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Clinicomycological profile of dermatophytosis in a tertiary care teaching hospital, Vadodara

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ABSTRACT

Background: Dermatophytosis is the most common type of cutaneous fungal infection seen in man infecting the superficial keratinized layer of the skin, hair and nails. The aim of the study is to isolate and identify the dermatophytes from clinically suspected cases of dermatophytosis, to determine the frequency of occurrence of various species of dermatophytes, to know the prevalence of age and sex of dermatophytosis in the locality.

Materials and Methods: The present study was carried out in the Department of Microbiology, Medical College and SSG Hospital, Vadodara. A total of 150 clinically diagnosed cases of dermatophytosis were taken for this study. Skin, hair and nail samples were aseptically collected and were subjected to KOH mount examination and culture. Differentiation of the dermatophyte species was performed based on the macroscopic and microscopic examination of culture and physiological test including urease test.

Results: Tinea corporis (41.3%) was the commonest clinical type with a male to female ratio of 1.05:1. Out of these samples, dermatophytes were isolated in 108 cases with the overall isolation rate of 72%. Seven species of dermatophytes were isolated. *T.mentagrophytes* 53 (49.1%) was the commonest species followed by *T.rubrum* 22(20.4%).

Conclusion: Identifying dermatophyte species and knowledge of their host preference and ecology play an important role in treating the patient. Correct and efficient laboratory methods for diagnosis of dermatophytosis is the need of the hour to provide correct and timely treatment and prevent the further spread and chronicity of the disease.

1. Introduction

Dermatophytes have the affinity to parasitize the horny layer of the skin and other structures rich in keratin, like hair and nails. They produce an inflammatory response leading to intense itching. It is also of cosmetic importance.[1] In recent years it has become an important clinical condition which deserves public health attention.[2,3] The etiological agents of dermatophytosis are classified, along with some non-pathogenic relatives in three anamorphic genera: *Trichophyton, Microsporum and Epidermophyton*.[1] Infection is acquired by the deposition of arthrospores or hyphae on the surface of the skin in susceptible individuals.[4] After the inoculation in the host, suitable conditions favours the progress of the infection. Skin responds to the superficial infection by increasing the proliferation in the basal cell layer, this leads to scaling and thickening of the epidermis.[5] Factors like heat and humidity, over population and poor hygienic conditions increase the incidence in tropical countries like India. The high humidity and temperature favours the prolific growth of dermatophytes.[6,7] The prevalence of various causative fungi varies according to the geographical area under study.[8] Though the clinical presentation is typical

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of ringworm infection, due to rampant use of broad-spectrum steroid containing skin ointments and creams, it is quite often confused with other skin disorders. This leads to misdiagnosis and improper management.[9] Therefore laboratory methods which are correct, rapid and efficient is essential for its diagnosis. Recently though antifungal agents have a high success rate in treatment, lack of clinical response may occur in 20%. Resistance to antifungals may be one of the causes of treatment failure.[10] Though during the last two decades, many new antifungals have been developed, they are confined to relatively few clinical classes.[11] The positive identification of a fungus allows a definitive diagnosis, determines the correct treatment and enables action to be taken on the source of the infection and prevention of further spread and chronic infection.[12]

2. Materials and Methods

All patients with a clinical diagnosis of dermatophytosis irrespective of the age group and gender, visiting the Department of Dermatology and Venereology at the SSG Hospital, Vadodara were considered for this study. A detailed history and clinical examination of the patient was done to determine the number of lesions, the type and the extent of involvement and presence of inflammatory margin. The affected area was thoroughly cleaned with alcohol to remove any surface contaminants. The scrapings were collected from an active and peripheral edge of the lesion on the skin with a sterile scalpel blade on to a sterile envelope. Infected hair stubs were collected by using a UV light (Wood's lamp).

