

# Prevalence of dermatophytes and other fungal agents from clinical specimens at a tertiary care hospital

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## Abstract

**Background:** Superficial fungal infections are the most common skin diseases, affecting millions of people throughout the world. The present study was undertaken to isolate dermatophytes and other fungal agents from clinical specimens and to assess the clinico-epidemiological profile of dermatophytic infection. **Material and Methods:** A total of 100 clinically diagnosed, randomly selected cases of skin, hair and nail infection, of all age groups and of both sexes were studied. The specimens for the study were skin scrapings, hair pluckings and nail clippings. Identification of the causative pathogen was done by performing KOH mount, culture on SDA and DTM, lactophenol cotton blue mount and urease tests. **Results:** Most common age group affected was 31-40 years with 38 cases (38%). Males were more commonly affected with 68 cases than females with 32 cases. Out of 100 cases, most common clinical type was Tinea corporis with 30 cases (30%) followed by Tinea unguium (26%). A total of 67 cases (67%) were positive by both microscopy and culture. Out of 67 dermatophytes isolated, *T. rubrum*, *T. mentagrophytes*, *T. tonsurans* and *E. floccosum* were 34%, 27%, 4%, and 2% respectively. **Discussion:** Tinea corporis was the commonest clinical type. Dermatophyte infections are very common in this region where hot and humid climate in association with poor hygienic conditions play an important role in the growth of these fungi.

**Key Words:** Dermatophytosis, Tinea corporis, Trichophyton, Socioeconomic status.

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## INTRODUCTION

Superficial fungal infections are the most common skin diseases, affecting millions of people throughout the world<sup>1</sup>. The dermatophytes are by far the most significant fungi because of their widespread involvement of population at large and their prevalence all over the world<sup>2</sup>. The estimated lifetime risk of acquiring a dermatophyte infection is between 10 and 20%<sup>1</sup>. "Ring worm", "tinea" or "dermatophytosis", are common terms used for infections caused by dermatophytes. Dermatophytosis is defined as the infection of the skin,

hair and nails caused by a group of closely related keratinophilic fungi called. Dermatophytes all of which produce enzyme keratinase<sup>2</sup>. The classical presentation of tinea infection is a lesion with central clearing which is surrounded by an advancing red, scaly, elevated border<sup>3</sup>. Dermatophytes are assuming greater significance in both developed and developing countries particularly due to the advent of immunosuppressive drugs and various conditions like organ transplantation, lymphoma, leukaemia, human immunodeficiency virus (HIV) infections and disease<sup>4</sup>. A study of dermatophytosis in a population is important as it may reflect the climatic condition, customs, hygienic and socio-economic status of people<sup>5</sup>. The present study was undertaken to isolate dermatophytes and other fungal agents from clinical specimens and to assess the clinico- epidemiological profile of dermatophytic infection.

## MATERIAL AND METHODS

A total of 100 clinically diagnosed, randomly selected cases of skin, hair and nail infection, of all age groups and of both sexes, attending Dermatology and Venerology

outpatient department were taken for the study. A detailed history of selected cases was taken in relation to occupation, socio-economic status and involvement of more than one site. Socio-economic status of patient was determined by B.G. Prasad's classification for socio-economic status [6]. Patients under antifungal treatment were excluded from the study group. After the detailed history, clinical examination of patient was made in good light, which included site of lesion, number of lesions, clinical type, etc. The specimens for the study were skin scrapings, hair pluckings and nail clippings. All specimens were obtained from the active edge of the lesion after thorough cleaning with 70% alcohol. These were preserved in small black paper envelopes and then subjected to potassium hydroxide (KOH) wet preparation of various concentrations (10%, 20% and 40%) depending on the type of clinical specimen for the presence of fungal elements. After direct microscopic examination, irrespective of demonstration of fungal elements, the specimens were inoculated on to Sabouraud's dextrose agar (SDA) with 0.05% chloramphenicol and 0.5% cycloheximide, and Dermatophyte Test Medium. (DTM). SDA with

antibiotics were incubated at 25- 30°C (room temperature) for upto three weeks, and was observed periodically for growth. If no growth seen after three weeks, it was taken as negative. Fungal isolates on SDA were identified based on growth rate, colony morphology, pigmentation on reverse, lactophenol cotton blue mount and urease test. Dermatophyte test medium was incubated at 25°C (room temperature) for upto two weeks and will be observed for colour change from yellow to red and growth. Tease mount, cellphone tape mount and slide cultures were undertaken for microscopic morphology.

