Original Articles

Clinico-epidemiological and Mycological Aspects of Tinea Incognito in Iran: A 16-Year Study

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ABSTRACT

Background: Tinea incognito is a dermatophytic infection in which topical or systemic steroids have modified the clinical appearance of the mycosis and mimicking other skin diseases. **Objectives:** A large retrospective study was carried out to identify the clinical aspects and type of dermatophytes involved in tinea incognito cases in Iran during 1993–2008. **Patients:** Out of 6325 subjects suspected to have dermatophytoses, 56 patients (29 males, 27 females, mean age 32.6 years) were affected with tinea incognito. **Methods:** The causative agents were identified macroscopically and microscopically after the clinical samples were subjected to potassium hydroxide examination and culture isolation. **Results:** The most common type of infection was tinea corporis (32.1%), which significantly affected male patients. The prevalence of the other tineas in decreasing order was as follows: tinea faciei (26.8%), tinea cruris (14.3%), tinea manuum (12.5%), tinea pedis (8.9%), and tinea capitis (5.4%). The clinical features were to some extent diverse, ranging from eczema-like, seborrheic dermatitis-like, pyoderma-like and folliculitis to alopecia on scalp, trunk and limbs. *Trichophyton verrucosum* was the most frequently isolated species representing 33.9% of isolates, followed by *T. mentagrophytes* (28.6%), *T. rubrum* (12.5%), *Epidermophyton floccosum* (10.7%), *Microsporum canis* (8.9%), *T. violaceum* (3.6%), and *T. schoenleinii* (1.8%). **Conclusion:** To the best of our knowledge, this is the first broad investigation dealing with tinea incognito in Iran. The etiological agents of tinea incognito in Iran are consistent with those of the general population.

Key words : dermatophytoses, tinea incognito, steroid modified tinea, tinea, *Trichophyton*, Iran

Introduction

Dermatophytoses are considered one of the most prevalent public health problems in economically underdeveloped and developing countries. The lifestyle in societies, contact with animals and prolonged use of broad-spectrum antibiotics, corticosteroids, and antineoplastic drugs are some of the factors that contribute to the increase in the risk of infection by fungi, especially by dermatophytes^{1,2}.

Steroid modified tinea (*Syn.* Tinea incognito) was first described in 1968³. The term is used to describe a tinea infection incorrectly diagnosed and treated by the application of topical or systemic corticosteroids which has resulted in

reducing the extent of inflammation and scaling as well as delay in treatment with a suitable antifungal agent. The corticosteroids not only modify the clinical manifestations of the annular eruptions, but they can masquerade as a number of other dermatoses.

As there has been no comprehensive study on the epidemiology of steroid modified tinea among Iranian individuals, the aim of this study was to address representative data on the incidence of inappropriate diagnosis and treatment of tineas and tinea incognito as well as the fungal agents involved over a period of sixteen years. To our knowledge, this is the first extensive investigation dealing with tinea incognito in Iran. The epidemiological and clinical data collected will

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provide a database for future research and will therefore be useful in improving diagnostic and preventive educational strategies.

Patients and methods

Among 6245 outpatients who were suspected of having cutaneous mycoses and were referred to the Dermatology Department of Sina Hospital, Hamadan University of Medical Sciences, and 80 hospitalized patients in this department during the period 1993 to 2008, 56 cases of tinea incognito were recognized. All the patients with tinea incognito had a history of treatment with corticosteroids. They were from both urban and rural areas and were between 5 and 69 years of age (29 males, 27 females, mean age 32.6 years) (Table 2). Informed consent was obtained from each patient in the form of a consent form before sampling. All parts of the body of each patient with a history of treatment with topical or systemic corticosteroids were thoroughly examined for clinical signs associated with tinea incognito, i. e. extensive annular lesions with a fewer raised margin, fewer scales and more pustules along with the appearance of a lack healing at the centre.

