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# COMPREHENSIVE STUDY OF TINEA CORPORIS IN A RURAL BASED TERTIARY CARE CENTRE OF EASTERN PART OF INDIA

Microbiology

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## ABSTRACT

**INTRODUCTION:** Although Tinea corporis is a known disease entity in our country, we have tried to explore various aspects of this ailment in a rural based tertiary care centre.

**AIMS & OBJECTIVE:** The present study is to evaluate the clinico-demographic profile, mycological-spectrum and drug-utilization-pattern in treatment non-responder tinea corporis and to compare with treatment-naïve.

**MATERIALS AND METHODS AND LOGICAL PLAN:** Out of 105 cases of dermatophytosis, 85 cases (80.95%) were positive by KOH and 95(90.48%) cases were positive by culture.KOH mount positivity was more in treatment naïve group (92%) compared with in non-treatment naïve group (77.5%).

**RESULT AND ANALYSIS:** Among 105 patients, mean age was 30.85±12.11. In treatment naïve patients, mean age was 22.92±10.48 which was much lower than non-treatment naïve group (33.33±11.56). Majority of them were in 21-30 years group (38.09%). Males outnumbered the females (1.44:1). Relapse, recurrence and unresponsiveness were more in males (55%) than females (45%). Housewife was most commonly affected group (32.38%) followed by farmer (24.76%), laborer (19.05%) and student (19.05%). Unresponsiveness were mostly seen in housewives (49.06%). Majority of the patients was literate (60.95%). Most of the participants were from rural background (85%) and from low socio-economic background (74.29%). Mean duration of illness was 3.71±1.95month in total study subjects.

Clotrimazole and Miconazole showed least effectiveness among topical drugs whereas Fluconazole and Terbinafine were least effective among systemic drugs. Trichophyton rubrum was most common isolate (50.53%).It was more common in treatment naïve group (62.5%) compared to non-treatment naïve group (46.48%). T.Mentagrophytes were second most common group (45.26%) and Microsporum canis comprised least found isolation (4.21%). T.Mentagrophytes were found increasingly in relapse, recurrence and unresponsive groups (50.70%).

**CONCLUSIONS:** The incidence of Tinea corporis can be brought down to a lower level if public awareness and control measures can be adopted which is not at all difficult task.

## KEYWORDS

Dermatophytes, Tinea corporis, Bioclimatic conditions, treatment naïve

## INTRODUCTION:

Fungal infections are of growingly significant both in developed and developing countries due to illnesses like diabetes, HIV infection and the use of immunosuppressive drugs. Moreover, The Indian subcontinent has a varied topography and the hot and humid climate is highly favorable for the amassment and growth of fungal infections. Quite often we come across people suffering from superficial /opportunistic fungal infections as seen in the dermatology outpatient clinics, chiefly in tropical countries [1].

Bioclimatic conditions, promiscuity, sweating, prolonged contact with pets, contaminated water from swimming pools and surrounding risk areas favor the growth and development of fungi. The acquisition of fungal infection may be geophilic, zoophilic, or anthropophilic. Superficial/Cutaneous mycoses are infections of skin, hairs, and nails caused by dermatophytes, yeasts, and nondermatophyte molds. Amongst these, dermatophytes are responsible for the largest number of cases and this infection is commonly known as tinasis.

Both topical and systemic antifungal agents are used for treatment but emerging resistance to the drugs is a burning issue. These variations are the inspiration to study the epidemiological and mycological pattern of this disease entity. The study was conducted at the Dermatology as well as Microbiology department of Bankura Sammilani Medical College & Hospital catering vast adjoining area. In this study we tried to identify the most prevalent species of Dermatophytes causing Tinea corporis in the region of eastern India. The study proposal along with other relevant documents has been reviewed and approved by the institutional ethical committee.

## AIMS & OBJECTIVES:

1. To study clinico-epidemiological profile and etiological agent of treatment naïve and treatment unresponsive patients.
2. To study the clinico-epidemiological profile and mycological profile of Tinea corporis.

