Original Article

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Dermatophytosis: Correlation Between the Site of Involvement and the Causative Agent

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Abstract

India is a large sub continent with remarkably varied topography, situated within the tropical and subtropical belts of the world. Its climate is conducive to the acquisition and maintenance of fungal infections. They are assuming greater significance both in developed and developing countries particularly due to advent of immunosuppressive drugs (steroids) and due to the increased prevalence of diseases like HIV. A total of one hundred and fifty clinically diagnosed randomly selected cases of skin, hair and nail infection, of all age groups and of both sexes, attending Dermatology out patient department were taken for the study. Out of 150 clinically suspected cases of dermatophytosis, fungi were demonstrated in 140 cases (93.33%) either by direct microscopy and/or culture. Eighty-five cases (58.67%) were positive by both microscopy and culture. Thirty-eight (25.33%) were positive by microscopy and negative by culture. Fourteen cases (9.34%) were negative by microscopy but culture positive. Ten cases (6.67%) were negative both by microscopy and culture.

Keywords: Dermatophytosis; Fungal Infections; KOH

Introduction

Dermatophytoses are the infections of keratinized structures such as the epidermis, hair, and nails, caused by a group of closely linked filamentous fungi known as dermatophytes [1]. Superficial fungal infections have been reported world wide as being one of the most common infectious diseases in clinical practice. Regardless of the rapeutic advances in the last decades, the occurence of cutaneous mycosesiss till increasing [2]. Depending on their origin of living, dermatophytes are described as anthropophilic (human), zoophilic (animal) orgeophilic (soil). Anthropophilic dermatophytes are the most frequent sources of tinea infections [3].

The classical clinical presentation of tinea infection, is an annular lesion with central clearing surrounded by an advancing, red, scaly elevated border. Inflammation assists in colonization and may result in vesicles on the border of the affected area. Atopic persons and those with zoophilic fungi infection tend to have more intense inflammation [3].

India is a large subcontinent with remarkably varied topography, situated within the tropical and sub-tropical belts of the world. Its climate is conducive to the acquisition and maintenance of fungal infections [4]. They are assuming greater significance both in developed and developing countries particularly due to advent of immunosuppressive drugs (steroids) and due to the increased prevalence of diseases like HIV [5].

In India, cases of superficial fungal infections were first reported from upper Assam by Dr. Powell in 1900 AD. Since then various studies have been conducted from different regions of the country [6]. The clinical presentation, though very typical of ring worm infection, is very of ten confused with other skin diseases, making laboratory diagnosis and its confirmation necessary [7].

Accurate assessment of the prevalence and etiological agent is required to estimate the size of disease problem and to prevent the transmission and spread of such infections with adequate measures [8].

Methodology

The present study of dermatophytosis was carried out in the department of Dermatology.

A total of one hundred and fifty clinically diagnosed randomly selected cases of skin, hair and nail infection, of all age groups and of both sexes, attending Dermatology out patient department were taken for the study.

The selected cases were studied as per the proforma enclosed. A detailed history of selected cases was taken in relation to name, age, sex, address, occupation, duration of illness and involvement of more than one site.

After the detailed history, clinical examination of patient was made in good light which included site of lesion, number of lesions, types, presence of inflammatory margin and extent of involvement.

Specimen Collection

The affected area was cleaned with 70% ethyl alcohol, skin scales, crusts and pieces of nail or hairs were collected in clean white paper packets.

Skin specimen was collected by scraping across the inflamed margin of lesion into the apparently healthy tissue.

Nail specimen was collected by taking clippings of the infected part and scrapings beneath the nail.

Hair specimen was collected by plucking with epilating forceps along with the base of the hair shaft around the follicle.

Direct Microscopic Examination

Specimen collected was subjected to potassium-hydroxide (KOH) wet preparation of various concentrations (10%, 20% and 40%) depending on the type of clinical specimen for the presence of fungal elements. The fungal elements appearas highly refractile, hyaline septate branching filaments.

Culture

For primary isolation Sabouraud's dextrose agar with 0.5% Chloramphenicol and 0.05% Cycloheximide slopes were used and Dermatophyte test media was used as a selective media.

Slide culture was done to study the micromorphology of microconidia and macroconidia, nature of the sporulation, special structures such as spirals, pectinate, racquet hyphae, and chlamydospores.