In all these cases, hairs and scales were collected for mycological examination by a conventional technique. Scale scrapings were collected with a sterile surgical blade and approximately fifteen hair stumps (roots) were pulled out with sterile epilator forceps. To obtain a viable sample, skin scrapings were taken from all parts of the lesions and were repeated for confirmation.

Microscopic examination of samples (hair and skin) was performed following treatment with a keratin-clearing agent, an aqueous solution 10% (w/v) potassium hydroxide (KOH). A portion of sample was placed on a slide and a drop of KOH added. After 10 min, the wet preparation was examined under low ($\times 100$) and high ($\times 400$) magnification for the presence of arthroconidia or mycelium and/or spores and their distribution pattern in hair (ectothrix, endothrix or favic type). All samples were cultured irrespective of the negative or positive examination result. Each sample was cultured on two plates of Sabouraud's glucose agar (BioMeriux, Marcy-1, Etoile, France), with chloramphenicol and cycloheximide (SCC), which was made according to the manufacturer's instruction. The plates were inoculated with finely divided pieces from the samples and

incubated for 4-6 weeks at 28-30C, except in cases with severe inflammatory reactions suspected to be infected by *T. verrucosum* which were incubated at 37C. They were examined twice weekly for evidence of growth. After the growth of the dermatophytes was established, a subculture was made on Sabouraud's glucose agar plates (Oxoid, Basingstoke, UK), for further identification. The isolates were examined macroscopically and microscopically in lactophenol cotton blue. The dermatophyte species were identified by their gross and microscopic morphologies and by *in vitro* tests if required. In order to determination *T. mentagrophytes* varieties, the isolates were differentiated based on the macroscopic and microscopic characteristics and divided into *T. mentagrophytes* var. *interdigitale* and *T. mentagrophytes* var. *mentagrophytes*.

Results

During the 16-years period of this study a total of 6325 patients clinically suspected of having dermatophytoses were examined and 56 of these (0.9%) were diagnosed as having tinea incognito through direct vision and/or culture. All 56 patients had used the steroids for a short period, and were sent to the dermatology center because of side-effects. The majority of our patients (62.5%) were residents of rural areas and about one-third (19.6%) of them were found during the last two years of study.

With respect to the causative species of dermatophytes in the typical cases of dermatophytosis among 6325 subjects, the most frequently isolated etiological agent was *T. verrucosum* representing 35% of isolates, followed by *T. schoenleinii* (20.0%), *M. canis* (14.3%), *T. mentagrophytes* (9.5%), *Epidermophyton floccosum* (19.0%), *T. rubrum* (5.7%), *T. violaceum* (5.7%), and *T. tonsurans* (0.8%). Furthermore, tinea capitis (55.0%) and tinea corporis (22.4%) were the most common types of dermatophytosis, followed by tinea faciei (9.2%), tinea manuum (6.3%), tinea cruris (3.5%), tinea pedis (2.4%), and tinea unguium (1.2%) (Ghiasian et al., unpublished data).

The seven dermatophyte species isolated, along with their frequencies according to type of tinea are shown in Table 1. With regard to tinea incognito, *T. verrucosum* was the most frequently isolated species representing 33.9% of isolates,

Table 1. Clinical and mycological aspects of tinea incognito in Iran during 1993–2008

