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Research Article

Dermatophyteic Infection

Prevalence of Dermatophyteic Infection in A Tertiary Care Hospital in Chennai in India

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Abstract: Dermatophytes are fungi that infect keratinized tissues in animals and humans. The group's most prevalent and only anthropophilic species is *Trichophyton rubrum*, whereas species from the *Trichophyton mentagrophytes* complex are zoophilic and anthropophilic. The prevalence of dermatophyte infections varies depending on environmental factors and location, with higher rates observed in tropical countries like India. Hence, this study was conducted to comprehend the distribution of various species and clinical symptoms to assess the prevalence and features of dermatophyte infections in patients receiving tertiary care. This study's main objective was to identify the frequency of dermatophyte species in clinical samples taken from suspected patients in a tertiary care centre.1000 patients attending Sree Balaji Medical College in Chennai were the subjects of cross-sectional observational research. The prevalence of dermatophyte infection was assessed using clinical sample data. The analysis included information on gender, age group, and clinical symptoms. In the examined samples, dermatophyte infection was shown to be clinically prevalent (14.2%). More men (64.7%) than women (35.2%) were impacted. The most common age group for dermatophyteic infection was those between 31 and 40 years. The most typical clinical presentation was tinea corporis, characterized by scaly, red areas on the skin. The most frequent dermatophyte species found was Trichophyton rubrum. The study revealed that the clinical samples taken from the tertiary care centre had a significant prevalence of dermatophyteic infection. These infections were more likely to affect men and those in the age range of 31 to 40 years. The most commonly noticed clinical sign was tinea corporis, caused by *Trichophyton rubrum*. These findings emphasize the need to detect and treat dermatophyteic infections, particularly tinea corporis, highlighting the need for suitable treatment techniques in the population under study.

Key words: India, Chennai, dermatophytes, tertiary care centre, *Trichophyton, rubrum, mentagrophytes.*

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1. INTRODUCTION

Dermatophyteic skin infection is the commonest infection affecting all age groups. Dermatophytes are fungi with more than 100 species discovered; 40% of these cause infections in humans. They are categorized by several genera, namely, *Trichophyton*, *Microsporum*, *Paraphyton*, *Nannizzia, Lophophyton, Epidermophyton*, and *Arthroderma* based on the new taxonomy[1]. Dermatophytes cause infection of keratinized tissue like hair, nails, skin, etc., in animals and humans. Some species of dermatophytes have limited geographic distribution and are endemic in certain areas of the world. *T. yaoundei, T.soudanense* and *T.gourvilii* are confined to places like West and Central Africa. *T.concentricum* is restricted to islands in South Pacific. Some species of Dermatophytes like *T.rubrum, T. tonsurans*, and *E. floccosum* are distributed globally [2]. Epidemiological patterns of these Dermatophytes are changing due to the increased mobility of the world population[3]. With increased travel and migration, people are exposed to different cultures and environments that may contain different species of Dermatophytes. This can lead to changes in the epidemiological patterns of these infectious diseases[4,5]. As such, this study seeks to determine the current prevalence of dermatophyteic infections in different populations. The results of this study will be used to develop strategies for preventing the spread of these infections. It could also help to identify potential risk factors associated with the increased prevalence of dermatophyteic infections. This will allow for implementing targeted public health interventions and developing more effective treatments for dermatophyteic infections. Furthermore, this research will provide valuable insights into the epidemiology of these infections and their burden on public health. The findings of this research could be used to inform public health policy and help reduce the spread of these infections. Additionally, the results could be used to improve clinical practices and treatments for those affected by dermatophyteic infections. Ultimately, this research could lead to a better understanding of preventing and controlling dermatophyteic infections, positively impacting global public health. This could benefit millions worldwide, allowing them to receive better medical care and live healthier lives. It could also save resources and money that would have been used to treat and manage the infections. Moreover, the research could be used to develop more effective treatments for dermatophyteic infections, leading to more positive outcomes for patients. This could result in a better quality of life for those suffering from these infections and improved health and well-being worldwide. Research has shown that early diagnosis and treatment of infectious diseases can prevent the spread of the disease and reduce the economic burden of healthcare costs.[6,7] Vaccines and other preventative measures are also key components of reducing the risk of infection and promoting a healthier lifestyle. So this study aims to discover the recent prevalence of dermatophyteic infections and whether there is any change in the epidemiological pattern of dermatophyteic species.

2. MATERIALS AND METHODS

An observational cross-sectional study was undertaken in a tertiary health centre, where 1000 patients who attended dermatology out- patient from December 2021 to July 2022 were observed for dermatophyte infection. Of these, 142 showed typical signs and symptoms of dermatophyte infection based on preliminary diagnosis by clinicians.

