

To Determine the Causative Dermatophyte Species in Steroid Modified Tinea

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Abstract

Background: Dermatophytosis has been recognized for many years; however, diagnosis and treatment remain challenging. In recent years there has been a rise in the number of cases with atypical presentations due to rampant use of topical steroids.

Aim of the study: The aim of the present study was to determine the causative dermatophyte species in steroid modified Tinea.

Methods: A prospective observational study was conducted at Government General Hospital, Srikakulam, from July 2022 to March 2023. A total of 100 patients presenting with clinically diagnosed tinea cases and those who used over-the-counter topical medications containing antifungals and Clobetasol propionate were included. Patients on immunosuppressants and other non-dermatophyte fungal infections were excluded. Skin scrapings were collected for KOH mount and culture and the details were analysed.

Results: The study population predominantly comprised individuals aged 20-39 years (70%), of which 65 were males and 35 females. Clinical variants observed included tinea cruris (35 cases), tinea corporis (30 cases), tinea pedis (15 cases), tinea faciei (10 cases), and tinea manuum (10 cases). KOH was positive in 71 cases of which culture was positive among 46 cases. Trichophyton mentagrophytes was the most common species (22 cases) identified, followed by trichophyton rubrum (14 cases). Other species identified included trichophyton verrucosum (5 cases), trichophyton violaceum (3 cases), and microsporum species (2 cases). Epidermophyton species were not detected.

Conclusion: This study highlights a significant change in the prevalence of dermatophyte infections, with trichophyton mentagrophytes emerging as the most common species in cases of steroid-modified tinea. This shift emphasizes the need for stringent regulations and legal measures to be imposed on the sale of topical steroid creams, addressing the rise in cases.

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Introduction

Dermatophytes represent a group of keratinophilic fungi which infect skin, hair, and nails. Trichophyton, Epidermophyton, and Microsporum are the three genera causing infection. Their natural habitat can be human, animal, or soil. In recent times, it has become a major public health problem because of the unscrupulous usage of combination of antifungals with potent topical corticosteroids.

Furthermore, changes like global warming and clothing patterns have led to an increase in prevalence of Dermatophyte infections across India.

It can affect all age groups and the clinical presentations are varied.

Aim of the study:

The aim of the present study was to determine the causative dermatophyte species in steroid modified Tinea.

Material and Methods:

This study is a prospective observational study that included a total of 100 patients of clinically diagnosed Tinea cruris, corporis, faciei, manuum and pedis.

The present study was conducted from July 2022 to March 2023 at Government General Hospital, Srikakulam. Patients above 18 years, adults, and elderly were included in the study. A detailed clinical history was taken from all patients after obtaining informed consent. It included age, sex, socioeconomic status, occupation, site of infection, duration of disease, history of similar illness in the family, history of recurrence, lifestyle, and associated diseases were elicited and recorded in proforma. Those patients who were on systemic immunosuppressant drugs, and with non-dermatophyte fungal infections were excluded. All the patients had used over the counter topical medications which contained antifungal, antibacterial along with Clobetasol propionate. Depending on the clinical types and site of lesions, skin scrapings, nail clippings along with subungual debris and infected hair stubs were collected. The site of lesion was cleaned with 70% alcohol, and allowed to dry then samples were collected using a sterile scalpel blade in sterile black paper folds and labelled with details of the patients. The collected samples were transported to the laboratory immediately without any delay for microscopic examination and culture.

For direct microscopic examination, the scrapings were placed on a microscopic slide with one or two drops of 20% potassium hydroxide (KOH), and a cover slip was applied. The sample was warmed by passing the slide several times over a flame of Bunsen burner and examined under the microscope. A sample like nail clippings was placed on a slide with a few drops of 40% KOH and a cover slip was applied, and examined after 6hrs, so that nails get dissolved in KOH and hyphae and arthroconidia become clearly visible when examined under low (x10) and high (x40) power objective.

The culture was performed in two different sets of antibiotic incorporated sabouraud dextrose agar (SDA) media, one with chloramphenicol 50mg/l and the other with cycloheximide 500mg/l and in addition to chloramphenicol and gentamicin.