Clinical manifestation	Number of cases (%)	Tinea type	Dermatophyte isolated
Eczema-like	12 (21.4)	6 t. corporis, 6 t. mannum	3 <i>T. verrucosum</i> , 3 <i>T. mentagrophytes</i> var. <i>mentagrophytes</i> , 3 <i>T. rubrum</i> , 1 <i>E. floccosum</i> , 1 <i>M. canis</i> , 1 <i>T. mentagrophytes</i> var. <i>interdigitale</i>
Rosacea-like	9 (16)	9 t. faciei	3 <i>T. verrucosum</i> , 2 <i>T. mentagrophytes</i> var. <i>mentagrophytes</i> , 2 <i>T. rubrum</i> , 1 <i>M. canis</i> , 1 <i>T. mentagrophytes</i> var. <i>interdigitale</i>
Seborrhoeic dermatitis-like	7 (12.5)	4 t. faciei, 3 t. cruris	2 <i>T. verrucosum</i> , 1 <i>T. mentagrophytes</i> var. <i>mentagrophytes</i> , 1 <i>M. Canis</i> , 1 <i>E. floccosum</i> , 2 <i>T. mentagrophytes</i> var. <i>interdigitale</i>
Pyoderma-like	6 (10.7)	5 t. corporis, 1 t. mannum	4 <i>T. verrucosum</i> , 2 <i>T. mentagrophytes</i> var. <i>mentagrophytes</i>
Pytirisias rosea-like	5 (8.9)	5 t. corporis	1 <i>T. verrucosum</i> , 1 <i>E. floccosum</i> , 1 <i>T. mentagrophytes</i> var. <i>interdigitale</i> , 1 <i>M. canis</i> , 1 <i>T. violaceum</i>
Psoriasis	3 (5.4)	3 t. pedis	1 <i>T. verrucosum</i> , 1 <i>E. floccosum</i> , 1 <i>T. rubrum</i>
Allergic contact dermatitis	3 (5.4)	3 t. cruris	1 <i>T. verrucosum</i> , 1 <i>E. floccosum</i> , 1 <i>M. canis</i>
Seborrhoic-like (Petaloid form)	2 (3.6)	2 t. corporis	1 <i>T. verrucosum</i> , 1 <i>T. mentagrophytes</i> var. <i>interdigitale</i>
Contact dermatitis	2 (3.6)	2 t. pedis	1 <i>E. floccosum</i> , 1 <i>T. rubrum</i>
Inverse psoriasis	2 (3.6)	2 t. cruris	1 <i>T. verrucosum</i> , 1 <i>T. mentagrophytes</i> var. <i>interdigitale</i>
Folliculitis	2 (3.6)	2 t. capitis	1 <i>T. verrucosum</i> , 1 <i>T. schoenleinii</i>
Photosensitivity-like dermatitis	1 (1.8)	t. faciei	1 <i>T. verrucosum</i>
Alopecia	1 (1.8)	t. capitis	1 <i>T. violaceum</i>
Discoïd lupus erythematosus-like	1 (1.8)	t. faciei	1 <i>T. mentagrophytes</i> var. <i>mentagrophytes</i>

T., *Trichophyton*; *E.*, *Epidermophyton*; *M.*, *Microsporum*

followed by *T. mentagrophytes* (28.6%), *T. rubrum* (12.5%), *Epidermophyton floccosum* (10.7%), *Microsporum canis* (8.9%), *T. violaceum* (3.6%), and *T. schoenleinii* (1.8%). The most common type of infection was tinea corporis (32.1%) which significantly affected male patients. The prevalence of the other tineas in decreasing order was as follows: tinea faciei (26.8%), tinea cruris (14.3%), tinea manuum (12.5%), tinea pedis (8.9%), and tinea capitis (5.4%). The predominant source of infection was cattle and the most relevant agents (50%) were the two zoophilic dermatophyte species, i.e. *T. verrucosum* and *T. mentagrophytes* var. *mentagrophytes*.

The age group 30–39 showed the highest incidence (28.57%) of tinea incognito, in which females and male incidence was 56.25% and

43.75%, respectively. In this age group, tinea corporis was the commonest form of tinea incognito with 50% contamination. The lowest incidence was related to the 60–69 age group with only one case of tinea cruris (Table 2).