2.1. Ethical clearance

The study was conducted according to the Declaration of Helsinki for biomedical research involving humans as subjects and Institutional ethical clearance was obtained from Sree Balaji medical college and Hospital (Ref No. 4.8.0000.0078-05). All subjects participated in this study only after signing informed consent.

2.2. Inclusion criteria

- All patients with clinical presentation typical of dermatophyteic skin infection were included.
- Gender: both gender
- Age: all ages
- Only new cases not under any treatment were included

2.3. Exclusion criteria

- A person who did not give consent
- Those associated with systemic illness, secondary pyoderma, or any other infections.
- Subjects who are already on treatment for fungal infections
- Different tinea presentations like tinea corporis, tinea cruris, tinea unguium, tinea capitis, tinea faciei, and tinea barbae were seen in patients. Fungal scrapings were taken from these patients from the edge of the lesion with a sterile scalpel after the lesions were decontaminated with 70% alcohol. Samples were sent to a laboratory and processed on the same collection day.

2.4. Direct microscopy

Hair and skin scrapings were mounted in 10% fresh KOH with Parker ink and were observed for filamentous septate hyphae under 400x magnification. 40% fresh KOH with Parker ink was also used.

2.5. Culture

2.6. Fungal cultivation

All samples were inoculated onto Sabouraud 4% dextrose agar with cycloheximide, chloramphenicol slant tubes, and commercially available dermatophyte test media (HIMEDIA). Slants were incubated aerobically at 28°C and 37°C (for *T. verrucosum* isolation). Cultures tubes were observed for growth every alternate day for any fungal growth of any pigment production on the reverse side of the slant. SDA slants were observed for up to 4 weeks for growth.

2.7. Lactophenol cotton blue (LPCB) mount

For microscopic observation, LPCB mount was performed, gently heated, and observed under 400x and 100x magnifications. Slide culture was done for better visualization of conidia and hyphae.

2.8. Species identification

The fungal cultures were identified based on their macroscopic and microscopic features with lactophenol cotton blue staining and urease test. The diagnosis of

Dermatophyteic infection was made based on direct smear and culture.

2.9. *Statistical analysis*

SPSS software for Windows (version 13.0, Chicago. IL) was used for descriptive statistical data analyses.

3. RESULTS

142 clinical dermatophyteic patients attending dermatology OPD were included in the study. Dermatophyteic infection was high among the 31 – 40 age groups (40.84%). 142 samples were analyzed gender-wise, and it was found that 64.7% (92) were males and 35.2% (50) were females (Table-1). The specimens were analyzed according to clinical manifestations, and it was found that out of 142 cases, 80(56.33%) had tinea corporis, 41(28.86%) had tinea cruris, and 15(10.56%) had tinea unguium (Table-2). Tinea corporis (51) was the commonest clinical lesion in males, followed by tinea cruris(28). Among female, 29 had tinea corporis, 13 had tinea cruris, 6 had tinea unguium and one had tinea capitis (Table-2). of 142 samples, 83% (118) showed positive KOH and culture positivity was 75.3% (107). On analyzing 107 culture-confirmed isolates, 73 were *T. rubrum* (68.22%), 28(27.1%) were *T. mentagrophytes*, 2 (1.86%) isolates were *E. floccosum*, one each for *M. canis, T. tonsurans* and *T. violaceum* (Table-3).

Table 1: Age-wise distribution of Dermatophytes

Age in years	Patients Total = 142	Percentage %
0 – 10	6	4.2
11 – 20	12	8.45
21 – 30	25	17.6
31 – 40	58	40.84
41 – 50	27	19
51 – 60	9	6.33
Above 60	5	3.5

Table 2: Clinical presentation of Dermatophytes with gender-wise distribution

Diagnosis	Patients N (%)	Male	Female
Tinea corporis	80(56.33)	51	29
Tinea cruris	41(28.86)	28	13
Tinea unguium	15(10.56)	9	6
Tinea capitis	3(2.11)	2	1
Tinea faciei	2(1.42)	1	1
Tinea barbae	1(0.70)	1	0
Total	142	92(64.7%)	50 (35.2%)

Table 3: Dermatophytes isolated with clinical presentation.

