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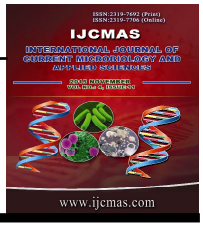

Original Research Article

Epidemio Clinico - Microbiological Study of Dermatophytosis in North West Region of Rajasthan, India

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Keywords

Dermatophytosis, Dermatophyte, Tinea, *Trichophyton*, Rajasthan

A B S T R A C T

300 clinically suspected cases of dermatophytosis in north-west region of Rajasthan were subjected to mycological examination with microscopy (10% KOH) and culture on Sabouraud's Dextrose Agar (SDA) with antibiotics. Causative agents were identified macroscopically and microscopically from the growth obtained from SDA. Direct examination revealed fungal elements in 69% cases, of which 71.15% were positive on culture. The commonest age group affected by dermatophytosis is between 21-30 years with slight male predominance as compared to female (1.8:1). The study also revealed the seasonal variation of these infections. *Trichophyton rubrum* was the commonest etiological agent (53.14%), followed by *Trichophyton mentagrophyte* (20.57%). Though various species of dermatophytes produce clinically different characteristic lesions, but a single species may produce various types of lesions depending on the site of infection

Introduction

Fungal infections are very common in human beings, especially cutaneous fungal infections in which superficial keratinized tissue of the stratum corneum of the skin, hair and nail are involved by a group of specialized fungi known as *Dermatophytes* and the condition is known as Dermatophytosis. These dermatophytes use keratin as a nitrogen source.

Dermatophytes produce only superficial infections of the skin and its appendages without involving the deeper tissue or the internal organs (Bailey *et al.*, 1990). Traditionally, infections caused by dermatophytes have been named according to the anatomical locations involved, by appending the Latin term designating the body site after the word "Tinea" (Hay *et al.* 2004). Emmons *et al.* (1963) proposed division of dermatophytes into three genera on the basis of clinical, morphological and microscopic characteristics - Epidermophyton (involving skin and nail), Microsporum (involving skin and hair) and Trichophyton (involving skin, hair and nail). Based on their ecological characteristic, dermatophytes are divided into geophilic, zoophilic and anthrophilic species (Jagdish, 2009).

Dermatophytosis produces a dermal inflammatory response with intense itching and also of cosmetic importance (Mishra *et al.,* 1998). Infection with dermatophytes is a common occurrence and forms a great bulk of cases attending any dermatologic clinic in the country. All races are affected and clinical varieties and prevalence appear to depend mainly on environmental factors and economic factors (poverty, poor hygiene and overcrowding). Based on the geographical and demographical position of North West region of Rajasthan, it provides a fertile ground for the abundant growth of dermatophytes.

Aims and Objectives

a) To detect the magnitude of the problem of dermatophytic infection in this north-western zone of Rajasthan and to find the particular season in which these infections are the most common.
b) To assess the clinico-epidemiological profile of fungal infections and species identification.
c) To compare clinical diagnosis with direct microscopy and culture positivity from clinically suspected cases.

Materials and Methods

Study area and study population

The prospective study was conducted for the period of one year in Department of Microbiology, Sardar Patel Medical College, Bikaner to identify the dermatophyte in the scrapping from the skin, clipping of the nail and hair of the patients attending the Department of Skin & V.D. in P.B.M Hospital, Bikaner.

Inclusion criteria

Different types of clinically suspected cases were included in the study. 50 cases each of (i) Tinea corporis, (ii) Tinea cruris, (iii) Tinea capitis, (iv) Tinea unguium, (v) Tinea pedis and (vi) other sites (Tinea barbae and Tinea mannum), a total of 300 cases.

Data collection

Along with the specimen collection (skin scrapping, nail clipping and hair clipping) (Joshi *et al.,* 1990), a detailed history was also taken using a questionnaire that included patients' demographic characteristics (age, gender), socio-economic status, occupation, site of disease, duration of disease, symptoms, past recurrence (duration and treatment taken in the past) and contacts with animals or soil.

Collection and processing of samples

All patient samples were collected and analyzed at Microbiology lab, Sardar Patel Medical College Bikaner, Rajasthan. Appropriate material i.e skin scrappings, hair or nail clippings will be taken according to the site involved. Out of the material collected, part of it was used for direct KOH examination and remaining part was used to inoculate Sabouraud's dextrose agar (SDA) medium for culture to isolate causative dermatophytes.

Direct KOH examination

Skin & hair samples were subjected to 10% KOH solution. Nail clippings were kept overnight in 40% KOH and then examined under microscope (10X and 40X).