The mycological and clinical details of various types of tinea incognito are reported in Table 1. The most predominant clinical presentations were eczema-like (21.4%) (Fig. 1) and rosacea (16.1%). The clinical characteristics varied greatly, ranging from eczema-like, pyoderma, pityriasis rosea and seborrhoeic dermatitis-like on trunk, rosacea and seborrhoeic dermatitis-like on the face, psoriasis-like and contact dermatitis-like on limbs and folliculitis, and alopecia on the scalp. More often tinea corporis manifested in forms of pustular erythematous lesions without scaling

Table 2. Distribution of tinea incognito by age, sex and type of tinea in Iran during 1993–2008

Age groups (year)	Type of tinea													
	tinea corporis		tinea faciei		tinea cruris		tinea manuum		tinea pedis		tinea capitis		Total	
	M	F	M	F	M	F	M	F	M	F	M	F		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0-9	1		2	1							1	1	6	10.71
10-19	1	2	1	1				1			1		7	12.50
20-29	2	2	1	1	1	1	2	2	2	1			15	26.79
30-39	3	5	1	3	2	1	1						16	28.57
40-49	1	1		2	2		1		2				9	16.07
50-59			1	1									2	3.57
60-69						1							1	1.78
Total	8	10	6	9	5	3	4	3	4	1	2	1	56	100

F, Females

M, Males

Fig. 1. eczema-like lesions on hand.

Fig. 2. Pustular erythematous lesions without scaling.

and typical well-defined inflamed raised edge (Fig. 2). In our patients, all the pyoderma-like forms of tinea corporis and tinea manuum were caused by *T. verrucosum* and *T. mentagrophytes* var. *mentagrophytes* and were associated with severe inflammatory reactions and some degrees of edema (Table 1). Occasionally, the tinea resembled a photosensitivity-like dermatitis and was discoid lupus erythematosus-like on the face. In any type of dermatophytosis caused by *T. verrucosum*, multiple erythematous plaques as well as severe papulopustular lesions with patches of alopecia were seen (Fig. 3). Moreover, no case of onychomycosis, concomitant infection or even dermatophytid reaction developed during this sixteen-year follow-up period.

Discussion

Despite the importance of *t. incognito*, there is a scarcity of information in developing countries, and the literature review shows few case reports describing this disease in Iran^{4,5}. In this large retrospective study, the causative agents, sources of infection and clinical aspects of 56 tinea incognito cases, who were misdiagnosed because of steroid abuse, were analyzed. Previously, we encountered a case of dermatomycosis due to *Alternaria* sp. with ill-defined erythematous patch on the right cheek of a 12-year-old boy with pityriasis alba, who had used betamethasone ointment inconsistently over a period of a

Fig. 3. 55-year-old woman suffering from faciei incognito caused by *Trichophyton verrucosum*.

(a) Multiple erythematous scaling lesions of the cheeks.

(b) Papulopustular lesions on the eyebrows and forehead with alopecia.

year [Ghiasian unpublished data].

Despite the length of time they have been around, topical corticosteroids are still important drugs in dermatology, their clinical effects being related to their anti-inflammatory and immunosuppressive properties. In Iran, topical steroids are available without prescription and over the past decade, the number of requests for their prescription to different dermatoses has increased as over-the-counter medicines. About one-third (19.6%) of our patients were found in the last two years of our study, which showed that uncontrolled use of steroids has trended to increase during recent years in our country. Corticosteroids have no crucial place in usual treatment of the majority of the tinea except for treatment of kerion type of *t. capitis* to avoid scarring alopecia.

The increasing frequency of misuse of these drugs has led to the emergence of a number of clinical syndromes such as tinea incognito, impetigo incognito infantile gluteal granuloma and perioral dermatitis⁽⁶⁾. In contrast to Iraqi people⁽⁷⁾ who have mostly used the topical steroids for their skin-lightening properties, in Iran, the anti-inflammatory activity of these drugs has been the main reason for using them. Most of our patients declared that they were used topical steroids to counteract the severity of pruritus and inflammation of their lesions and stated that these symptoms initially improved for a few days but then become worse. In spite of the deterioration of the symptoms a number of patients had used them repeatedly.