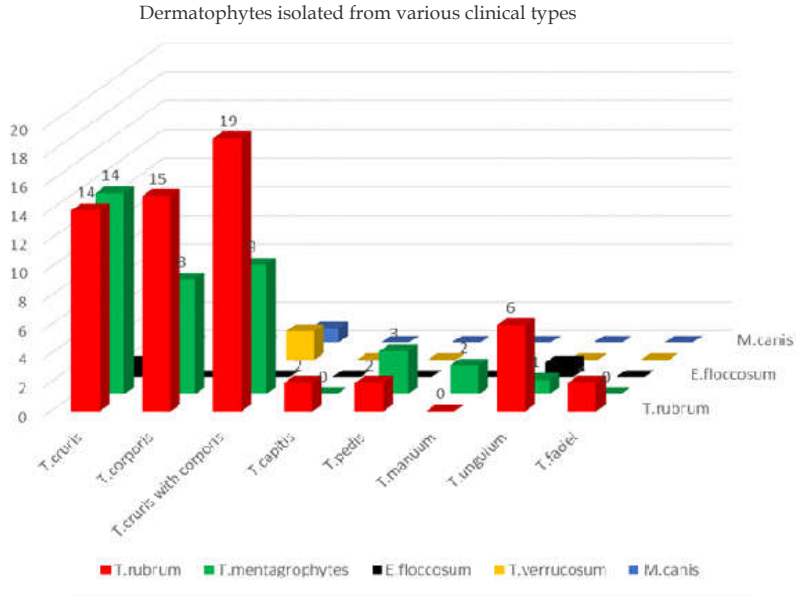
Special tests were performed when necessary, viz, hair perforation test and biochemical test like urease test was done for species identification.

Results

Table 1: Dermatophytes Isolated from the Study Group

Sl. No.	Dermatophyte species	No.	Percentage
1	*T. rubrum*	60	58.82
2	*T. mentagrophytes*	37	36.27
3	*E. floccosum*	2	1.96
4	*T. verrucosum*	2	1.96
5	*M. canis*	1	0.98
	Total	73	100

Out of the total 150 cases, isolation rate was 102 (68%). *T. rubrum* was the commonest species isolated 60 (58.82%) followed by *T. mentagrophytes* 37 (36.27%), *E. floccosum* 2 (1.96%), *T. verrucosum* 2



Graph 1: Dermatophytes Isolated from Various Clinical Types

(1.96%) and *M. canis* 1 (0.98%) (Table 1).

In Tinea cruris, out of 42 cases, *T. rubrum* and *T. mentagrophytes* were the commonest species isolated 14 (33.33%) each followed by one case of *E. floccosum* (2.3%).

In tinea corporis, out of 37 cases, *T. rubrum* was the commonest species isolated 15 (40.54%) followed by *T. mentagrophytes* 8 (21.62%).

In tinea cruris with corporis, out of 36 cases, *T. rubrum* was the commonest species isolated 19 (52.78%) followed by *T. mentagrophytes* 9 (2.5%), *T. verrucosum* 2 (5.5%) and *M. canis* 1 (2.78%).

In tinea capitis, out of 7 cases, only in two cases organisms were isolated and both were positive for *T. rubrum* (28.57%)

In tinea pedis, out of 8 cases, *T. mentagrophytes* was the commonest species isolated 3 (37.5%) followed by *T. rubrum* 2 (25%).

In tinea manuum, out of 4 cases, only 2 cases showed culture positivity and both were of *T. mentagrophytes* (50%).

In tinea unguium, out of 13 cases, *T. rubrum* was the commonest species isolated with 6 (46.15%) isolates and one each case of *T. mentagrophyte* and *E. floccosum* (7.69%).

In tinea faciei, out of 3 cases, *T. rubrum* was the only species isolated 2 (66.67%) (Graph 1).

Out of 150 clinically suspected cases of dermatophytosis, fungi were demonstrated in 140 cases (93.33%) either by direct microscopy and/ or culture. Eighty-five cases (58.67%) were positive by both microscopy and culture. Thirty-eight (25.33%) were positive by microscopy and negative by culture. Fourteen cases (9.34%) were negative by microscopy but culture positive. Ten cases (6.67%) were negative both by microscopy and culture (Table 2).

Out of 42 cases of tinea cruris, all were KOH positive (100%) and 29 cases showed culture positivity (69.04%). Having 69% culture positivity rate, this is the second most common site for dermatophyte isolation.

Out of 37 cases of tinea corporis, 35 cases (94.59%) KOH showed positivity and 23 cases (62.16%) showed culture positivity.

Out of 36 cases of tinea cruris with corporis, all 36 (100%) showed KOH positivity and 31 cases (86.11%) were culture positivity which is the highest among other clinical types.

Out of 7 cases of tinea capitis, none of the cases were KOH positive and only 2 cases were culture positive.

Out of 8 cases of tinea pedis, 4 cases (50%) were KOH positive and 5 cases (62.5%) were culture positive.

Among 4 cases of tinea manuum, only one case (25%) showed KOH positivity, and 2 cases (50%) showed culture positivity.

Of total of 13 cases of tinea unguium, only 6 cases (46.15%) were KOH positive and 8 cases (61.54%) were culture positive. Here culture positivity was better than KOH positivity similar to tinea pedis.

Of the 3 cases of T. faciei, 2 were KOH positive (66.67%) and 2 were culture positive (66.67%) (Table 3).