The cultures were incubated at 25 degrees for one to four weeks and checked twice in a week for any growth. In case of positive cultures, identification of causative agents was performed based on macroscopic and microscopic examination of culture isolates which include gross morphology of the fungal colony (texture, color, surface and reverse pigment, topography), rate of colony growth. Microscopic examination was done using lactophenol cotton blue preparation. Fungal conidia (type of macroconidia, shape, and size of microconidia) and accessory structures were studied using the slide culture method. Special tests like hair perforation test, urease production, and slide culture were performed whenever necessary by standard technique. In the absence of growth even after four weeks, the culture was declared negative.

Results

Of the 100 cases, 70% were in the age group 20-39 years. 15% were between 40 to 49 years. Another 10% were 50-59 years age group. Around 5% of patients were above 60 years of age with the eldest being 85 years. 65% of the patients were males and 35% were females. The following clinical variants were observed in the study. Tinea cruris [35 cases], Tinea corporis [30 cases], Tinea pedis [15 cases], Tinea faciei [10 cases] and Tinea manuum [10 cases]. Out of the 46 fungal culture positive cases, the predominant species grown in culture was *Trichophyton mentagrophytes*, which was identified in 22 cases. In 14 cases the species grown was *Trichophyton rubrum*. Moreover, *Trichophyton verrucosum*, *Trichophyton violaceum*, *Microsporum* species were detected in five, three, and two cases respectively. *Epidermophyton* was not reported in the present study.

KOH and Culture findings –Of the hundred cases KOH was positive in 71 cases. The culture was positive in a total of 46 cases. In 26 cases inspite of KOH being positive, dermatophyte growth was not seen in culture. Only one case of fungal growth was observed despite KOH being negative.

Table 1: Clinical types identified in this study

Tinea cruris	35
Tinea corporis	30
Tinea pedis	15
Tinea faciei	10
Tinea manuum	10
Total	100



Figure 1: Images of Steroid modified tinea

Table 2:

KOH- Positive	Culture- Positive	45
KOH -Positive	Culture -Negative	26
KOH -negative	Culture -Positive	1
KOH- Negative	Culture -Negative	54