**RESULTS**

Most common age group affected was 31-40 years with 38 cases (38%) followed by 21-30 years with 32 cases (32%) and 41-50 years with 12 cases (12%). Males were more commonly affected with 68 cases (68%) than females with 32 cases (32%). Male to female ratio was 2.1:1. Most cases isolated from lower socioeconomic class (76%), followed by middle (18%) and higher (6%) (Table 1).

**Table 1: Demographic distribution of cases**

Demographic data	No. of cases (%)
Age groups (yrs)	
≤ 10	02
11-20	05
21-30	32
31-40	38
41-50	12
>50	11
Sex	
Male	68
Females	32
Occupation	
Sedentary workers	24
Labors	46
Housewives	12
Students	18
Socioeconomic status	
Lower	76
Middle	18
Higher	06

Out of 100 cases, most common clinical type was Tinea corporis with 30 cases (30%) followed by Tinea unguium (26%). Tinea corporis was most commonly seen in labors with 13 cases (43.3%) followed by sedentary workers with 8 cases (26.6%). Tinea cruris was most commonly seen in with labors 7 cases (50%). Tinea unguium was more commonly seen in labors 15 cases (57.7%) followed by sedentary workers and housewives 4 cases (15.3%) each. Tinea capitis was more commonly seen in school going children with 3 cases. Tinea pedis was more commonly seen in labors 6 (66.6%). Tinea mannum was more commonly seen in students 3 (42.8%). Tinea cruris with corporis more commonly seen in sedentary workers 3 (42.8%).

**Table 2:** Clinical types in relation to occupation

Clinical types	Occupation				Total
	Sedentary workers	Labors	Housewives	Students	
T.corporis	8(26.6%)	13(43.3%)	5(16.6%)	4(13.3%)	30
T. cruris	5(35.7%)	7(50%)	-	2(14.2%)	14
T.unguium	4(15.3%)	15(57.7%)	4(15.3%)	3(11.5%)	26
T.capitis	-	-	-	3(100%)	03
T.pedis	2(22.2%)	6(66.6%)	-	1(11.1%)	09
T.mannum	1(14.2%)	2(28.5%)	1 (14.2%)	3(42.8%)	07
T.faciei	-	-	1(50%)	1(50%)	02
T.barbae	1(50%)	1(50%)	-	-	02
T.cruris with T.corporis	3(42.8%)	2(28.5%)	1(14.2%)	1(14.2%)	07
<b>Total</b>	<b>24</b>	<b>46</b>	<b>12</b>	<b>18</b>	<b>100</b>

A total of 67 cases (67%) were positive by both microscopy and culture. Seven cases (7%) were positive by microscopy and negative by culture. Three cases (3%) were negative by microscopy but culture positive. 26 cases (26%) were negative both by microscopy and culture. *Trichophyton rubrum*, *Trichophyton mentagrophytes* were mainly isolated from Tinea corporis, Tinea unguium and Tinea cruris cases. *T. tonsurans* mainly

isolated from T.corporis and *E.floccosum* isolated from, T.unguium and T.pedis cases. All the isolates were isolated on SDA while 98% were isolated on DTM. The maximum incubation period was more than a week for SDA, whereas DTM gave positive results on culture within a week of inoculation. SDA required to be incubated at least for three weeks before being reported as negative.

**Table 3:** Clinico-mycological correlation of the study group

Clinical type	Species isolated				Total
	<i>T.rubrum</i>	<i>T.mentagrophyte</i>	<i>T.tonsurans</i>	<i>E.floccosum</i>	
T.corporis (n=30)	6	5	3	0	14
T. cruris (n=14)	6	6	1	0	13
T.unguium (n=26)	6	7	0	1	14
T.capitis (n=3)	-	1	-	-	1
T.pedis (n=9)	3	3	-	1	7
T.mannum (n=7)	2	2	-	-	4
T.faciei (n=2)	1	1	-	-	2
T.barbae (n=2)	2	-	-	-	2
T.cruris with T.corporis (n=7)	8	2	-	-	10
Total (n=100)	34	27	4	2	67

## DISCUSSION

The present study shows that dermatophytosis was more common in the age group of 31-40 years with 38 cases (38%) followed by 21-30 years with 32 cases (32%) which is comparable with other studies done by Veer *et al*<sup>7</sup>. The highest incidence in young adults aged 31-40 years could be due to increased physical activity and opportunity for exposure. Males (68%) were more commonly affected than females (32%). Male to female ratio was 2.1:1, these observations are comparable with other studies done by Veer *et al*<sup>7</sup> Sarma *et al*<sup>8</sup> and Kamothi *et al*<sup>9</sup>. Current results revealed that males are more prone to dermatophytoses than females. This may be co-related with their outdoor work leading to excessive sweating and the frequent interaction with different people of the society. The lower incidence in females

