagrophytes,#T Violaceum, ^T tonsurans N=86 Only culture positive cases.

Table 4: Risk factors associated with various dermatophytoses.

Risk factors	T. cruris	T. corporis	T. unguium	T. pedis	T. faciei	T. capitis	T. manumm	Total (N=95)	%
Poor hygiene	21	02	03	02	-	02	-	30	32.0
Steroid usage	14	06	-	-	02	-	01	23	23.9
Diabetes mellitus	09	05	02	02	01	-	-	19	20.1
Trauma	-	01	03	04	02	01	-	11	11.4
Smoking	02	02	-	-	01	-	-	05	05.4
Hypertension	02	02	-	-	-	-	-	04	04.3
Animal exposure	-	02	-	-	-	01	-	03	2.7

DISCUSSION

Fungal infection of the skin and its appendages are more prevalent in India, as it is a tropical country with favorable climatic, economic and social conditions such as temperature, humidity, poverty and overcrowding. The degree of immunosuppression and number of immunosuppressed patients are increasing at a remarkable pace, due to which management of dermatophytoses has become a challenge to the clinicians. Depending on the nature of dermatophytes and risk factors in that topography, preventive and therapeutic measures have to be framed.

Dermatophytes possess the affinity for parasitizing keratin rich tissues and produce dermal inflammatory response. This leads to redness, intense itching/burning in turn causes cosmetically poor appearance.[10] The severity of the infection depends on various factors like immune reactions of the host to the fungal metabolic products, virulence of infecting strain, anatomical location of the infection and environmental factors.[11] However, anthropophilic species are responsible for the majority of human infections; which tend to be chronic with mild inflammation, whereas infections caused by geophiles and zoophiles are often associated with acute inflammation and are self-healing.[12]

In our study the maximum incidence of dermatophytoses was in the age group of 21-30 yrs (37.3%). It was more predominantly seen in males (61.3%) when compared to females (38.6%). Similarly a study conducted by Jain et al in Jaipur noted tinea infections were common among men (67.5%).[8] Above mentioned findings were in congruent with other studies by Sen et al and Sumana et al done in Assam and Andhra Pradesh respectively.[13,14] The higher incidence of dermatophytes in young age and men may be due to excessive physical activity, increased opportunity for exposure and hormonal pattern.[15]

In this study, T. cruris was the most common clinical presentation encountered (50%) followed by T. corporis (18.4%), T. unguium (11.9%) T. pedis (8.1%), T. faciei (32%), T. capitis (4.4%) and T. manuum (4%). Case studies on dermatophyte infection conducted by Gupta et al reported internal parts (54%) were infected more commonly, followed by hand (15%), neck (12%) and leg (6%).[16] Similarly, in a study by Sarika et al, it was found that the maximum samples 32.67% (49) were recovered from groin followed by hands/legs 21.33% (32) and thighs 15.33% (23).[17]

In contrast to our findings, studies by Sen et al, Sumana et al and Patwardhan et al reported T. corporis to be the most prevalent clinical type.[13,14,18] The variations observed in the clinical type of dermatophytoses could be due to varied climatic conditions, migration of population to earn a livelihood, type of occupation, pathogen and host relationship.[19] Our subjects were from low socioeconomic status living in poor hygienic conditions; changing and washing of undergarments were practiced rarely. Complete unaeration due to tight clothing, high rate of sweating, maceration in groin and waist regions makes these sites more vulnerable to dermatophytoses.[20] These environmental and sociodemographic conditions are favorable to fungal dispersion and development of infection in that anatomic area.

