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Original Research Article

Clinicomycological study of tinea infections in and around Pune

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ABSTRACT

Background: Tinea is a common fungal infection seen in the tropical and subtropical countries affecting the skin and its appendages. The presentation may vary from mild scaling to severe inflammation with bacterial super infection. It may be confused with other manifestation such as psoriasis, seborrhea, drug eruptions, eczema, and contact dermatitis. Hence correct diagnosis is necessary for appropriate treatment, which will reduce morbidity, discomfort and lessens possibility of transmissions. The aims and objectives were to determine clinicomycological profile of Tinea infections in patients attending dermatology OPD of B. J. Govt. Medical College and Sassoon General Hospital, Pune.
Methods: Skin scrapings, nail clippings; hair samples from clinically suspected cases of tinea were collected. Identification of dermatophytes from these samples was done by conventional technique.
Results: 119 clinically suspected cases of Tinea infections were processed over a period of one year. Out of these cases mixed infection of Tinea cruris with corporis was the predominant (27.73%) clinical presentation. Among all the samples, fungal filaments were seen by KOH mount in 48 (40.33%) whereas 35 (29.41%) samples were confirmed as dermatophytes by culture. Among these 35 isolates of dermatophytes 20 were *T. rubrum*, 7 isolates were *T. tonsurans*. 8 isolates were of *T. mentagrophytes.*
Conclusions: In present study mixed infections of tinea cruris with corporis was the predominant clinical presentation and *T. rubrum* was the most common dermatophyte isolated.

Keywords: Tinea, Dermatophytes, *T. rubrum*, *T. mentagrophytes*, *T. tonsurans*

INTRODUCTION

Tinea means fungal infection, whereas dermatophyte refers to the fungal organisms that cause tinea.[1] Dermatophytosis, is commonly referred to as 'ringworm'.[2] Traditionally, infections caused by dermatophytes have been named according to the anatomic locations involved after the word tinea. Several anatomic sites may be infected by a single dermatophyte species, and different species may produce clinically identical lesions.[2] Dermatophytosis is very common throughout the world. About 20-25% of the world's population is infected with dermatophytic fungi and the incidence is increasing.[3] The estimated life risk of acquiring tinea infection is 10-20%.[4] Although the tinea infection is not invasive, it's widespread nature and cost of the treatment is a major public health problem.[5] The various antifungal agents now available for management of tinea infection against dermatophytes are terbinafine, itraconazole, fluconazole, ketoconazole and voriconazole. Resistance to these antifungal agents against

dermatophytic species has been established due to their inappropriate use. Due to inappropriate use of antifungal agent for clinically suspected cases of tinea infection without accurate diagnosis, development of resistant strains has been increased.[2] Hence there is need for accurate diagnosis of all clinically suspected case of tinea infection before initiation of antifungal therapy. Identification of fungus causing tinea infection up to species level is of importance not only for the epidemiology but also in therapy, when treatment is advised for longer duration.[6] With this background present study was performed to know the clinicomycological profile of clinically suspected cases of tinea infection. The causative dermatophytes in confirmed cases of tinea infection were identified up to species level by conventional technique.

METHODS

The study was conducted in Department of Microbiology at B J Govt. Medical College and Sassoon general hospital Pune. After getting a due permission from Institutional Ethical Committee, study was conducted during a period of one year from January 2016 to December 2016.

Method for data collection

In present study, 119 randomly selected patients who had been suspected for tinea infection, before initiation of treatment were enrolled. Patients of tinea receiving antifungal treatment were excluded from the study. Written informed consent was taken from every participant. Detailed history of patients including name, age, sex, habits, chief complaints, was taken. Important features of clinical presentation were noted.

Specimen collection

Skin scraping: The site was cleaned with 70% alcohol, allowed to dry and the specimen was obtained by scraping the edge of the affected area with sterile scalpel blade.

Hair: Hairs from the lesions on the scalp were epilated by forceps. Scales were obtained by scraping the edge with scalpel.

Nail: The affected nail was cleaned with 70% alcohol. Nail clippings of the infected part and scrapings beneath the nail were collected in a clean white paper packet or on a sterile slide.

Direct microscopic examination: Specimens collected were subjected to potassium-hydroxide (KOH) wet preparation of various concentrations, depending on type of clinical specimen for the presence of fungal elements.

- 10% KOH for skin and hair samples
- 40% KOH for nail samples.

KOH wet mount was screened for fungal elements i.e. hyaline hyphal fragments, septate, branched hyphae and chain of arthroconidia.