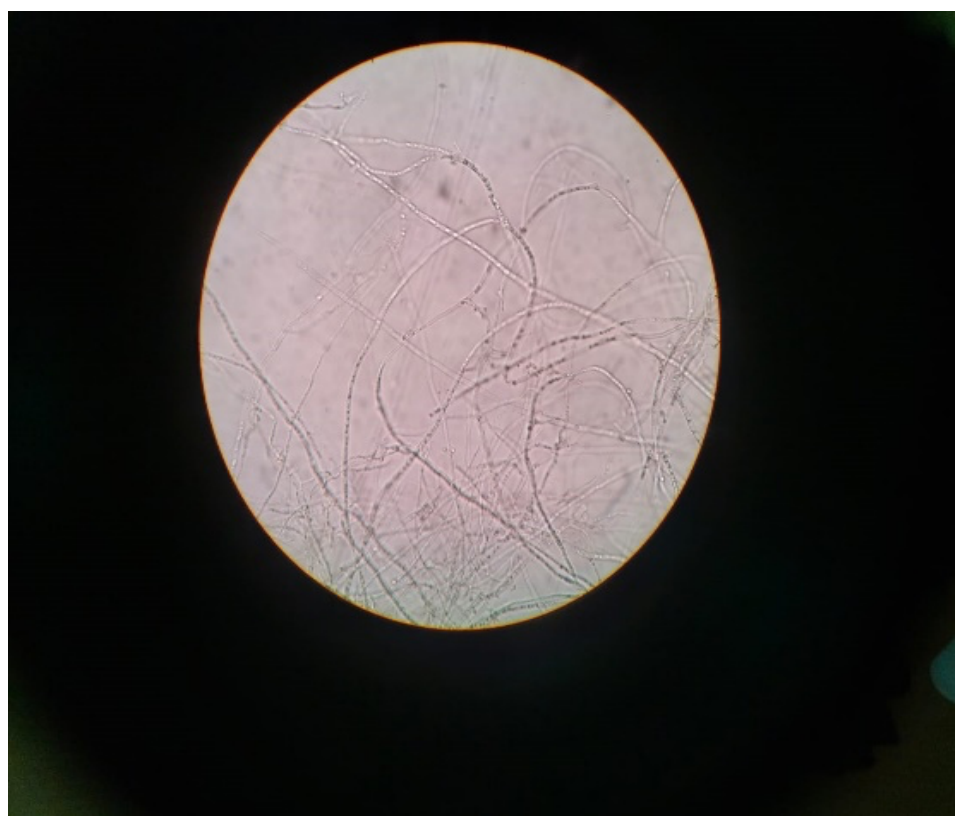


Figure 2: Hyaline septate fungal hyphae



Figure 3: Lactophenol cotton blue mount of trichophyton species with microconidia

Table 3: Identified species in Culture

Trichophyton mentagrophytes	22
Trichophyton rubrum	14
Trichophyton verrucosum	5
Trichophyton violaceum	3
Microsporum species	2
Epidermophyton species	0
Total	46

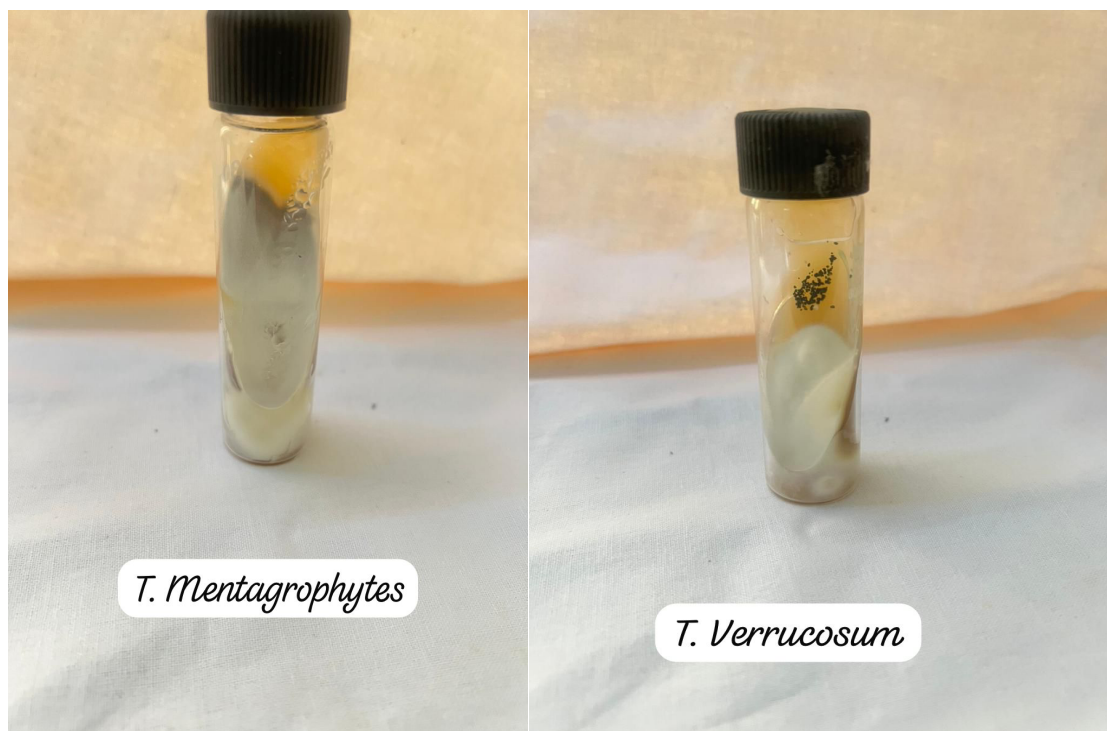


Figure 4: culture of Trichophyton Species

Discussion

Dermatophytosis is more prevalent in tropical and sub-tropical countries like India where heat and humidity are high throughout the year which favours the fungal growth. Global warming, social factors, evolving clothing trends, and the use of over-the-counter combination products have contributed to a rise in its incidence in recent years. This has led to changes in clinical features with diverse morphologies, making treatment more challenging. The easy availability and irrational use of combination creams containing potent steroids are thought to be major cause for the epidemic-like situation of superficial dermatophytosis.