In Hamadan province, although the most common dermatophytic infection has been tinea capitis, however tinea corporis, tinea manuum, tinea cruris and athlete's foot (tinea pedis) are also quite common⁽⁸⁾. In contrast to the general population, tinea capitis showed the lowest incidence of contamination in tinea incognito cases, while tinea corporis was the most common form of tinea, accounting for 32.1% of all infections (Table 2). This is similar to some reports from Iran^(2,9-11) but in contrast to the only report of dermatophytosis from Hamadan province⁽⁸⁾, which declared that after *t. capitis*, the most frequent dermatophytosis was *t. corporis* (10.4%). On the other hand, the epidemiological features of different kinds of dermatophytoses among the 6325 subjects over the 16 years have shown that tinea capitis, tinea corporis and tinea faciei have been the three most common types of tinea (Ghiasian et al., unpublished data). Regarding the causative species of dermatophytes in both groups, general population and tinea incognito cases, *T. verrucosum* has been the predominant etiological agent. Furthermore, although *T. tonsurans* has been the least common dermatophyte species among the Iranian people, it has not been a causative agent of dermatophytosis in our tinea incognito cases. It is well justified that the majority of our patients (58.9%), who used steroids were contaminated with zoophilic agents and suffered from annoying symptoms. So, because of this high degree of similarity in the etiological agents in the two surveyed groups, there is no special profile about

the isolated species in tinea incognito cases in Iran.

The majority of clinical manifestation (21.4%) were eczema-like (Fig. 1, Table 1). Of interest, in our series, no case of onychomycosis and dermatophytid (ID) reaction were detected. These results are in contrast to those of Romano et al.¹²⁾, who reported that 2% and 3% of Italian patients showed onychomycosis and ID reaction, respectively. Most of the patients in the current study were rural residents and visited a general practitioner, who did not diagnose an infectious disease and prescribed topical corticosteroids to alleviate the severity of inflammation and pruritus in acute dermatophyte infections. There was also evidence that some patients had used steroids more frequently despite deterioration of the symptoms. In our series, 64.3% of patients were treated at home by themselves (friends or family members) without consulting a physician or pharmacist, 21.4% on the prescription by general physicians and 14.3% by dermatologists. Regarding the role of general practitioners, the fungal infections were mostly mistaken for eczema and erroneously treated with topical steroids. In some cases children had been medicated by mothers for several weeks.

All of our patients except one who used the systemic steroids, were immunocompetent and used the topical form. Taking into account the mentioned considerations, it seems in areas with high incidence of zoophilic mycetes such as *T. verrucosum*, because of the severity of infection produced the patients have more predilections for using over-the-counter corticosteroids than those who were contaminated with anthropophilic species. In this study also, 58.9% of the patients who had self-treated topical corticosteroids at home, contaminated with *T. verrucosum* and *T. mentagrophytes* var. *mentagrophytes* and showed severe inflammatory reactions.

From an etiological standpoint, our tinea incognito cases were found to be due to different dermatophyte species of which *T. verrucosum* was the most frequently isolated, representing 33.9% of isolates. *Trichophyton verrucosum* is a zoophilic infectious agent causing 93% and 17.2% of the dermatophytic infections of cattle and human in Iran, respectively^{2,13)}. In developed countries, tinea infections caused by this fungus has been very rare (about 1% of all tineas)¹⁴⁾. The infection is often acquired from animal to human

contact, especially through young asymptomatic calves¹³⁾. In some studies carried out in Iran, it has been one of the most important and prevalent dermatophytes isolated from human, especially residents of rural areas^{2,8,13)}. Furthermore, in some other Iranian surveys, *M. canis*, *T. mentagrophytes*, *T. rubrum*, and *T. violaceum* have been the predominant dermatophyte agents commonly isolated^{9,10,15)}. Based on Romano et al. (2006)¹²⁾, *T. rubrum* has been a common causative agent of tinea incognito among Italian people. In our study, after zoophilic fungi, the anthropophilic fungi were the next (41%) most implicated agents encountered, of which *T. rubrum* and *T. interdigitale* had the highest frequency. The wide variety of anthropophilic dermatophytes isolated in this survey is in conformity with other reports^{5,9)} and showed that this group of the fungi possibly plays an imperative role in tinea incognito.

