

## Clinicomycological Correlation of Tinea Incognito

Sumati Hogade<sup>1†</sup>, Sneha Chavan<sup>2</sup>, Vaibhavi Verekar<sup>1</sup>, Ahuti Pandya<sup>1</sup>,  
Anandkumar R Annigeri<sup>3</sup> and Tejashwar Hogade<sup>4</sup>

<sup>1</sup>Department of Microbiology, J.N.Medical College,  
KAHER (KLE Academy of Higher Education and Research), Belagavi, India

<sup>2</sup>Department of Dermatology, J.N.Medical College,  
KAHER (KLE Academy of Higher Education and Research), Belagavi, India

<sup>3</sup>Department of Mechanical Engineering, JSS Academy of Technical Education, Bengaluru, India

<sup>4</sup>Namma Clinic, Macche, Belagavi, India

**Background:** Tinea incognito refers to the unusual clinical manifestation of dermatophytosis brought on by prior topical or systemic medication use. Given the widespread and easy diagnosis of dermatophytic infections, steroid usage has created a diagnostic conundrum, thus turning a straightforward infection that may be treated into a persistent, long-term skin disease.

**Objective:** To examine the clinical characteristics of tinea incognito and correlate the clinical manifestations with the microbiological findings.

**Methods:** An observational study was conducted with 100 cases in a department of microbiology, dermatology, venereology, and leprology, in India. The baseline data of the patients and clinical features of tinea incognito were recorded. To identify the causative agents, skin scrapes were collected and tested as per standard protocol.

**Results:** In this study, 30% of the patients were between 31 and 40 years old. The male-to-female ratio was 2:1, 66% reported a history of application of the triple combination of steroids, and 34% used single steroids. *Tinea corporis* was seen in 30% of the patients, and the trunk/body (52%) was the most frequent site, followed by other sites (34%). Potassium hydroxide positivity was observed in 75% of the cases, cultural positivity in 77%, and both tests were positive in 75%. The most common organisms found were *T. mentagrophytes* (72.7 (56/77)%), *T. rubrum* (19.5 (15/77)%), and *T. tonsurens* 7.8 (6/77)%.

**Conclusion:** Tinea incognito is a fungal skin infection that can present with various nonspecific clinical features. This steroid-modified dermatophytosis is largely under-reported because the underlying fungal infection is masked by the irrational use of topical steroids.

**Key Words:** Dermatophytosis, Steroid, Tinea incognito, *Trichophyton* spp.

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†Corresponding: Sumati Hogade, Department of Microbiology, J.N.Medical College, KAHER (KLE Academy of Higher Education and Research), Belagavi, 590010, India.

Phone: +91-9448866944, e-mail: [sumatihogade@gmail.com](mailto:sumatihogade@gmail.com)

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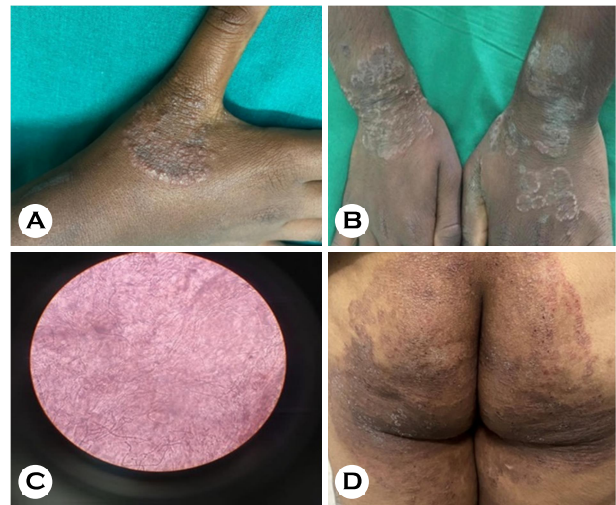
## INTRODUCTION