## PARAMETERS

Patients of Tinea corporis, was evaluated for the following parameters

- Age: Mostly in younger age group or in older immunosuppressed individuals ,
- Sex: Young males are more prone to encounter it. Ladies, who wears sarees, also suffer.
- Climate: Residents of hot and humid climatic condition mostly suffer.
- Other contributory factors are poor hygiene, bathing habit, close contact with patients having tineasis, use of topical or systemic corticosteroid, Diabetes, Undernutrion, Immunosuppression, Overcrowding, Low socio-economic status (below poverty line) etc.
- Dermatophytes, causing tinea corporis are *Microsporum sp., Trichophyton sp*.and *Epidermophyton sp.*

In this study the species of these dermatophytes had been identified in the Mycology laboratory.

- Unresponsive cases of Tinea corporis, had been evaluated for Drug history:

1. Details of topical and systemic treatment including types of medication, regimen, and duration of use were taken into account.

- 2.Compliance to treatment

- The clinico-demographic and mycological profile of treatment naïve and treatment unresponsive tinea corporis had been compared.

## MATERIALS AND METHODS:

The study was an institution based case-control study. Clinical samples were sent to Mycology laboratory after collection in sterile folded craft

paper or petri dishes for further processing.

**INCLUSION CRITERIA:**

1. All patients irrespective of age, sex, socioeconomic and immunological status presenting with skin lesion.
2. Those who gave informed consent to the study.

**EXCLUSION CRITERIA**

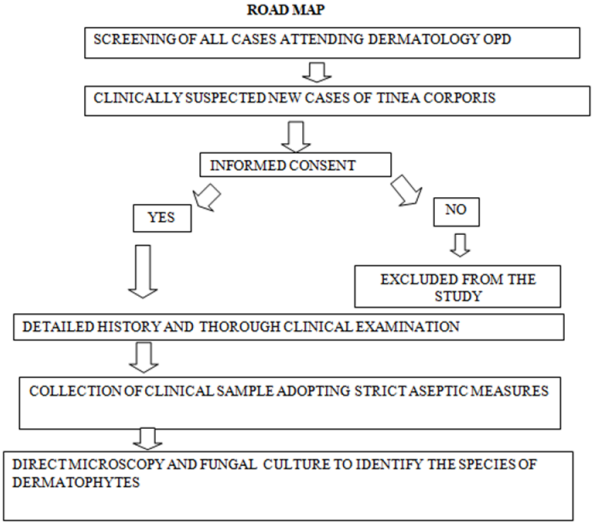
1. Those that were unable to attend OPD for follow up.
2. Those who did not give consent.

Detailed history and their demographic profile were recorded as per the proforma. The past and present history of any treatment received was also documented.

**General Examination:** All patients were examined thoroughly in natural light with proper exposure of clothing with maintaining of privacy.

**Cutaneous Examination:** The skin of the whole body was examined thoroughly, for any lesions, in natural light after undressing the patient. The findings were recorded as per proforma, under the prescribed headings like Morphology: 1) Macule /Papule/ plaque/Patch/ Infiltration/Nodule/Ulceration. 2) Site and Number: Single/Multiple. 3) Distribution: Unilateral/Bilateral, Symmetrical/Non-Symmetrical.4) Size and shape: Small/Big, Round/Oval/Linear. 5) Colour: Normal/Erythematous/Hypopigmented.6) Margin: Well defined/Ill defined, Raised/Not raised/papulo-vesiculation. 7) Surface: scaly/central clearing/any pustule.

**Microbiological Study** of the sent samples were done mainly by direct microscopy with 20% KOH wet mount identifying long septate branching hyphae. **Culture** done in Sabouraud's dextrose agar medium with cycloheximide & chloramphichol (SDCCA). Culture features including surface topography and pigmentation along with microscopy revealing septate hyphae with microconidia and macroconidia, helped in the diagnosis. Culture of Scales from the advancing border embedded in the **Dermatophyte Test** medium which also helped in identification due to change in color of medium with other characteristics. Tissue obtained by skin biopsy techniques were undergone histopathological studies along with special staining like Periodic acid-Schiff ( PAS) - Pink and Grocott's methylamine silver stain (GMS)- black, so fungal elements were easily noted in the stratum corneum.