Culture: After direct microscopic examination, irrespective of demonstration of fungal elements, the specimen was inoculated into two sets of test tubes in duplicate containing Sabouraud dextrose agar. One set was of Sabouraud dextrose agar (SDA) with 0.05% chloramphenicol and another was SDA with 0.5% cycloheximide and 0.05% Chloramphenicol. These inoculated culture media were incubated at 25˚c and 37˚c up to four weeks. Culture media were observed on twice a week for fungal growth.[7] Colony characteristics of growth on the obverse and pigment on reverse was noted. If no growth was found after four weeks, it was taken as negative for the growth of fungi. All culture media showing filamentous growth on culture up to 4 weeks were further identified by microscopic examination of lactophenol cotton blue preparation (LPCB) and Slide culture Technique for confirmation of tinea infection. Urease test was performed on isolates showing macroscopic and microscopic characters of *T. rubrum* and *T. mentagrophytes*. This test was done to differentiate between *T. rubrum* and *T. mentagrophytes*.

RESULTS

119 samples from clinically suspected cases of tinea were processed. Out of these, 76 were skin scrapings, 37 were nail clippings and 6 were hair samples. Majority of study population was male (71.42%). In this study, maximum number (57.14%) of cases belonged to age group of 21-40 years followed by 41-60 years.

Table 1: Comparison of KOH mount with culture (n=119).

	KOH positive	KOH negative	Total no.
	N **(%)**	N **(%)**	N **(%)**
Culture positive	32 (26.89)	03 (02.52)	35 (29.41)
Culture negative	16 (13.44)	68 (57.14)	84 (70.58)
Total	48 (40.33)	71 (59.66)	119

Culture was the gold standard to confirm the diagnosis. Sensitivity and specificity of KOH mount was 91.42% and 80.95% respectively with its positive predictive value of 66.66% and negative Predictive value of 95.77%.

Majority of clinically suspected cases were belonging to mixed infection of tinea cruris with corporis (27.73%), followed by tinea unguium (26.05%). *T. rubrum* was the most common isolate obtained (57.14%) followed by *T. mentagrophytes* (22.86%) and *T. tonsurans* (20%).

Table 2: Dermatophytes isolated from different clinical types (n=35).

Clinical type	*T. rubrum*	*T. mentagrophyte*	*T. tonsurans*	Total
	N (%)	N (%)	N (%)	
T. cruris + corporis	11 (64.7)	02 (11.8)	04 (23.5)	17
T. corporis	05 (50)	03 (30)	02 (20)	10
T. cruris	03 (75)	01 (25)	00	04
Onychomycosis	00	01 (100)	00	01
T. capitis	01 (100)	00	00	01
T. pedis	00	01 (100)	00	01
T. manuum	00	00	01 (100)	01
Total	20 (57.14)	08 (22.86)	07 (20)	35

DISCUSSION

The WHO estimates global prevalence of tinea infection throughout the world up to 20%.[8] In India it varies from 20-78%.[9] The prevalence of tinea infection varies from place to place. It is dependent on population density, climatic and socioeconomic condition of the place.[10] Skin infections like psoriasis, seborrhoea, drug eruption, eczema, contact dermatitis have very close resemblance to dermatophytosis in terms of clinical signs and symptoms. Therefore it is necessary to make correct diagnosis of tinea infection. [11] Accurate diagnosis will avoid empirical therapy in clinically suspected infections, which will avoid overuse of antifungal agents. With this background the present study particularly was focused on prevalence of tinea infections from a tertiary care hospital, accurate diagnosis of clinically suspected cases of tinea infections and identification of the isolate up to species level in confirmed cases.

Out of 119 clinically suspected cases included in present study 35 (29.41%) were confirmed as tinea infections by conventional fungal culture technique. The prevalence (29.41%) of tinea infection in present study was similar to study done by Madhavi et al and Chaudhary et al.[9,12] Naglot et al found prevalence (59.66%) more than present study, and it is due to variation in climatic condition of Assam and Pune.[13]

In present study out of 35 culture positive cases of tinea infection, 80% were male and 20% were female. Gupta et al, Sujatha et al and Ramraj et al in their similar studies also showed male preponderance in tinea infection.[14-16] The reason for male preponderance had been explained by Ramraj et al is that, increased outdoor exposure and more physical work results in increased sweating, which favors the growth of dermatophytes.[16] Study done by Garg et al reported that the lower incidence in females might be due to that females report less in dermatology OPD.[17] It may be due to social stigma associated with skin infections among society. These all social factors could also be there in present study for male preponderance of tinea infection in present study.

