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Original Research Article

Profile of dermatophyte infections among rural population: a facility based prospective observational study

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ABSTRACT

Background: Dermatophyte infections are a common but neglected public health problem in rural India. Considering the heterogeneity of presentation and changing trends periodic studies documenting the demographic and clinical profile of these infections may be vital in guiding clinical practice. The objectives of the study were to analyse the demographic, clinical and etiological profile of dermatophyte infections among rural population, presenting to a rural health center.
Methods: The current study was a cross sectional study, conducted in the rural health center, Department of Community Medicine and Department of Microbiology, Dhanalaskmi Srinivasan medial College and Hospital, permbalur between January 2017 to June 2017. All patients who are clinically diagnosed to have dermatophytosis in the study setting were included in the study. The relevant skin, nail or hair scrapings were subjected to KOH preparation and culture.
Results: A total of 250 subjects were included in the final analysis. The majority (47.20%) of the subjects were between 21 to 30 years. Males constituted 65.60% of the study population. The proportion of participants who worked in agricultural labour/farmer, housewife, industrial skilled worker, housemaid, and businessman was 22.40%, 17.20%, 15.20%, 6.40% and 4.80% respectively The majority (38.80%) of the participants were in lower class and lower middle class (31.20%). The most common clinical diagnosis was tinea corporis seen in 30.8% of the population, followed by tinea cruris in 19.6% and tinea ungium in 7.6% of the population. The most common organism isolated in culture was *Trichophyton rubrum* (25.2%), followed by *Trichophyton mentagrophyte* (17.2%), and *Trichophyton tonsurans* (1.20%).
Conclusions: Clinicians need to be aware of the demographic profile, common clinical presentations and changing the etiological profile of dermatophyte infections, especially in rural population.

Keywords: Dermatophytes, Epidemiology, Rural population

INTRODUCTION

Dermatophytes are one of the most common superficial fungal infections around the globe. Dermatophytes are commonly seen in countries of the tropical region such as India due to high levels of humidity. They also have the propensity to affect specific population groups living in overcrowded environments, with poor personal hygiene.[1] They are also called as ringworm infections due to characteristic ring-like appearance. But more scientific nomenclature is 'Tinea infections', which can be further labeled based the region of the body affected like tenia capitis for dermatophytosis of head, tinea pedis for dermatophytosis of foot etc.[2]

Various studies conducted across India have reported dermatophyte infections caused by three common genera of fungi belonging to trichophyton, epidermophyton, and microsporum. Many of these studies have also highlighted the key risk factors associated with occurrence of dermatophyte infections to be poor socio-economic status, working in occupations with prolonged immersion of hand or feet in water, poor personal hygiene, living in hot and humid climatic conditions etc.[3,4] Considering the poor availability of KOH or culture facilities in primary and secondary level health care facilities in resource poor settings like India, most of the times treatment is provided basing on the clinical findings.[5] Hence it is very important for clinical practitioners to have a thorough understanding the varied clinical presentations, the organism profile and the appropriate treatments, to be able to provide effective empirical treatment.[6] Hence periodic studies documenting the demographic and clinical profile of these infections may play a vital role in this regard. Considering the scarcity of studies documenting the profile of dermatophyte infections affecting the rural population, the current study has been conducted with the following objectives.

Objectives

- To analyse the demographic and clinical profile of dermatophyte infections among rural population, presenting to a rural health center.
- To assess the culture positivity and organism profile of the dermatophyte infections among the study population.

METHODS

The current study was a cross sectional study, conducted in the Rural health center, Department of Community Medicine and Department of Microbiology, Dhanalaskmi Srinivasan medial College and Hospital, permbalur, Tamilnadu. The study was conducted between Jan 2017 to June 2017. The study Population included patients presenting to the rural health center OPD, with skin lesions suggestive of dermatophyte infections

All patients who are clinically diagnosed to have dermatophytosis in the study setting were included in the study. Patients reporting the use of topical or systemic antifungal medication in the preceding 4 to 6 weeks time were excluded from The study, as it may affect the culture positivity.