Multiple permutations and combination formulations are available containing potent topical steroids, antifungals, and antibacterials. They provide the feeling of temporary relief on the application due to their anti-inflammatory effects promoting its use. In our study, most of the patients used the combination creams as suggested by the pharmacists. Dispensing over the counter without any prescription is one of the major factors contributing to the widespread misuse of steroids. Dutta et al; [6] found that 78% of their patients in the study were prescribed combination creams by the pharmacists. Rajkumaran et al; [7] also noted that pharmacists were accountable for 50.4% of the cases. In our study the most frequently used topical steroid among the fixed combinations applied by the patients was clobetasol propionate, this is comparable with the study conducted by Rajkumaran et al; [7] in which clobetasol was the principal offending component in the formulations which was around 34.8% followed by betamethasone in 17.2% of the patients.

In our study, the predominant clinical variants observed were tinea cruris, tinea corporis, tinea pedis, tinea faciei, and tinea manuum. This distribution aligns with the findings of Gupta et al; [8] and many other studies who also identified tinea cruris and tinea corporis as common presentations. Due to the anti-inflammatory effects of steroids, these patients showed unusual features like double-edged tinea, widespread lesions with scaly eczematous appearance at the centre of the ring, and involvement of unusual sites like face, ears, scalp, palms and soles. It can mimic many eczematous conditions like nummular eczema, atopic dermatitis, contact dermatitis, seborrheic dermatitis, rosacea and psoriasis which leads to misdiagnosis and mismanagement. For instance, tinea faciei, which was noted in 10 cases in our study, might be mistaken for other facial dermatoses such as rosacea or lupus erythematosus [9]. The adverse effects observed in our study were striae, atrophy, telangiectasia, acneiform eruptions, and two patients presented with Cushingoid features. Similar side effects were noted in a study

carried out by Thakur et al; [10] including Cushing's syndrome with bilateral osteonecrosis of the femoral head in one of their patients. In the multicentric study conducted by Nenoff et al; [11] they observed the side effects like atrophy, striae, and hypopigmentation in many of their patients who used topical steroid creams.

The majority of the patients in our study were in the age group of 20-39 years. A similar trend was observed in the study by Sowmya et al; [12] in which the most common age group affected was 20-40 years. Also, in agreement with the study carried out by Poluri et al; [13] 64.5% of patients were between the age group of 21-40 years. In our study among 100 patients, 65 were males and 35 were females, showing male preponderance and the results were similar to many other studies [6,9,13-15] where males outnumbered female patients. The higher incidence in males may be attributed to a greater susceptibility to infections and the nature of their work. Additionally, the lower occurrence in females might be due to under-reporting, likely influenced by the existing social stigma. In our study, we have also observed that partners and siblings were affected, which is in agreement to the study conducted by Balasubramanian et al; [16] where family history was positive among his patients. Also, Chaudhary et al; [15] found that family history was positive in 52.5% of their patients, similar findings of 44% in Salecha et al; [9] This is emphasizing on the importance of educating patients about the contagious nature of the disease and proper hygiene practices.

In our study, KOH positivity was 71% and these findings corroborate with the study conducted by Chaudhary et al; [15] where KOH positivity was 76% and similar findings were noted in the study conducted by Salecha et al; [9] where KOH positivity was 69%. In our study Trichophyton mentagrophytes was the predominant species identified in 22 cases followed by trichophyton rubrum identified in cultures from 14 cases. This finding is in corroboration with several other studies, including those conducted by Chaudhary et al; [15] Salecha et al; [9] Bhatia and Sharma; [2] Dipmala Das et al; [3] and Manjyot Gautam et al; [4] where T. mentagrophytes was the most common species identified. In study conducted by Nenoff et al; [11] trichophyton mentagrophytes/trichophyton inetrdigitale complex was isolated in 93.2% cases and trichophyton rubrum in only 6.8% of the cases. Whereas in studies conducted by Dutta et al 2017; [6] Gupta et al 2014; [17] Singh et al; [1] Trichophyton rubrum was isolated as most common dermatophyte followed by T. mentagrophyte. In our study we have also identified 5 cases of trichophyton verrucosum, 3 cases of trichophyton violaceum and 2 cases of microsporum species.