The hair which showed fluorescence, was distorted or fractured were epilated and the active border of the scalp lesion was scraped to collect epidermal scales. The affected nail was first cleaned with alcohol and the specimen was scraped from the deeper part or nail clippings were collected onto a sterile black envelope. The collected samples were examined in the Microbiology department by using 10% and 40% potassium hydroxide (KOH) mounts to look for the presence of hyphae, spores or conidia, budding yeasts, spherules or sclerotic bodies. KOH mount also helps in differentiating the hyphal forms from epidermal cell outlines and cotton fibres. Samples were inoculated into sets of 3 tubes, each containing Sabouraud dextrose agar (SDA), SDA with chloramphenicol 50 mg/L and cycloheximide 500 mg/L to inhibit saprophytic fungi and Potato dextrose agar(PDA). Any growth on Sabouraud's dextrose agar was examined by studying the colony morphology, microscopic appearance and other relevant tests. The colony morphology, the colour of the obverse and reverse surface, pigment production on the reverse, the texture of the surface, the topography and the rate of growth was studied. The fungus was examined microscopically to identify microconidia, macroconidia, spores, nodular organ, pectinate bod, spiral hypha, racquet hypha, or favic chandelier which help in identification of the species. T.mentagrophytes and T.rubrum were differentiated by using in-vitro hair perforation and urease test.

3. Results

The present study of dermatophytosis was carried out by the Department of Microbiology, Medical College, Vadodara for a period of one year .In total of 150 clinically diagnosed cases of dermatophytosis were taken for this study. Out of the total samples collected, 114 were skin scrapings (76%), 23 nail clippings (15.3%) and 13 were hair stubs (8.7%).

Total number of 150 cases were distributed between the age group range of 3-72 years. Age group of 21-30 years showed the highest incidence accounting for a total of 55 cases (36.7%) as seen in Figure 1.

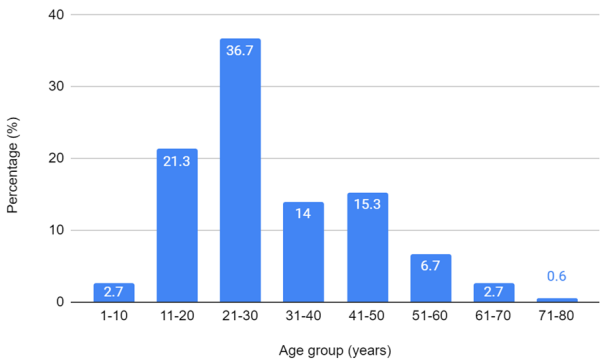

Fig. 1: Distribution of dermatophytosis in various age groups

Out of the total 150 cases of dermatophytosis, males were slightly more affected with 77 cases (51.3%) than females with 73 cases (48.7%). The incidence was almost equal in both sexes with a male to female ratio of 1.05:1.

Table 1: Comparison of KOH positivity with culture positivity

KOH Mount	Culture	Total no (%)
Positive	Positive	98(65.3%)
Negative	Positive	10(6.67%)
Negative	Negative	42(28%)

Out of 150 samples, both KOH and culture were positive for dermatophytes in 98 cases (65.3%). In 10 cases KOH was negative but culture was positive for dermatophytes (6.67%). Both KOH and culture were negative for dermatophytes in 42 cases (28%). (Table 1)

Out of 150 cases, tinea corporis was the highest incidence with 62 cases (41.3%) followed by tinea unguium with 23 cases (15.3%). Tinea cruris and tinea capitis followed with 14 cases (9.3%) each. (Figure 2)

Among the total dermatophytes isolated, *T.mentagrophytes* was the most common species 55 (50.9%). This was followed by *T.rubrum* 22 (20.4%),