Table 2: KOH & Culture Findings

	Total KOHand/ or culture +ve	KOH +ve Culture +ve	KOH +ve Culture -ve	KOH –ve Culture+ve	KOH –ve Culture – ve
Number of cases	140	88	38	14	10
Percentage	93.33%	58.67%	25.33%	9.34%	6.67%

Table 3: Corelation of KOH & Culture with Clinical Diagnosis

Clinical Type	Total no of cases	No of cases positive by KOH	No of cases positive by Culture
T. *cruris*	42	42(100%)	29(69.04%)
T. *corporis*	37	35(94.5%)	23(62.16%)
T. *cruris with corporis*	36	36(100%)	31(86.11%)
T. *capitis*	7	0	2(28.57%)
T. *pedis*	8	4(50%)	5(62.5%)
T. *manuum*	4	1(25%)	2(50%)
T. *unguium*	13	6(46.15%)	8(61.54%)
T. *faciei*	3	2(66.67%)	2(66.67%)

Discussion

In the present study, out of 150 clinically diagnosed cases of dermatophytosis, 140 cases (93.33%)were positive for fungi, either by KOH and/or culture. Eighty eight cases (58.67%) were positive by both KOH and culture, 38 cases (25.33%) were positive by KOH and negative by culture, 14 cases (9.34%) were negative by KOH but culture positive and 10 cases (6.67%) were negative by both KOH and culture. These findings are comparable with other studies done by Sumana V. et al., Karmakar S. et al., Singh S. et al. and Bindu V.

This variation could be due to non-viability of fungal elements in some cases.

In the present study, *T. rubrum* 60 (58.82%) was the commone staetio logical agent in majority of clinical types followed by *T. mentagrophytes* 37 (36.27%), which is comparable to other studies done by Bindu V. et al., Ranga nathan S. et al., Singh S et al. and Jain N et al.

E. flocossum and *T. verrucosum* was the third etiological agent of dermatophytosis to be isolated in 1.96% cases, which is similar to previous studies by Bindu V., Sahai S. et al. and Kannan P et al.

Intineaunguium, *T. rubrum* (46.15%) was the most common isolate followed by *T. mentagrophytes* (7.69%) and *E. floccosum* (7.69%).

The most frequent etiological agent of tinea unguium (80-90%) are *T. rubrum* and *T. mentagrophytes*. Mathur M. et al. reported equalisolation rates of 11.1% for both *T. rubrum* and *T. mentagrophytes*, whereas Veer P. et al. reported *T. rubrum* 57.64%, followed by *T. mentagrophytes* (42.3%) from cases of onychomycosis.

Conclusion

Dermatophyte infections are very common in our country where hot and humid climate in association with poor hygienic conditions play an important role in the growth of these fungi along with other factors like immunosuppression, occupational trauma and corticosteroid use. There is varying difference in isolation of differents pecies from southern and northern part of India. By and large Trichophyton species forms the commonest etiological agent of dermatophytosis.

Male preponderance was seen in all clinical types except T. *unguium* which could be due to increased outdoor physical activities and increased opportunity for exposure to infection than females.

Table 4: Comparison of KOH & Culture Findings with Other Studies (in percentage)

Author name, year andplace	Total KOH and/ or culture +ve	KOH +ve Culture +ve	KOH +ve Culture–ve	KOH–ve Culture +ve	KOH–ve Culture–ve
Huda MM. et al. [9]., 1995, Assam	92.85	57.14	1.19	34.52	7.15
Bindu V. et al. [10]. 2002, Calicut.	75.3	34	30	11.3	24.7
Singh S. et al. [3]. 2003, Gujarat	66.16	43.65	18.66	3.85	33.84
Karmakar S. et al. [11]., 1995, Rajasthan	88.40	39.2	46.8	2.4	11.6
Sumana V. et al. [12]., 2004, Khammam	70	45	14	11	30
Present study	93.33	58.67	25.33	9.34	6.67

Table 5: Dermatophytes Isolated in Various Studies

Name of the author, year and place	*T. rubrum*	*T. mentagrophyte*	*M. canis*	*T. tonsurans*	*E. floccosum*	*T. violaceum*	*T. verrucosum*
Bindu V. et al. [10], 2002, Calicut	66.2	25	-	5.9	2.9	-	-
Venkatesan G. et al. [13]., 2007, Chennai	73.3	19.7	2.8	-	4.2	-	-
Fathi HI. et al. [14]., 2000, Iraq	20.9	16.2	-	10.5	-	-	36.2
Karmakar S. et al. [11]., 1995, Rajasthan	42.3	-	-	-	-	55.7	-
Hanumanthappa H. et al. [2]., 2012, Mysore	58.9	24.6	-	5.4	0.7	-	-
Present study	58.82	36.27	0.98	-	1.96	-	1.96

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