Historically, *Trichophyton mentagrophytes*, especially *Trichophyton interdigitale*, was the main cause of superficial dermatophytosis worldwide until 1935. By 1954, *Trichophyton rubrum* had replaced it in many countries including India where incidences went up to 80% [18]. This shift was attributed to factors like environmental conditions, host susceptibility, and changing virulence. However, in recent years, *Trichophyton mentagrophytes* has been re-emerging as the main causative organism amid an upsurge in dermatophytosis cases. Easy accessibility and

irrational abuse of topical steroids were thought to be the major causes for this upsurge. A probability that the zoophilic *trichophyton mentagrophyte* has acclimatised itself and has undergone anthropization leading to easy transmission among humans has been suggested. [18] In the Study conducted by Indraneel Saha et al; [5] they found that the predominant species grown in chronic dermatophytosis and in steroid-modified tinea was *Trichophyton mentagrophytes*, while in the naïve Tinea and recurrent cases it was *T. rubrum*.

Table 3:

Study / Year	State	Clinical type	Species identified
Chaudhary et al (2018)	Uttar Pradesh	Disseminated tinea, <i>T. corporis</i> , <i>T. cruris</i> , <i>T. faciei</i>	<i>T. Mentagrophytes</i> , <i>T. rubrum</i> , <i>T. verrucosum</i>
Salecha et al (2023)	Andhra Pradesh	Mimicked various eczematous dermatoses	<i>T. mentagrophytes</i> , <i>T. rubrum</i>
Balakumar et al (2012)	Tamil Nadu	<i>T. corporis</i> , <i>T. Cruris</i> & <i>T. capitis</i>	<i>T. rubrum</i> , <i>T. mentagrophytes</i>
Bhatia & Sharma (2014)	Himachal Pradesh	<i>T. corporis</i> , <i>T. cruris</i> , <i>T. unguium</i>	<i>T. mentagrophytes</i> , <i>T. rubrum</i> & <i>Microsporum gypseum</i>
Gupta et al (2014)	Madhya Pradesh	<i>T. capitis</i> , <i>T. corporis</i> , <i>T. unguium</i>	<i>Trichophyton rubrum</i>
Singh et al (2019)	Odisha	<i>T. corporis</i> , <i>T. barbae</i> , <i>T. cruris</i> , <i>T. faciei</i>	<i>T. mentagrophytes</i> , <i>T. rubrum</i> , <i>T. tonsurans</i> , <i>T. verrucosum</i>
Dipmala Das et al (2022)	Bihar	<i>T. corporis</i> , <i>T. faciei</i>	<i>T. mentagrophytes</i> , <i>T. rubrum</i> , <i>Trichophyton verrucosum</i>
Manjyot Gautam et al (2023)	Mumbai	<i>T. corporis</i> , <i>T. cruris</i> , <i>T. faciei</i> , <i>T. pedis</i>	<i>T. rubrum</i> , <i>T. mentagrophytes</i>
Sharma et al (2012)	Rajasthan	<i>T. corporis</i> , <i>cruris</i>	<i>Tichophyton rubrum</i>

Conclusion

The usage of topical steroids and combination creams has become the major cause for increasing incidence and atypical clinical presentations of superficial dermatophytosis making the diagnosis more challenging and more difficult to treat. This study highlights a significant change in the prevalence of dermatophyte infections, with *trichophyton mentagrophytes* emerging as the most common species in cases of steroid-modified tinea. This shift emphasizes the need for stringent regulations and legal measures to be imposed on liberal sale of topical steroid creams, addressing the rise in cases. There is a pressing need for public awareness about the potential harms of improper topical steroid use and for pharmacists to adhere to stricter guidelines to prevent indiscriminate dispensing.

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