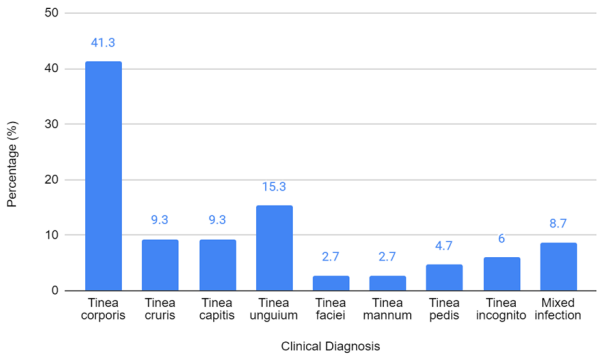

Fig. 2: Various clinical types of dermatophytosis

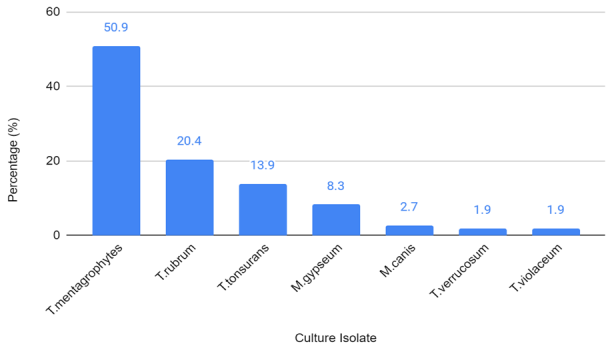

Fig. 3: Incidence of various species of Dermatophytes isolated

T.tonsurans 15(13.9%), *M.gypseum* 9 (8.3%), *M.canis* 3 (2.7%),*T.verrucosum* 2 (1.9%) and *T.violaceum* 2 (1.9%).(Figure 3)

In tinea corporis, out of 62 cases, *T.mentagrophytes* was the common species isolated 32(54.2%) followed by *T.rubrum* 15(25.4), *T.tonsurans* 7(11.9%), *M.gypseum* 3(5.1%) and *M.canis* and *T.violaceum* 1 each (1.7% each). In tinea unguium, out of 23 cases, *T.rubrum* was the common species isolated 2(66.7%) followed by *T.mentagrophytes* 1(33.3%). In tinea incognito, out of 9 cases, *T.mentagrophytes* and *T.rubrum* were the common species isolated with 2 cases each (33.3%) followed by *M.gypseum* and *M.canis* 1 case each (16.7% each). In mixed infection, out of 13 cases, *T.mentagrophytes* was the common species isolated 7(87.5%).(Table 2)

Out of 150 cases, 10 were associated with other medical disorders and conditions. Diabetes mellitus type II was commonly associated with tinea unguium. Pregnancy was associated with tinea corporis in 2 cases. Tinea incognito was seen in patient with hypertension and hyperthyroidism and another patient with diabetes mellitus type II and hypertension. (Table 3)

4. Discussion

In the present study, 150 clinically diagnosed cases of dermatophytosis were studied. Out of the total samples, dermatophytes were isolated in 108 cases. The overall isolation rate of dermatophytes was 72%. The study done by Gopi et al.showed a range close to the one obtained in the present study.[6] This high rate of dermatophytosis could be due to several factors like heat and humidity, overpopulation, and poor hygienic conditions.

Higher incidences in cases of tinea incognito is due to misuse of broad-spectrum steroid containing skin ointments and other indigenous creams. This has also led to poor rate of isolation of dermatophytes in a typical clinically diagnosed case of dermatophytosis masking the laboratory diagnosis.[7]

Dermatophytosis affects all age groups. Doddamani et alin Gulbarga, Karnataka found that out of the 200 cases of suspected dermatophytosis, those between 21-30 years are most commonly affected.[13] Similarly, in our study, the highest incidence is seen in this age group Studies conducted by Gopi et al., and Rao et al. also show similar result.[6,7] This could be due to participation in active field work, higher incidence of trauma, high incidence of hyperhidrosis and shoe wearing encountered in this age group.

Most of the above studies show a male predominance pattern. In the present study, incidence of dermatophytosis shows a slight male predominance with a male to female ratio of 1.05:1. These findings correlate with the findings of Majeed et al., Rao et al., Gopi et al. and Kumar et al.(6,7,14,15)High incidence in males may be explained by increased outdoor physical activity leading to higher exposure.