**RESULT AND ANALYSIS:**

During the study period of (January 2017 to June 2018) 1.5 years, 105 patients of Tinea corporis were recruited for the study. The aim of this study was to evaluate the clinico-demographic profile, mycological-spectrum and drug-utilization-pattern in treatment non-responder tinea corporis and to compare with treatment-naïve one,

The participants were classified into two (2) major groups -treatment naïve (25 participants) and non-treatment naïve (80).The non-treatment naïve (80) participants were then subcategorized into relapse (n1=14), recurrence (n2=13), and unresponsive (n3=53) according to the response of therapy they got in past.

**Tables 1.Age group distribution in study participants (N=105)**

| Age | Treatment naïve (n1=25) | Non-treatment naïve(n2=80) | Total ( N=105) | % | * Chi-square test *P |
|---|---|---|---|---|---|
| **<10yrs** | 2 | 0 | 2 | 1.90% | 0.0046 |
| **11-20yrs** | 7 | 9 | 16 | 15.24% | |
| **21-30yrs** | 12 | 28 | 40 | 38.09% | |
| **31-40yrs** | 2 | 20 | 22 | 20.95% | |
| **41-50yrs** | 1 | 16 | 17 | 16.19% | |
| **>50yrs** | 1 | 7 | 8 | 7.61% | |

Table (1) shows among 105 patients, mean age was 30.85±12.11.In treatment naïve, mean age was 22.92±10.48 which was much lower than non-treatment naïve group (33.33±11.56). Majority of them were in 21-30 years group (38.09%). Male outnumbered the female (1.44:1).Relapse, recurrence and unresponsiveness were more in male (55%) than female (45%). Housewife was most commonly affected group (32.38%) followed by farmer (24.76%), labourer (19.05%) and student (19.05%).Students were the most common group (52%) among treatment naïve group. Unresposiveness was mostly seen in housewives (49.06%).Majority of the patients were literate (60.95%). Most of the participants were from rural background (85%) and from low socio-economic background (74.29%). Majority of the participants were from Hindu religion (63.80%).Unresponsiveness was more common in Muslims (56.60%).

It was revealed from history that both sexes have used dual mode of treatment. Females were slightly more prone to unresponsiveness [29(54.72%)] in comparison to male [24(45.28%)] which is statistically significant p= 0.0063.

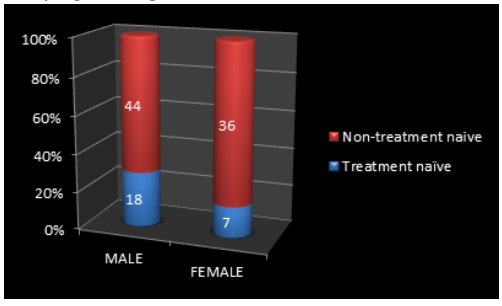



**Figure 1 is a bar diagram that shows male female ratio.**

**Table 2: Occupational Distribution in the study population classified according to the history of antifungal therapy (either topical or systemic)**

| Occupation | Treatment Naïve (n1=25) | Non-Treatment Naïve (n2=80) | Total (N=105) | Chi-square test P Value |
|---|---|---|---|---|
| **Farmer** | 7(28%) | 19(23.75%) | 26(24.76%) | <0.001 |
| **Housewife** | 2(8%) | 32(40%) | 34(32.38%) | |
| **Office worker** | 2(8%) | 3(3.75%) | 5(4.76%) | |
| **Labourer** | 1(4%) | 19(23.75%) | 20(19.05%) | |
| **Student** | 13(52%) | 7(8.75%) | 20(19.05%) | |
| **Total** | 25(100) | 80(100) | 105(100) | |

This table 2 showing housewives were more prone to emerge as non responders among other occupational groups and this difference was statistically significant.