Tinea incognito is a dermatophyte infection altered by corticosteroid therapy<sup>1</sup>. Dead keratin is metabolized by dermatophytes, which causes dermatitis. This reaction reduces the amount of keratin that the fungus receives, thus suppressing the infection. Steroids and other immunosuppressants inhibit this protective eczematous response, which promotes fungal growth<sup>2</sup>. Patients with these infections can be of any age or sex. Although it can affect any area, it most commonly occurs in the face and arms<sup>3</sup>. Risk factors of infection include occupational hazards, excessive sweating, poor hygiene, immunocompromised status, lack of basic education among people of low socioeconomic status, overcrowding, humid conditions, and excessive exposure to outdoor activities such as agriculture and manual labor<sup>4-6</sup>. The clinical presentation of tinea incognito varies widely and can be mistaken for skin conditions, such as psoriasis, erythema migrans, lichen planus, seborrheic dermatitis, eczema, and purpura<sup>7-9</sup>. Lesions are typically unusual; thus, its diagnosis is sometimes overlooked or delayed. The diagnosis of tinea incognito can be easily done by using potassium hydroxide (KOH) preparation to visualize branching hyphae and spores, which are characteristic of dermatophytes<sup>10</sup>. Treatment of tinea incognito consists of discontinuing all topical steroids and starting a targeted antifungal regimen. The daily incidence of such cases is increasing because of the increased availability and use of over-the-counter medications and topical steroids. To link the clinical manifestations with the microbiological findings, this study aimed to investigate the clinical and mycological aspects of tinea incognito.

## MATERIALS AND METHODS

This cross-sectional study was conducted for 1 year after obtaining institutional ethical committee clearance. Written informed consent mentioning confidentiality was obtained from the patient.

The study included a total, 100 patients of both sexes with clinical characteristics suggestive of tinea incognito (clinically, these lesions have less raised margin and are not scaly as classic dermatophytosis; they tend to be extensive, pruritic, erythematous, and pustular) and a history of steroid overuse. Skin scraping from the edges of the skin lesions was taken and then subjected to 10% KOH preparation. Samples were also inoculated onto Sabouraud dextrose agar (SDA) for culturing. By analyzing colony morphology and pigment production, species growing from SDA plates were identified by micro-



**Fig. 1.** (A) Tinea incognito masquerading as eczema. (B) Tinea incognito mimicking as psoriasis. (C) KOH mount of the lesion scraping shows segmented hyphae suggesting Dermatophytes. (D) Hyperpigmented erythematous plaques

scopic examination with lactophenol cotton blue (LPCB). For final identification, conventional procedures were performed to conduct tests such as the hair perforation test, urease test, and slide culture, as needed.

### 1. Statistical analysis

A Microsoft Excel spreadsheet was used to record the collected data. Continuous data (SD) were expressed as means and SDs. Categorical data were expressed as rates, ratios, and percentages and were compared using the chi-square test, test of proportion, and Fisher's exact test. A probability value of  $\leq 0.050$  indicates significance.

## RESULTS

This cross-sectional study was conducted from January 2020 to December 2020. A total of 100 patients with clinical signs and symptoms suggestive of tinea incognito were included. Clinically, these lesions have a less raised margin and are not as scaly as classic dermatophytosis. They tend to be extensive, pruritic, erythematous, and pustular (Fig. 1).

In this study, 61% of the patients were male, and 39% were female, with a male-to-female ratio of 2:1. Patients aged 31~40 years were predominant, comprising 30% of the patients (male = 20%; female = 10%), followed by those

**Table 1.** Demographic data of the patients with tinea incognito (n = 100)

Age (years)	No. of cases	Sex of the patient		Socioeconomic status of the patient*				
		Male	Female	I (upper class)	II (upper middle class)	III (middle class)	IV (lower middle class)	V (lower class)
<20	3	2	1	0	1	0	2	0
21~30	28	18	10	1	10	16	1	0
31~40	30	20	10	0	10	16	3	1
41~50	26	13	13	0	3	21	2	0
51~60	12	7	5	0	5	7	0	0
61~70	1	1	0	0	0	1	0	0
Total	100	61	39	1	29	61	8	1

\*On the basis of BG Prasad's revised socioeconomic status classification (2021)

**Table 2.** History of corticosteroid usage and duration in the patients with tinea incognito

Corticosteroid application	Distribution (n = 100)		
	Number	Percentage	
Duration	<6 months	14	14
	7~12 months	67	67
	13~18 months	19	19
Steroids used	Triple combination*	66	66
	Single steroid	34	34
	1. Beclomethasone dipropionate 0.025%	20	58.8
	2. Clobetasol propionate 0.05%	9	26.5
	3. Fluocinolone acetonide 0.01%	5	14.7

\*Triple combination includes ofloxacin, ornidazole, terbinafine hydrochloride, and clobetasol propionate cream

aged 21~30 (28%), 41~50 (26%), 51~60 (12%), <20 (3%), and 61~70 (1%) respectively. Moreover, 61% of the patients belong to socioeconomic class III (middle class), followed by those in the upper middle class (29%) according to the BJ Prasad revised classification (Table 1).