The present study shows tinea corporis to be the most common clinical type which is consistent with the studies by Majeed et al. and Ramaraj V et al.[14,15] But this is contrary to the results of Karmakar et al., who reported tinea cruris and Abu-Elteen and Malek, who reported tinea pedis as the commonest clinical type.[16,17] The second common type encountered was tinea unguium. The high incidence of tinea unguium in the study might be due to the trauma inflicted to the nails during physical work and also the habit of walking or working barefoot.

Most of the studies especially done in India show a common dermatophyte isolated as *T.rubrum*. In the present study *T.mentagrophytes* (50.9%) followed by *T.rubrum* (20.4%) was the most common isolate. But according to other studies *T.rubrum* is by far the commonest etiological agent in India.[14–17] The species distribution is dependent on the geographical area. Amel et al. reported *Trichophyton violaceum* was the most common etiological agent followed by *Microsporum canis*. Even studies outside India, Asticcioli et al. reported *T.rubrum* as the common isolate with an isolation rate of 42.3% which is the second

Table 2: Dermatophytes isolated from various clinical types

Clinical types	Total No.	*T. mentagrophyte*	*T.rubrum*	*T.tonsurans*	*M. gypseum*	*M. canis*	*T. verrucosum*	*T. violaceum*	Total isolated
Tinea corporis	62	32(54.2%)	15(25.4%)	7(11.9%)	3(5.1%)	1(1.7%)	-	1(1.7%)	59(95.2%)
Tinea cruris	14	8(66.7%)	-	4(33.3%)	-	-	-	-	12(85.7%)
Tinea capitis	14	-	-	3(30%	5(50%)	1(10%)	-	1(10%)	10(71.4%)
Tinea unguium	23	1(33.3%)	2(66.7%)	-	-	-	-	-	3(13.1%)
Tinea faciei	4	1(25%)	1(25%)	-	-	-	2(50%)	-	4(100%)
Tinea manuum	4	1(33.3%)	2(66.7%)	-	-	-	-	-	3(75%)
Tinea pedis	7	3(100%)	-	-	-	-	-	-	3(42.9%)
Tinea incognito	9	2(33.3%)	2(33.3%)	-	1(16.7%)	1(16.7%)	-	-	6(66.7%)
Mixed infection	13	7(87.5%)	-	1(12.5%)	-	-	-	-	8(61.5%)

Table 3: Correlation between associated medical disorders and clinical diagnosis

Associated Disorders	Tinea corporis	Tinea incognito	Tinea unguium
DM type II	1	-	5
Hypertension withhypothyroidism	-	1	-
Hypertension with DM type II		1	
Pregnancy	2	-	-
Total	3	2	5

most common isolate in the present study.[18] Other studies like Azab et al., and Grover et al. reported the most common isolate as *T.violaceum* with the most common clinical diagnosis being *T.capitis.*[19,20]

The present study shows 6.67% of cases associated with medical disorders and conditions like diabetes mellitus type II, systemic hypertension, hypothyroidism or pregnancy which was similar to the study reported by Ranganathan et al., with 8.7% showing associated medical disorders like diabetes mellitus type II and immunocompromised states.[21]