Educational status in the population shows higher percentage of literates used dual mode of treatment than illiterates. Those who are in below poverty line were more interested to get treatment than treatment naïve group and this difference was statistically significant. It has been observed that below poverty line population have more relapse, more recurrence and more unresponsiveness compared with APL group. Religion distribution in the study population showed that majority of the patients were from Hindu religion than Muslim and treatment seekers were more in Hindu religion. This difference was significant. Dual mode of therapy was utilised more by Hindu participants. The relapse and recurrence were more in Hindus which is again statistically significant but unresponsiveness was found to be significantly more in Muslims.

Mean duration of illness was 3.71±1.95 month, in treatment naïve group it was quite lower 1.16±0.37 month. The study also revealed that duration of illness was 2 to 4 month (42.85%) followed by >4 month duration (31.43%). The patients were presented with moderate itchy condition. Trunk was most common site of involvement in all groups. Hot and humid conditions along with friction and tight clothing were major contributory factors regarding relapse, recurrence and unresponsiveness. Diabetes and HIV had major impact on relapse, recurrence and unresponsiveness.

Majority of the participants experienced similar episode in past (62.86%).Similar episode was more in non-treatment naïve group (81.25%) compared to treatment naïve group (4%).Positive family history was significantly more in all relapse, recurrence and unresponsiveness groups(75%). Addiction was a major concern in non-treatment naïve group (70%) as compared to treatment naïve group (32%). It was one of major contributory factors of non-responders (relapse, recurrence and unresponsiveness-92.86%, 92.31% and 58.49% respectively). Steroid abuse was a major concern in unresponsive group (52.83%).

Those who were unresponsive to treatment had moderate itching. This study also revealed involvement of more than one site or generalised involvement showed delayed response to treatment or unresponsiveness to antifungal therapy (either topical or systemic). Working environment i.e. hot & humid climate is aggravating the situation towards acquisition of resistant type of tineasis. Friction due to various reasons (either topical or systemic) worsens the situation.

Presence of concomitant illness like Diabetes, Hypertension, and HIV modify the disease course & do additional damage to the patients. Another observation is systemic comorbidities, like bacterial, fungal, viral infections which are not very uncommon contribute to the unresponsiveness in spite of receiving both systemic and topical treatment.

Those who have positive family history and also history of getting systemic and topical form of therapy suffers most than who got monotherapy. History of addiction was more common in them, who experienced relapse, recurrence and unresponsiveness. About 25% of patients have tried topical or systemic steroid with antifungal drugs as a mode of treatment.

**Tables 3: Previous treatment with topical antifungal showed significant unresponsiveness in the study population.**

| | Relapse | Recurrence | Unresponsiveness | Total (N=80)* | Chi-square test P Value |
|---|---|---|---|---|---|
| **Clotrimazole** | 11 | 7 | 52 | 70 | P < 0.0001 |
| **Miconazole** | 8 | 4 | 34 | 46 | |
| **Terbinafine** | 6 | 0 | 8 | 14 | |
| **Luliconazole** | 2 | 0 | 5 | 7 | |
| **Sertaconazole** | 0 | 4 | 4 | 8 | |
| **Eberconazole** | 0 | 5 | 3 | 8 | |

* A few patients had used more than one topical antifungal

**Tables 4: Previous treatment with topical & systemic antifungal also play significant role:**

| | Topical Therapy | Systemic Therapy | Both | Total (N=80)* | Chi-square test P Value |
|---|---|---|---|---|---|
| **Fluconazole** | 7 | 6 | 53 | 66 | P = 0.0047 |
| **Itraconazole** | 0 | 0 | 17 | 17 | |
| **Terbinafine** | 2 | 4 | 21 | 27 | |
| **Griseofulvin** | 0 | 1 | 0 | 1 | |
| **Ketoconazole** | 0 | 0 | 1 | 1 | |

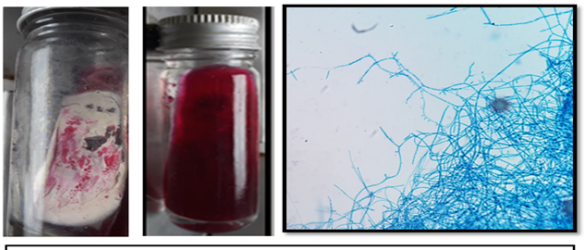
* A few patients had used more than one systemic antifungal The older systemic antifungal were less effective in those who used both form of treatment which is statistically significant p=0.0047.