In addition, 66% of the patients reported a history of application of triple combination of drugs (ofloxacin, ornidazole, terbinafine hydrochloride, and clobetasol propionate cream), followed by 34% who reported single steroid use (beclomethasone dipropionate 0.025%, followed by clobetasol propionate 0.05%, and fluocinolone acetoneid 0.01%). The duration of steroid application was 7~12 months in 67% of

the patients, with a minimum of 5 months and a maximum of 18 months (Table 2).

In this study, lesions were found on the trunk/body (52%), face (14%), and other sites (34%). The most common clinical presentation was an ill-defined erythematous plaque with less scaling (56%), followed by psoriatic lesions (19%), various other presentations such as eczemas (18%), and other atypical presentations (rosacea, discoid lupus erythematosus, and impetigo) (7%). The most common fungal species isolated was *T. mentagrophytes* (56%), followed by *T. rubrum* (15%), *T. tonsurans* (6%), and no growth was found in 23% (Table 3).

**Table 3.** The clinical presentation, their site of distribution and fungal culture of the patients with tinea incognita

Clinical presentation of the lesion	Site of the Lesion			Mycological growth			
	Face	Trunk/ Body	Other sites	<i>T. mentagrophytes</i>	<i>T. rubrum</i>	<i>T. tonsurans</i>	No growth
Eczematous lesion n=18	4	9	5	5	2	0	11
Psoriatic lesion n=19	3	11	5	10	2	4	3
Hyperpigmented erythematous plaque n=56	6	30	20	34	11	2	9
Other atypical lesions n=7	1	2	4	7	0	0	0
Total n=100	14	52	34	56	15	6	23

In this study, fungal elements were observed in 75% (75/100) of the cases in the KOH test, cultures were positive in 77% (77/100), and both KOH tests and culture were positive in 75% (75/100). By Cohen's kappa, 0.945 ( $p$ -value) showed a substantial agreement between the results of the KOH test and culture, and the agreement between these two was 98%. The diagnostic parameters of KOH over culture showed a sensitivity of 97.4%, a specificity of 100%, a positive-predictive value of 100%, and a negative-predictive value of 92%.

In this study, patients were taking oral and topical antifungals for 2 months, from which the patients exhibited significant improvements with no recurrence.

## DISCUSSION

This study analyzed patients aged >18 years with skin lesions and a history of steroid use. The age group most frequently affected was those aged 31~40 years 30%. In this study, 28% of the patients were 21~30 years old and <1% were 61~70 years old. This result aligns with the results of Bhatia et al.<sup>11</sup>, reporting 21~50 years (64.9%) as the mean age. In another study by Maulingkar et al.<sup>12</sup>, the mean age group was the third decade (28%). The present study had a male predominance. The male-to-female ratio was 2:1 in the present study and that in the study by Pathania et al.<sup>13</sup> was 1.7:1 (63% vs 37%). In another study by Rudramurthy et al.<sup>14</sup>, the male-to-female ratio was 2.8:1 (73.8% vs 26.1%) and that in the study by Bhatia et al.<sup>11</sup> was 5.7:1. Men have

historically been afflicted more often than women, which was most likely due to their propensity for outdoor employment that exposes them to hot, muggy, and sweaty environments that increases the development of dermatophytosis.

In this study, 61% of the patients belonged to the middle socioeconomic strata; this result matched the findings of Hanumanthappa et al.<sup>15</sup>, who reported that the majority of dermatophyte infections occurred in those in the lowest socioeconomic strata (65.4%). Poluril et al.<sup>16</sup> revealed a high incidence in individuals in the lowest socioeconomic group (67.74%). Noronha et al.<sup>17</sup> showed that most patients were from poor social class (61.3%). Thus, belonging to lower socioeconomic groups, unhygienic living conditions, living in crowded quarters, and inadequate nutrition are risk factors for infection and, if not identified, will lead to chronicity and recurrence. In the present study, the average duration of the application of steroids was 7~12 months i.e., 67% (67/100), in comparison with that reported by Ansar et al.<sup>18</sup>, which was approximately 1 year. Dutta et al.<sup>19</sup> reported that the duration of steroid application varied from 6 weeks to 12 months; thus, in the present study, patients continue to use steroids for a longer duration because of the abrupt reduction in pruritis and clearing of lesions. In the present study, 66% of the patients reported using steroid combinations that were sold over the counter (OTC), and 53.2% utilized OTC topical corticosteroid combination in a related study conducted by Pathania et al.<sup>13</sup> Mahajan et al.<sup>20</sup> and Singh et al.<sup>21</sup> revealed that 187 (70.6%) and 63 (42%) patients, respectively, took a combination of topical steroids. The increasing availability of OTC topical steroid creams and their irrational usage were