Now, a prior sample size calculation was done. All the eligible cases presenting to the study setting in the data collection period were included by convenient sampling.

The study was approved by the institutional human ethics committee. Informed written consent was obtained from all the participants prior to inclusion in the study. After thorough clinical examination and confirmation of clinical diagnosis, appropriate clinical specimens were collected under aseptic conditions. The black photographic paper was used for collecting and better visualization of skin scrapings. 10% KOH solution was used for skin. Hair and nail scrapings required a stronger alkali solution 40% KOH. All preparations were examined under low power and confirmed under high power. Culture was done in Sabourad dextrose agar. Three tubes, one with Gentamicin to prevent bacterial growth, one with actidione to prevent growth of saprophytic fungus, another plain tube were used for culture. The three tubes were incubated, one at 37 degree incubator,one at room temperature and another one in Biological oxygen demand incubator. The duaration of incubation was for 2 to 4 weeks.

All growth positives were further subjected to slide culture for species identification. The exact morphology and identification was done by microscopic lactophenol cotton biue mount. Negative culture was further incubated for another 2 weeks before deciding as no growth

The demographic variables like age, the gender of the affected person, occupation and socioeconomic status were collected. The dermatophyte infections were classified as per the area of the body affected. KOH positivity, culture positivity and the type of organism isolated were noted. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. No inferential analysis was performed in the study.

RESULTS

A total of 250 subjects were included in the final analysis.

Majority (47.20%) of the subjects were between 21 to 30 years. The proportion of subjects who were aged between 31 to 40 years was 26%, aged between 41 to 50 years was 16.4% and 5.2% were 51 to 60 years. The proportion of subjects who were below 20 years and above 61 years was 2.40% each. Males constituted 65.60% of the study population and females constituted remaining 34.40% of the study population. The majority (26.80%) of the participants were construction workers. The proportion of participants who were worked in Agricultural labour/farmer, House wife, industrial skilled worker, House maid, and Business man was 22.40%, 17.20%, 15.20%, 6.40% and 4.80%. The proportion of participants who were worked in other occupations and clerical was 3.60% each. The majority (38.80%) of the participants were in lower class. The proportion of 31.20% were in lower middle class, 18.80% were in middle class, 8.40% were in upper middle class and 2.80% were in upper class (Table 1).

Table 1: Socio demographic profile of study population (N=250).

Characteristics	Frequency	Percentages (%)
Age group		
Less than 20	6	4.00
21 to 30	119	47.20
31 to 40	65	25.60
41 to 50	41	16.00
51 to 60	13	4.80
61 and above	6	2.40
Gender		
Male	164	65.60
Female	86	34.40
Occupation		
Construction worker	67	26.80
Agricultural labor/farmer	56	22.40
Housewife	43	17.20
Industrial skilled worker	38	15.20
Housemaid	16	6.40
Businessman	12	4.80
Clerical	9	3.60
Other occupations	9	3.60
Socioeconomic status		
Lower	97	38.80
Lower middle	78	31.20
Middle	47	18.80
Upper middle	21	8.40
Upper	7	2.80

The most common clinical diagnosis was tinea corporis seen in 30.80% of the population, followed by tenia cruris in 19.6%, tinea corporis & tinea cruris in 8%, tenia ungum and tinea faciei in 7.60% each of the population. Tenia involving other parts like face, head, feet and hands contributed to the remaining minor proportion of study population. Significant proportion of the patients had tinea involving multiple sites. Among the study population 163 (65.2%) had KOH amount positive. Among the study population 113 (45.2%) had culture positive (Table 2).