Dermatophytes	Tinea corporis	Tinea cruris	Tinea unguium	Tinea capitis	Tinea faceie	Tinea barbae	Total N (%)
T. rubrum	45	20	6	1	1	0	73(68.22)
T. mentagrophytes	18	7	3	0	0	1	29(27.1)
T. violaceum	0	0	0	1	0	0	1(0.93)
T. tonsurans	0	0	0	1	0	0	1(0.93)
M. floccosum	1	1	0	0	0	0	2(1.86)
M. canis	1	0	0	0	0	0	1(0.93)
Total	65	28	11	3	1	1	107

T. mentagrophytes=Trychophyton mentagrophytes, M. canis=Microsporum canis, , T. rubrum=Trychophyton rubrum; T. violaceum - Trichophyton Violaceum; T. tonsurans- Trichophyton tonsurans and M. floccosum- Microsporum floccosum

4. DISCUSSION

India is a tropical country with a climate of elevated temperature, humidity, and sweating conducive to dermatophyteic infection. This fungal infection usually affects humans' skin, hair, and nails. It is highly contagious and can spread through contact with infected people or animals. Therefore, proper hygiene is important to avoid these infections. The high humidity in India provides an ideal environment for the growth and spread of the fungus, making it easier for the fungi to attach themselves to the skin and cause infection. The hot and humid conditions also lead to excessive sweating, creating an environment conducive to fungal growth and infection. [8]. Knowing the prevalence of dermatophyteic infection with various clinical presentations and species can guide the clinician with early diagnosis and adequate treatment. This study observed that maximum dermatophyteic infection was prevalent among ages 31-40 (40.84%). The male: female ratio was 1.8:1, which correlated to studies by Suman et al [9], Prasad et al [10], and SS Sen et al [11]. The higher prevalence among males aged 30- 40 may be due to greater physical activity and profuse sweating, which can lead to dermatophyteic infection. These findings correlated with the study by Kumar et al [12] and Verenkar et al [13]. Among all clinical presentations, tinea corporis was predominant at 80(56.33%), followed by tinea cruris at

41(28.86%), concordant with studies by others[14-17]. Other clinical conditions like tinea unguum, tinea capitis, faceie, and tinea barbae were less common. This could be because tinea corporis and tinea cruris are more commonly seen in warm climates, where people are more likely to be exposed to warm, humid environments that can lead to fungal infections. This could also be due to people not taking proper precautions or using protective clothing in such environments, leading to an increased risk of infection. KOH mount and culture media SDA with cycloheximide were used to diagnose dermatophyteic infection. Direct KOH mount could detect 83% of cases; hence it can be used as a screening test under a microscope, and culture positivity was 75.3%. These results correlated with the study by Sudha M [13] and Suman Singh et al [9]. Among dermatophytes, *Trichophyton* has been the major causative genus[18,19]**.** *Trichophyton* was the predominant genus in our study, with 104 out of 107 confirmed isolates; other species like *Epidermophyton* and *Microsporum* were very few. Out of *Trichophyton, T. rubrum* was the most common species isolated, followed by *T. mentagrophytes, T. violaceum, T. tonsurans*, and *T. soudanense*. This suggests that *T. rubrum* is the most common species of *Trichophyton* and is likely to be the most important pathogen among dermatophytes. This underscores the importance of *T. rubrum* as a potential agent of dermatophytosis. It warrants further research into its prevalence and clinical manifestations rubrum was the predominant pathogen (68.22%), followed by *T. mentagrophytes* (27.1%). Similar results were seen in Kumar et al [12] studies, Balakumar et al [15,] and Ramaraj et al[14]. But a study by Ebert A t al[20] and Nenoff et al [21]showed that *T mentagrophytes* as the dominant isolate in patients with tinea. In the Ebert A et al study, the researchers collected samples from patients with tinea and identified *T mentagrophyte* as the most common isolate. Similarly, in the Nenoff et al. study, the researchers found that *T mentagrophyte* was the most common isolate responsible for more than half of all tinea cases. These findings demonstrate the strong prevalence of *T mentagrophyte* in patients with tinea, underlining the need for further investigation into the cause and potential treatments.

5. CONCLUSION

The clinical prevalence of dermatophyteic infection was 14.2%; males were more affected than females. The age group with the highest prevalence of dermatophyteic infection was the 31-40-year-olds. Tinea corporis was the common clinical manifestation, with *Trichophyton rubrum* being the most common species, followed by *T. mentagrophytes*. This agrees with earlier studies, but later studies have shown that predominance is shifted to *T. mentagrophytes*.

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7. AUTHOR'S CONTRIBUTION STATEMENT

Dr**.** Puhazhendi gathered the data and helped to conceptualize the study. Dr. Nandini M S and Dr. Bindu D analyzed these data, and necessary inputs were given during the design of the manuscript. All authors contributed to discussing of methodology and results of the manuscript.

8. CONFLICT OF INTEREST

Conflict of interest declared none.

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