may be also due to the non-reporting of the female patients to the hospitals due to the prevailing social stigma in the rural population in India. In the present study, Tinea corporis was the commonest clinical type encountered (30%) it is comparable to other studies done by Kumar *et al*<sup>10</sup> and Das *et al* (50.0%)<sup>11</sup>. In the present study, T.unguium was the second commonest clinical type isolated (26%), whereas Das *et al*<sup>11</sup> reported it 0.9%. In the present study, Tinea cruris was the third commonest clinical type (14%) and commonest age group affected was 31-40 years where as Raja *et al*<sup>12</sup>, recorded highest incidence in age group 20-45 years (67.9%). It seems that excessive moisture, exercises, crowded places, low level of personal hygiene and type of clothes might be the major causes and risk factors for this problem. Tinea capitis is less common in India than other countries because of habit of applying vegetable oil. It has

inhibitory effect on growth of dermatophytes in vitro<sup>4</sup>. In the present study, out of 100 cases, *Tinea pedis* was seen in 9% cases, which is comparable with the study done by Chimelli PAV *et al* (9.9%)<sup>13</sup>, Das *et al*<sup>11</sup> reported (6%). In the present study, out of 100 cases of dermatophytosis *Tinea manuum* was (7%), which is comparable with the study done by, Das *et al* (8%)<sup>11</sup>, Sahai *et al*(5%)<sup>14</sup> whereas study done by Kumar *et al*<sup>10</sup> reported (3.4%). In the present study, *Tinea corporis* with *Tinea cruris* was present in 7% cases, which is comparable with the study of Karmakar *et al* (10.4% cases)<sup>15</sup>. Tight synthetic clothes resulting in conditions like increased dampness and warmth of the body facilitating the skin surface suitable for the growth of dermatophytes. Such conditions are linked to the higher incidence of *Tinea corporis* and *Tinea cruris*<sup>4,5</sup>. In the present study, infection was most common in low income group (76%) followed by middle income group (18%) and high income group (6%), Ranganathan *et al*<sup>5</sup> reported that (69.2%) of infected people were from low income group and (23.2%) from middle income group. Hanumanthappa *et al*<sup>16</sup> also reported 65.4% from lower class. Lower socioeconomic group is most commonly affected with ringworm may be due to the prevalence of poor hygienic practices and overcrowding. In the present study, dermatophytosis was most commonly seen in labors (46%) followed by sedentary workers (24%), housewives (12%) and students (18%) which is similar to study by, Veer *et al*<sup>7</sup>, Hanumanthappa *et al*<sup>16</sup> reported majority of the patients were manual laborers (30.6%). It was observed that most of the patients were involved in exhausting physical work with long working hours under the sun, which leads to profuse sweating. Such conditions are related to the higher incidence of dermatophytoses in labours<sup>4,5</sup>. In the present study, out of 100 clinically diagnosed cases of dermatophytosis, 67 (67%) were positive by both KOH and culture, 7 cases (7%) were positive by KOH and negative by culture, 3 cases (3%) were negative by KOH but culture positive, 26 cases (26%) were negative by both KOH and culture, it is comparable with other studies done by H. Hanumanthappa *et al*<sup>16</sup> and Singh S *et al*<sup>4</sup>. The KOH positive and culture negative cases in our studies could be due to either previous antifungal treatment or the nonspecific resistance of the host, and no evidence of active infection. In such situations hyphae must be dead and hence did not grow in culture. Both KOH and culture negative cases may be due to other allergic conditions which may be misdiagnosed clinically as dermatophytosis. In the present study, *T. rubrum* (34%) is the commonest etiological agent in majority of clinical types followed by *T. Mentagrophytes* (27%), *T. tonsurans* (4%) and *E. floccosum*(2%). Similar observations were reported by Sen *et al*<sup>17</sup>, Jain *et al*<sup>18</sup>,

Hanumanthappa *et al*<sup>16</sup>. Whereas, study of Sahai *et al*<sup>14</sup> shows higher incidence of *T. mentagrophytes* (25%) followed by *T. tonsurans* (20%), *T. rubrum* (5%), *E. floccosum* (3%). In the present study DTM was found slightly less efficient than SDA in primary isolation of dermatophytes. All the isolates were isolated on SDA while 98% were isolated on DTM. These results are similar to the study of Madhavi *et al*<sup>19</sup>. The study showed a male preponderance and greater association with labourers and low-income group. *Trichophyton* species forms the commonest aetiological agent of dermatophytosis and *T. rubrum* was the commonest isolate, concluding that it is the most common cause of dermatophytic infection. The results of present study indicate that dermatophyte infections are very common in this region where hot and humid climate in association with poor hygienic conditions play an important role in the growth of these fungi. *Tinea corporis* was the commonest clinical type.

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