Clinically suspected patients included in present study were divided into various age groups such as 1-20 years, 21-40 years, 41-60 years and above 60 years. Out of these age groups maximum (57.14%) patients affected were in age group 21-40 years followed by 41-60 years (21%). Parul et al stated that higher frequency was seen in adults, as it is physically active group which get larger exposure to dermatophytes.[18] Sudha et al explained that more physical exertion at age group of 21-40 years results in increased perspiration.[19] This produces a hot and humid environment in the body and increased body temperature favors the growth of dermatophytes.

In present study among the 35 confirmed cases of tinea infection, mixed infection of tinea cruris with tinea corporis was the major clinical type accounting for 48.57% followed by tinea corporis (28.57%), tinea cruris (11.42%). tinea unguium, tinea pedis, tinea capitis, and tinea manuum each accounting for 2.86%. A similar study done by Sayyed et al reported that tinea cruris with corporis as second most common clinical presentation.[20] Pavani et al found that mixed infection was 15 (17%).[10]

In present study we have done comparison between direct microscopy by KOH and conventional culture method. Considering the culture as the gold standard method to confirm the diagnosis, sensitivity and specificity of KOH mount was 91.42% and 80.95% respectively. Similar report was obtained by Santosh et al of KOH mount with sensitivity of 83.46%.[21] They found specificity of KOH mount as 71.52%. In present study the KOH mount had positive predictive value of 66.66% and negative predictive value of 95.77%. Santosh et al in their similar study have positive predictive value 84.29% and negative predictive value 70.25%.

Out of 35 isolates, 32 were both KOH and culture positive, 3 samples were KOH negative but grew on culture. A study by Nasimuddin et al reported 49% culture positivity, out of which 14.7% were negative by KOH mount.[22] Mahale et al[7] gave explanation that it may be due to the inactive sporulating phase of the fungi which is difficult to be seen by microscopy. They concluded that findings of direct microscopy by KOH also depend on the skill of the observer.

In 16 (13.44%) samples of present study, fungal filaments were seen by KOH but no growth on culture. Similar finding was seen by Choudhary et al, in which they found that 18.5% of samples were KOH positive but culture negative.[12] They have explained that KOH positive and culture negative samples could be due to non-viability of fungal elements or due to inadequate sample provided. They further suggested that the isolate obtained from culture positive cases could be due to non dermatophytes causing similar infections.

T. rubrum was the predominant (57.14%) isolate followed by *T. mentagrophytes* (22.86%) and *T. tonsurans* (20%) among all dermatophytes from confirmed cases of tinea infection of present study. Similar to other studies done by Jain et al, Mahale R et al, Doddamani et al also found the *T. rubrum* as the commonest isolate.[7,23,24] *T rubrum* have greater adaptability to survive in varying climatic condition, overcrowding, unhealthy conditions.[23]

Thus the present study gave important data regarding the prevalence of tinea infection in tertiary care hospital. Tinea infections can be confused with other skin infections of non-fungal etiology. Non-dermatophytes causing infections of skin, nails, hair may also have similar clinical presentation to Tinea infection. Present study was performed for accurate diagnosis of clinically suspected cases of tinea infection by isolation and identification of the causative dermatophytes. As fungal culture technique is time consuming and KOH is quick method, but when either of the method is used alone for diagnosis of tinea infection, it may give false negative reports. Hence, present study highlights the use of both, direct microscopy by KOH and culture for diagnosis of clinically suspected cases of tinea infection. This study was helpful to give appropriate antifungal therapy to confirmed cases of tinea infection, because when treatment is advised for longer duration, identification of fungus causing tinea infection up to species level is very important. Limitation of the present study was population restricted to a single tertiary care hospital only, with limited sample size in shorter duration. So a multicentric study, covering larger population and for longer duration would give a better insight into clinicomycological profile of tinea infection.

CONCLUSION

29.41% of prevalence of tinea infection found in present study from clinically suspected cases from a tertiary care hospital. Present study reveals that mixed infection of tinea cruris with corporis was most common (48.57%) clinical presentation. Males more frequently affected than females. Maximum cases belonged to 21-40 yrs. The most common isolate was *T. rubrum* (57.14%) among all clinical types of tinea infection. As fungal culture technique require longer time and KOH is quick method, but when either of the method is used alone for diagnosis of tinea infection, it may give false negative reports. Hence present study highlights the use of both, direct microscopy by KOH and culture for diagnosis of clinically suspected cases of tinea. Accurate diagnosis of each and every clinically suspected case of tinea infection is necessary to avoid unnecessary empirical use of antifungal agents.

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