Isolation of organism is more in case of **culture** [95(90.48%)] than KOH mount, Clinical samples showed KOH mount positivity in 85(80.95%) cases. 77(73.33%) cases showed both KOH and culture positivity and 2(1.91%) cases showed both KOH and culture negativity. So culture showed more effective way to isolate and identify the organism upto species level thus making it a **gold standard investigation in dermatophytic infection** .

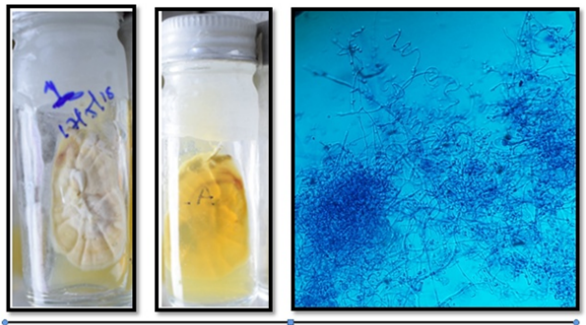
Clotrimazole and Miconazole showed least effectiveness among topical drugs whereas Fluconazole and Terbinafine were least effective among systemic drugs. Participants who used Clotrimazole and Miconazole showed more relapse, recurrence and unresponsiveness. Similar fate was seen who used Fluconazole and Terbinafine.

Trichophyton rubrum was most common isolate among 105 participants (50.53%).It was more common in treatment naïve group (62.5%) compared to non-treatment naïve group (46.48%).T.Mentagrophytes were second most common group (45.26%) and Microsporum canis comprised least found isolation (4.21%).

T. Mentagrophytes was found increasingly in relapse, recurrence and unresponsive groups (50.70%).



**Front &Reverse side of Culture bottle showing growth of Trichophyton rubrum. Microscopy reveals Small tear shaped, clavate microconidia, arranged along the sides of hyphae giving the appearance "birds on a fence "suggest growth of Trichophyton rubrum.**



**Culture shows -Flat white to creamy colony with central folding and raised tufts. Reverse of the colony shows yellowish pigmentation .Microscopy reveals - Cigar-shaped macroconidia, grape like clusters of microconidia, spiral hyphae suggestive of Trichophyton mentagrophytes**

## DISCUSSION

Dermatophytoses form over 16–75% of all the mycological infections. It is more prevalent in tropical and subtropical countries including India, where heat and moisture play an important role.[2]Although not life threatening, its severity can cause great discomfort particularly in immunosuppressive conditions. It remains a public health problem, which is prevalent in all age groups and both the sexes[3]. Clinical lesions caused by the fungi are highly variable and closely resemble other skin diseases making laboratory diagnosis and confirmation necessary[4]. The diagnostic tests include potassium hydroxide (KOH) wet mount examination, wood's lamp examination, skin biopsy-histopathological study with special fungal staining and fungal culture.[13-17]

Morbidities of tinea infection are not only because of its frequent relapses or recurrences but also due to increasing resistance to antifungal drugs, that has become a major concern of dermatologists and patients in today's situation.It is essential to evaluate the clinico-demographic profile, mycological spectrum and drug utilization pattern in tinea corporis. The study has enlightened us about the risk factors of unresponsiveness, relapse and recurrences also.

In our study maximum number of cases were seen in the age group of 21-30 years 40 (38.09%) followed by 31-40 years (24%) and males were affected more than females. Similar peak in this age group has been observed by various workers. The higher incidence may be due to increased physical activity, increase friction or trauma that are help to form portal of entry and increased perspiration and humidity aggravates the situation.[1-3]

In the present study males (62 cases, 59.05%) were more commonly affected than females (43 cases, 40.95%). Male to female ratio was 1.44: 1. In almost all studies done by other researchers reported male preponderance.[2]. This may be due to increased outdoor physical activity and increased opportunity for exposure in men than women.