In healthy adults *T. verrucosum* can cause atypical tinea corporis mimicking other skin diseases such as trichophytia profunda, abscess formation¹⁴⁾, lupus erythematosus and photodermatitis¹⁶⁾. In the current study, some atypical tineas resembled other dermatoses, including discoid lupus erythematosus-like, alopecia and photosensitivity-like dermatitis, which is mostly caused by zoophilic mycetes (Table 1). Different manifestations of tinea incognito such as erythroderma-like, psoriasiform, Majocchi granuloma, rosacea-like, and eczematoid have been recorded by previous researchers^{17,18)}. In the current study, tinea corporis was the most predominant form of tinea and in dermatological examination most of the patients showed a localized dermatitis of the trunk characterized by annular erythematous lesions, without peripheral rim, central healing and prominent scaling as well as reduction in itching. Eventually, the skin lesions were enlarged and become darkish and pustular in appearance (Fig. 2). In some cases the infection was limited and in others it was extended to other body sites due to a dampening down of the inflammatory responses by prolonged use of topical steroids. In forms involving the face, most clinical manifestations were Rosacea-like and Seborrheic dermatitis-like, with some cases having multiple erythematous scaling lesions without advancing active border spread over the face at nose, cheeks and forehead along with papules and pustules (Fig. 3).

Following the use of topical corticosteroids in

our patients, two cases of deep follicular invasion of scalp by dermatophytes were seen. This finding is in accordance with what has been cited by Degreef and De Doncker¹⁹⁾ that 'Application of topical corticosteroids to a dermatophyte infection, may promote a deeper follicular invasion by the fungus'. Romano et al.,¹²⁾ upon conducting a study of 200 cases of tinea incognito in Siena and Milan, Italy, stated that 9% of the patients showed intrafollicular invasion by dermatophytes.

Tinea cruris is also apt to be misdiagnosis and complicated by t. incognito. Tinea cruris incognito was the third most common infection encountered in this series, and *E. floccosum* was found to be one of the commonest etiological agents (25% of the total fungi isolated). Recently, Mahmoudabadi and Mossavi⁵⁾ have reported a case of tinea cruris incognito due to *E. floccosum* from Iran. Furthermore, 14.3% of our cases showed t. cruris predominantly caused by zoophilic mycetes. Mistreatment of these patients with topical steroids resulted in exacerbation and spread of the disease to the inner part of the buttock, thighs and even in some cases to the upper trunk. Furthermore, due to long-term use of topical steroids in two patients surveyed, secondary changes as stretch marks in the groin's skin folds were seen. Because of application of topical steroids, obtaining sufficient skin specimens was difficult in some cases due to the lack of scale and peripheral rim.

As with treatment, the standard antifungal therapy for different type of dermatophytoses was used and all the patients were successfully treated with systemic griseofulvin: 12.5 mg/kg body weight for children and 250–500 mg twice daily for adults. Duration of therapy was 4 to 6 weeks for tinea corporis, cruris, pedis, faciei and manuum and 6 to 8 weeks for tinea capitis.

Conclusion

As evidenced above, different kinds of t. incognito have shown increasingly frequent trends during recent years in Iran. In order to overcome and solve this multiphase problem, the collaboration of different sectors of the community will be needed. With regard to the role of general physicians, who are in the first line of treatment in Iran, their correct recognition of fungal infections and appropriate treatment would undoubtedly be beneficial. Moreover, organized health education to the general public

through mass media programmes will be the most important strategy to reduce this problem. Finally, it is necessary that an infection be precisely identified by using laboratory methods on skin samples prior to the beginning treatment with therapeutic agents.

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