5. Conclusion

The incidence of dermatophytosis has increased in India. It is often confused with other skin disorders which results in improper diagnosis and treatment. Unwarranted and inappropriate use of corticosteroids or steroid based skin ointments and creams and antibiotics without appropriate microbiological investigations increases the number of tinea incognito cases. Hence, there is a need for correct, rapid and efficient laboratory methods for diagnosis of dermatophytosis for determining the correct and timely treatment and preventing the source of infection and further spread and also to prevent chronicity of the disease.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Mishra M, Mishra S, Singh PC, Mishra BC. Clinico-mycological profile of superficial mycoses. *Indian J Dermatol Venereol Leprol*. 2018;64(6):283–5.
2. Mwaura E. Isolation and identification of fungal dermatological agents among patients attending Thika district hospital Thika, Kenya. Kenya; 2011.
3. Cohen J, Powdery W. Infectious diseases. Mosby Edinburg London New York: Elseiver; 2004.
4. Hay RJ, Ashbee HR. Rook's Textbook of Dermatology. 8th ed. Edinburgh: Blackwell Publishing Ltd; 2010. p. 36.
5. Odom R. Pathophysiology of dermatophyte infections. *J Am Acad Dermatol*. 1993;28:2–7.
6. Gopi A, Harindranath D, Kaushik A. Mycological profile of dermatophytes isolated from clinical samples in KIMS Hospital, Bangalore. *J Evolution Med Dent Sci*. 2015;4(5):835–42.
7. Rao R, Mahale R, Tejashree A, Rajeshwari KG, Kulkarni M. Evaluation of culture media for rapid isolation of dermatophytes in JSS Medical College, Mysore. *J Med Dent Sci*. 2015;14(8):6–9.
8. Grover C, Arora P, Manchanda V. Tinea capitis in the paediatric population: A study from north India. *Indian J Dermatol Venereol Leprol*. 2010;76(5):527–32.
9. Singh S, Beena PM. Comparative study of different microscopic techniques and culture media for the isolation of dermatophytes. *Indian J Med Microbiol*. 2003;21(1):21–4.
10. Saripakioglu E, Seckin D, Demirbilek M, Can F. Invitro antifungal susceptibility pattern of dermatophytic strains causing T.unguium. *Clin Exp Dermatol*. 2007;32(6):675–9.
11. Martinez-Rossi NM, Peres NTA, Rossi A. Antifungal Resistance Mechanisms of Dermatophytes. *Mycopathologia*. 2008;166:369–83.
12. Collee JG, Fraser AG, Marmion BP, Simmons A. Mackie & McCartney; Practical Medical Microbiology. 14th ed. Churchill

Livingstone: Elsevier; 1996. p. 695–717.
13. Doddamani PV, Harshan KH, Kanta RC, Gangane R, Sunil KB. Isolation, Identification and Prevalence of Dermatophytes in Tertiary Care Hospital in Gulbarga District. *People J Sci Res*. 2013;6(2):10–3.
14. Majeed N, Narayanankutty S, Rajan R, Theodore RB. Clinicomycological study of dermatophytosis in a tertiary care centre. *J Acad Clin Microbiol*. 2016;18:110–3.
15. Ramaraj V, Vijayaraman SR, Rangarajan S, Kindo AJ. Incidence and prevalence of dermatophytosis in and around Chennai. *Int J Res Med Sci*. 2016;4(3):695–700.
16. Karmakar SG, Kalla KR, Karmakar S. Dermatophytoses in a desert district of Western Rajasthan. *Indian J Dermayol Venereol Leprol*. 2015;61(5):280–3.
17. Abu-Elteen KH, Malek AM. Prevalence of dermatophytoses in the Zarqa district of Jordan. *Mycopathologia*. 2019;145(3):137–42.
18. Asticcioli S, Silverio AD, Sacco L, Fusi I, Vincenti L, Romero E. Dermatophyte infections in patients attending a tertiary care hospital in northern Italy. *New Microbiol*. 2018;31(4):543–8.
19. Azab MM, Mahmoud NF, Allah SA, Hosny AED, Shehata AS, Mohamed RW. Dermatophytes Isolated From Clinical Samples of Children Suffering From Tinea Capitis In Ismailia, Egypt. *Aus J Basic App Sci*. 2012;6(3):38–42.
20. Grover S. Clinico-mycological evaluation of onychomycosis at Bangalore and Jorhat. *Indian J Dermatol Venereol Leprol*. 2013;69(4):284–6.
21. Ranganathan S, Menon T, Sentamil G. Effect of socio-economic status on the prevalence of dermatophytosis in Madras. *Indian J Dermatol Venereol Leprol*. 2015;61(1):16–8.

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