found to be strongly correlated. The present study showed the incorrect and widespread use of preparations containing steroids, as well as their easy availability, low cost, and early alleviation from inflammatory symptoms (such itching), are major contributors to the current revival of dermatophytosis. These drugs inhibit the immunity mediated by the host cell, which makes the disease resistant to therapy<sup>22</sup>. In this study of tinea incognito, ill-defined erythematous plaque with less scaling was the most common presentation, followed by eczematous lesions. Vineetha et al. reported similar atypical presentations along with eczematous changes<sup>23</sup>. In a study by Romano et al.<sup>24</sup>, eczema was the most common clinical manifestation. Dogra et al.<sup>25</sup> reported various atypical presentations of tinea incognito such as eczema and psoriasis. The trunk (52%) was the most common site of the clinical lesion in our patients. In the study by Thakur et al.<sup>26</sup>, the clinical lesions were more commonly seen on the trunk (61.20%). Multiple sites and single genital involvement were suggestive of topical steroid usage, as reported by Verma et al.<sup>22</sup> KOH test positivity was observed in 75% (75/100) of our cases and culture positivity in 77% (77/100), and both KOH and culture positive were observed in 75% (75/100). This result aligns with the results of Banerjee et al.<sup>27</sup>, who reported 90% culture positivity and 80.95% KOH positivity. In the study by Noronha et al.<sup>28</sup>, direct microscopy was positive in 60%, and 52.4% of patients in the study by Mahajan et al.<sup>20</sup> showed cultural positivity and 79.6% indicated KOH positivity.

In the present study, *T. mentagrophyte* was the most common isolated organism at 56% (56/100), followed by *T. rubrum* at 15%. Tigga et al.<sup>29</sup> showed that *T. mentagrophyte* accounted for 97.2% of the isolated dermatophytes. According to Nenoff et al.<sup>30</sup>, *T. mentagrophyte* (48.3%) was the most often occurring organism in culture. Bhatia et al.<sup>11</sup> indicated that *T. mentagrophyte* (63.5%) was the most often emerging organism. *T. mentagrophytes* grows quickly in 5~7 days, which may account for the inflammatory lesions, extensive involvement, and fomite transmission<sup>22</sup>.

## 1. Limitation

The study was an outpatient, hospital-based study with a small sample size and not a complete representation of the population. Thus, the results cannot be generalized to the entire population. We have not performed antifungal susceptibility testing to determine the most sensitive drug against *Trichophyton* spp., and we did not perform histopathological examination to rule out noninfective manifestations.

## CONCLUSION

The overuse of steroids is the primary cause of the nation's growing epidemic of superficial fungal infections. Physicians, paramedics, and the general public must be made more aware of the negative effects of steroids on fungal infections. Thus, the manufacture and distribution of illogical topical formulations that combine steroids and antifungals must be regulated. The public and medical professionals must be informed about the risks associated with topical steroids, including their serious adverse effects, and the need for prudent and thoughtful use to avoid tinea incognito.

## CONFLICT OF INTEREST

In relation to this article, we declare that there is no conflict of interest.

## DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ORCID

Sumati Hogade: 0000-0002-1215-8003  
Sneha Chavan: 0009-0003-2150-1381  
Vaibhavi Verekar: 0009-0005-0563-2650  
Ahuti Pandya: 00009-0002-1741-1874  
Anandkumar R Annigeri: 0000-0002-9734-236X  
Tejashwar Hogade: 0009-0005-0270-1913

## ETHICAL APPROVAL STATEMENT

The study was approved by the Institutional Review Board of (IRB No. MDC/DOME/280). This study was conducted in accordance with the principles of the Declaration of Helsinki.

## PATIENT CONSENT STATEMENT

The patient provided written informed consent for the publication and the use of their images.

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