In this study majority of patients were house wives (34 cases with 32.38%) followed by farmers (26 cases with 24.76%), labourer (20cases with19.05%) and students (20 cases with19.05%). It was also noted that among unresponsiveness females were more 26 (49.06%) than males. Sarma and Borthakur[5] found the disease most commonly associated with occupations like agriculture (39%), followed by students and unskilled labourers (15%).

In the present study, maximum number of patients came from rural areas (77 cases with 73.33%) while only 28 cases (26.66 %) of patients were from urban areas. Sumana et al have reported same[6]. The higher incidence in rural areas may be due to more outdoor exposure to environmental dust, improper personal hygiene and ignorance. Highest incidence was seen in low socioeconomic status (BPL) 78 cases (74.29%). In our study 67(63.81%) cases were Hindu and 38(36.19%) cases were Muslims. This indicates health seeking behaviour is more in Hindus than Muslims. More over the Muslims females are shy that's why they do not disclose their problem.

WORKING ENVIRONMENTAL CONDITION: In the present study, highest incidence of Tinea corporis was reported in persons who worked in hot, humid condition and it was 81 cases (77.14%) in compared with 24 (22.85%) cases. The similar picture found in study done by Janardhan B. et al[7]. They found highest incidence of dermatophytosis was reported in summer season (128 cases with 64%) followed by rainy season (56 cases with 28%). Siddappa et al observed similarly in their study[8]. Higher incidence in summer season may be due to the increased heat which in turn leads to increased perspiration contributing to fungal infection.

MYCOLOGICAL STUDIES: Out of 105 cases of dermatophytosis, 85 cases (80.95%) were positive by KOH and 95(90.48%) cases were positive by culture. 77 cases (73.33%) were positive by both KOH and culture. 8(7.62%) cases were KOH positive but culture negative. 18 cases (17.14%) were KOH negative but culture positive. Siddappa et al reported 100% positivity by KOH and 49% positivity by culture[8].

INCIDENCE OF VARIOUS SPECIES OF DERMATOPHYTOSIS: In our observation, T.rubrum was the commonest isolate 48 cases (50.53%) followed by T. mentagrophytes 43 cases (45.26%) and M. canis 4 cases (4.21%) Siddappa et al reported T. rubrum in 54 cases (81.82%), T. violaceum in 3 cases (4.54%). T. mentagrophytes in 1 case (1.51%), E. floccosum in 6 cases (9.09%) and M.audouinii in 2 cases (3.03%) [8] Verenkar et al reported. T.rubrum as the commonest species (55%) followed by T.Mentagrophytes (31.03%) E.floccosum (6.89%) and M.gypseum (3.4%) [2]. Gupta et al reported T.rubrum as commonest isolate followed by E.floccosum (15.15%) [9]. Bindu reported T. rubrum as the predominant species followed by T. mentagrophytes[10]. Huda et al [11] reported T.rubrum as commonest isolate (88.15%) followed by T. mentagrophytes (16.7%) T.violaceum (8.8%) M.audouinii (5.9%) and M. gypseum (2.9%) [12].

## CONCLUSIONS

Thus to conclude we can say that hot, humid climate with friction, trauma increase perspiration, and poor hygiene all are significant contributory factors of developing increase frequency of Tinea corporis. Moreover, over the counter use of topical steroid leads to unresponsiveness of these apparently benign dermatoses. Dermatophytosis, when associated with systemic diseases like diabetes mellitus and HIV or conditions like Hypertension, atopy and HIV infection, it becomes most distressing. KOH preparation and cultures were done for all the cases. Trichophyton species formed the commonest etiological agent.

Trichophyton rubrum was the commonest species isolated from most clinical specimen. Clothing patterns, personal hygiene appears to be an important factor. Moreover, judicious use of antifungal and awareness regarding not to use over the counter medicines bring down the relapse recurrence and unresponsiveness.

We also found that Culture of the specimen is gold standard to diagnose the species of different dermatophytes. The most striking finding in our study was increase trend of isolation of Trichophyton mentagrophytes in relapse, recurrence and unresponsive cases.

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