Out of 77 participants with tinea corporis 54 (70.13%) participants had KOH positive. Out of 49 participants with tinea cruris 38 (77.55%) participants had KOH positive. Out of 20 participants with tinea cruris 11 (55%) participants had KOH positive. Out of 19 participants with tinea cruris 11 (55.89%) participants had KOH positive. Out of 16 participants with tinea pedis 12 (75%) participants had KOH positive. Out of 77 participants with tinea corporis 32 (41.56%) participants had culture positive. Out of 49 participants with tinea cruris 20 (40.82%) participants had culture positive. Out of 20 participants with tinea cruris 9 (45%) participants had culture positive. Out of 19 participants with tinea cruris 10 (52.63%) participants had culture positive. Out of 16 participants with tinea pedis 8 (50%) participants had culture positive (Table 3).

Table 2: Clinical presentation and KOH and culture positivity (N=250).

Diagnosis based on site involvement	Frequency	Percentage (%)
Tinea corporis	77	30.8
Tinea cruris	49	19.6
Tinea corporis and tinea cruris	20	8
Tinea unguium	19	7.6
Tineafaciei	19	7.6
Tinea pedis	16	6.4
Tinea mannum	11	4.4
Tinea pedis and tinea cruris	8	3.2
Tinea faciei and tinea cruris	8	3.2
Tinea capitis	6	2.4
Tinea faciei, tinea cruris and corporis	6	2.4
Tinea faciei and tinea corporis	4	1.6
Tinea mannum and tinea faciei	3	1.2
Tinea unguium, tinea cruris and tinea corporis	3	1.2
Tinea mannum, tinea cruris and corprois	1	0.4
KOH		
Positive	163	65.2
Negative	87	34.8
Culture		
Positive	113	45.2
Negative	137	54.8

Table 3: Comparison of diagnosis based on site involvement between two study groups (N=250).

Diagnosis based on site involvement	KOH		Culture	
	Positive (%)	Negative (%)	Positive (%)	Negative (%)
Tinea corporis (N=77)	54 (70.13)	23 (29.87)	32 (41.56)	45 (58.44)
Tinea cruris (N=49)	38 (77.55)	11 (22.45)	20 (40.82)	29 (59.18)
Tinea corporis and tinea cruris (N=20)	11 (55)	9 (45)	9 (45)	11 (55)
Tinea unguium (N=19)	11 (57.89)	8 (42.11)	9 (47.36)	10 (52.63)
Tinea faciei (N=19)	11 (57.89)	8 (42.10)	10 (52.63)	9 (47.36)
Tinea pedis (N=16)	12 (75)	4 (25)	8 (50)	8 (50)
Tinea mannum (N=11)	7 (63.64)	4 (36.36)	5 (45.45)	6 (54.54)
Tinea pedis and tinea cruris(N=8)	4 (50)	4 (50)	3 (37.5)	5 (62.5)
Tinea faciei and tinea cruris (N=8)	3 (37.5)	5 (62.5)	3 (37.5)	5 (62.5)
Tinea capitis (N=6)	4 (66.67)	2 (33.33)	4 (66.67)	2 (33.33)
Tinea faciei, tinea cruris and corporis (N=6)	2 (33.33)	4 (66.67)	3 (50)	3 (50)
Tinea faciei and tinea corporis (N=4)	3 (75)	1 (25)	3 (75)	1 (25)
Tinea mannum and tinea faciei (N=3)	1 (33.33)	2 (66.67)	1 (33.33)	2 (66.67)
Tinea unguium, tinea cruris and tinea corporis (N=3)	1 (33.33)	2 (66.67)	1 (100)	0 (0)
Tinea mannum, tinea cruris and corprois (N=1)	1 (100)	0 (0)	2 (66.67)	1 (33.33)

Table 4: Culture characteristics of fungi isolated in study population (N=250).

Culture	Frequency	Percentage (%)
No growth	137	54.80
Trichophyton rubrum	63	25.20
Trichophyton mentagrophyte	44	17.60
***Trichophyton tonsurans* (*T. Capitis*)**	3	1.20
Trichophyton verrucous	2	0.80
Trichophyton schoenleinii	1	0.40

The most common organism isolated in culture was *Trichophyton rubrum* (25.20%), followed by *Trichophyton mentagrophyte* (17.60%), and *Trichophyton tonsurans* (1.20%). The other minor proportion of culture isolated fungi were *Trichophyton verrucous* and *Trichophyton schoenleinii* in 0.80% and 0.40% of the subjects (Table 4).