We reported T. pedis (8.1%) in our study. Our patients were working in factories who had to follow dress code with closed footwear for prolonged periods in all weathers. The predominance of T. pedis is usually seen in western countries due to regular use of shoes and socks, predisposing to perspiration and maceration.[21] T. capitis was seen in only 3.8% of cases in our study which could be attributed to the use of hair oils that has an inhibitory effect on dermatophytes.[22]

In our study, T. rubrum was the predominant isolate (33%) followed by T. mentagrophytes (20%), T. violaceum (14%) and least was by E. floccosum. These findings are similar to a study conducted by Mohanty et al.[23] Other researchers who reported T. rubrum as predominant isolate in their studies, were Bindu V et al in 2002 - 66.2%, Sumana et al in 2004 - 60%, Peerapur et al in 2004-43.7%.[24,14,25] Surveillance of these fungal species helps in the detection of emerging organisms and adequacy of its management.

In recent years there is a higher incidence of dermatophytoses, though these infections are treatable. This may be due to reinfection, relapse (the fungus not being completely eradicated during treatment) or a new infection. The reasons for recurrence could be due to continued exposure to the infective source or persistence of some risk factors. Identifying responsible risk factors may help in prevention and control of the dermatophytoses.[26,27]

There are several risk factors which can influence dermatophytoses depending on geographical area or population. In our study, majority of the subjects were from rural background (65.3%), low socioeconomic strata (57.3%) working in factories (36%) and agricultural fields (20%). Family history was positive in 72% of cases. Among the modifiable risk factors, poor hygiene was noted in 32% which was an indispensable factor observed among our subjects which is in congruent with other studies.[20,21] Living conditions, large family size and close contact, either directly or by sharing facilities, including combs and towels, is common between family members in low socioeconomic strata people which may facilitate transmission.[28]

Previous studies have found the prevalence of dermatophytoses to be more common in farmers and students.[1,27,29] However, Sharma et al observed dermatophytoses among rural population of Sitapura, Sanganer area and most of the patients were labors working in small cottage industries and farmers.[21] We also found it in factory workers, agriculturist followed by students. Majority of them were working in factories using synthetic uniforms and safety shoes for long period throughout the year. This enhances sweating, sweat retention and moist skin which predisposes to dermatophytoses.[21] Imparting knowledge about maintenance of personal hygiene, avoid sharing of clothes, regular bathing, completing proper course of treatment can be recommended especially to these patients.[29]

Based on the results, we observed various malleable risk factors like poor hygiene (32%), topical steroid usage (23.9%), diabetes (20.1%) and trauma (11.4%). We noted 23.9% of cases used topical steroid which could be due to easy availability of these creams giving temporary relief. With the increased use of topical agents, development of resistant strains remains a possibility and several newer antifungal compounds needs to be evaluated to manage resistant dermatophytes.

Diabetes mellitus (20.1%) was noted mostly in cases of T. cruris, T. corporis and T. unguium. Infectious diseases are more prevalent in individuals with diabetes. Hyperglycemic environment increases the virulence of some pathogens; lower production of interleukins, reduced chemotaxis and phagocytic activity, immobilization of polymorphonuclear leukocytes in response to infection are the main pathogenic

mechanisms involved.[30] Early detection and appropriate management of diabetes will avoid recurrent and chronic dermatophytoses.

Our study highlights a common problem in many areas of the globe and suggests that further measures regarding community health and personal hygiene must be addressed in order to reduce the risk of dermatophytoses. This was a hospital-based, cross-sectional study with a small sample size which cannot be generalized. Our observations imply that more data is required on other co morbidities like atopic dermatitis, disorders of keratinization, anemia and HIV that could play a role in dermatophytoses.

CONCLUSION

This study recognized T. rubrum as the predominant organism and T. cruris was the most common clinical type. There are several risk factors which can influence dermatophytoses, but identifying common risk factors in a particular population or geographical area is required in routine clinical practice. Poor hygiene and topical steroid usage were the major risk factors which was responsible for spreading dermatophytoses in our topography. Educating the people regarding personal hygiene and sanitary control in community must be undertaken in order to reduce the risk of dermatophytoses. Elimination and treatment of dermatophytes not only terminate spreading of the disease but also prevents reinfection.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Hosthota A, Gowda T, Manikonda R. Clinical profile and risk factors of dermatophytoses: a hospital based study. Int J Res Dermatol 2018;4:508-13.