DISCUSSION

Considering the scarcity of studies documenting the profile of dermatophyte infections in the rural population, the current study was conducted in the outpatient setting of a tertiary care teaching hospital in south India.[7] The most common age group affected in the study was 21 to 30 years of age group, which constituted 47.60% of the subjects followed by 26.00% of the subjects belonging to 31 to 40 years' age group. This indicates higher propensity of these infections affecting economically more productive age groups and may be due to occupation as a risk factor. But the overall age distribution indicated that the persons in all age groups are a risk of developing dermatophyte infections and no age is an exemption for them. Prasad et al have reported 21 to 30 years to most commonly affected age group.[8] Studies by Grover et al 39.6% of dermatophyte infections to be in the age groups of 21 to 30 years.[9] Singh et al have reported highest incidence in slightly younger age group, belonging to 16 to 30 year age group. sixteen to thirty years.[10]

The proportion of males was slightly higher at 65.60%, compared to females. Similar to our study, Studies by Singh et al, Grover et al have reported similar findings, where the proportion of males was significantly higher than females. It was 1.17:1 in the former and 4.23:1 in the later study.[9,10] Some of the studies on non-Indian population also have reported similar findings.[11]

The analysis of the occupational profile of the subjects indicated that among both genders working as construction workers/ agricultural labor constituted the majority of study subjects. Even the housewives and women working as maids were also at risk probably attributable to long hours of immersion of hands and feet in the water, increasing the risk of tinea ungium, tinea pedis and tinea mannum in them. Lower socioeconomic status was an important risk factor, probably attributable to working in unhealthy working environments and also poor housing conditions making them constantly exposed to hot humid climatic conditions and also can be attributable to the personal hygiene. Many studies in the past have established a strong association between occupations and dermatophyte infections. Studies also

have reported a strong negative impact on quality of life and productivity of the employees due to these superficial fungal infections.[12] Sahin et al have reported high incidence of dermatophyte infections in forestry workers and farmers as in current study.[13]

The most common clinical diagnosis was tinea corporis is seen in 30.80% of the population, followed by tinea cruris in 19.60%, tinea corporis and tinea cruris in 8% and tinea ungium in 7.60% of the population. Tinea involving other parts like face, head, feet, and hands contributed to the remaining minor proportion of study population. In the study by Singh et al, the most frequent infection was tinea corporis, followed by tinea cruris.[10] Prasad et al in their study reported that tinea cruris to be a most common fungal infection in males, but in females, the waist was the most common area involved.[8] Grover et al have reported tinea pedis to be the most common infection followed by T cruris, which was different from current study findings.[9]

The most common organism isolated in culture was *Trichophyton rubrum* (25.20%), followed by *Trichophyton mentagrophyte* (17.60%), and *Trichophyton tonsurans* (1.20%). The other minor proportion of culture isolated fungi were *Trichophyton verrucous* and *Trichophyton Schoenleinii* in 0.80% and 0.40% of the subjects. Many previous studies have reported finding similar to the current study and have highlighted the emergence of *Trichophyton mentagrophytes* as the leading organism causing dermatophyte infection, surpassing *Trichophyton rubrum* and termed it as the epidemiological transformation of dermatophytes.[6,14-16]

The study concludes that dermatophyte infections are common in economical productive age group, with slight male preponderance. Occupations with a high level of exposure to humidity, heat and dust or occupations involving prolonged immersion of body parts in water are prone to fungal infections. Tinea corporis and tinea cruris are the most common clinical presentations and *Trichophyton Rubrum* was the most common organism causing dermatophyte infection.

Hence the study findings, in the wake of the other published literature shows, dermatophyte infections to be quite heterogeneous in their presentation, depending on the type of population studied. This emphasizes the need for healthcare practitioners to be aware of these changing epidemiological profile of dermatophyte infections to diagnose and treat them effectively.

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