Culture examination

Samples were inoculated after reducing the size to approximately 1mm and inoculated onto SDA slant containing 0.05 mg/ml chloramphenicol and 0.5 mg/ml cycloheximide (Bailey *et al.,* 1990). Then tubes were incubated in BOD incubator at

27°C and were examined daily up to 4 weeks. If no growth appeared, results were declared negative after 4 weeks of incubation.

Identification

The accurate identification of fungal isolate was done by their characteristic appearance on the media by Gross examination (general topography, texture, surface pigmentation and pigmentation on reverse) and microscopic examination of growth by lactophenol cotton blue mount, scotch tape preparation, slide culture, hair perforation test, germ tube test and conventional bio-chemical tests such as urease hydrolysis, sugar fermentation and sugar assimilation test (Hendrickson, 1985).

Results and Discussion

The study comprised of 300 clinically suspected cases of Tinea. It was found that the maximum incidence was in III decade of life (29%), with slight predominance in males as compared to females (Male to female ratio, 1.8:1). The study also revealed that maximum incidence of this infection was in the months of June to August (66.86%).

Mycological examination revealed that the culture was positive in 175 (58.33%) cases, out of which direct microscopy (KOH mount) was positive in 148 cases and negative in 27 cases. The incidence of different species of dermatophytes found in 175 culture positive cases is shown in table 1. The commonest species isolated was *Trichophyton rubrum* (53.14%).

Out of 300 cases of dermatophytosis, 208 cases (69.3%) were positive in KOH examination and total of 175 (58.3%) were positive in culture. 148 (71.15%) cases were positive in both KOH examination and culture. In 27 cases, (29.3%) KOH was negative but they were culture positive. 65 cases were negative in both KOH examination and culture (Table 2).

The correlation between clinical and mycological study is shown in table 3. *Trichophyton rubrum* and *Trichophyton mentagrophyte* were the prime isolates from Tinea corporis cases, *Trichophyton violaceum* from Tinea capitis cases and *Microsporum gypseum* from Tinea pedis cases. Only one case of *Epidermophyton floccosum* was isolated from Tinea mannum case. Contaminants were found in 15 samples including *Aspergillus* and *Fusarium* and *Candida* species were isolated in total 12 cases.

Among the various fungal infections of human beings, dermatophytes are the most common infection. Studies on dermatophytosis in India have received increased attention in recent years.

In present study, maximum incidence of dermatophytosis was found in III decade of life (21–30 years) due to maximum outdoor activity and exposure to dust, which is a chief source of fungal infections.

Higher incidence of dermatophytic infections was more common in males than females. Male to female ratio was 1.8:1. This slight predominance was due to greater frequency with which the male patients seek medical advice as compared to females in this part of country and also females have limited exposure to outdoor activities.

The maximum incidence of this infection was found in the months of June to August (66.86%), because of high degree of humidity during these months causing constant sweating and also low level of personal hygiene due to lack of proper water supply in outer areas of Rajasthan.

Table.1 Distribution of different species of dermatophytes (culture positive)

Species	**No. of cases**
Trichophyton rubrum	93 (53.14%)
Trichophyton mentagrophyte	36 (20.57%)
Trichophyton violaceum	20 (11.42%)
Microsporum nanum	06 (03.42%)
Trichophyton tonsurans	04 (02.28%)
Microsporum gypseum	03 (01.71%)
Epidermophyton floccosum	01 (00.57%)
Candida species	12 (06.85%)
Contaminants	15 (08.57%)
Total	**175**

Table.2 Correlation of Culture and Direct Microscopy

	KOH positive	**KOH negative**	**Total**
Culture positive	148 (49.33%)	27 (9%)	175 (58.33%)
Culture negative	60 (20%)	65 (21.66%)	125 (41.66%)
Total	208 (69.33%)	92 (30.66%)	300 (100%)

Table.3 Correlation between Clinical and Mycological study

Species	Tinea corporis	Tinea cruris	Tinea unguium	Tinea pedis	Tinea capitis	Others	**Total**
Trichophyton rubrum	25	17	8	16	15	12	93
Trichophyton mentagrophyte	12	8	8	6	-	2	36
Trichophyton violaceum	2	2	-	-	13	3	20
Microsporum nanum	1	-	-	-	3	2	6
Trichophyton tonsurans	-	1	1	-	-	2	4
Microsporum gypseum	-	-	-	2	-	1	3
Epidermophyton floccosum	-	-	-	-	-	1	1
Candida species	-	3	8	-	-	1	12
Contaminants	-	4	1	4	3	3	15

The most common fungal isolate was *Trichophyton rubrum* (53.14%), followed by *Trichophyton mentagrophyte* (20.57%) and *Trichophyton violaceum* (11.42%). *Microsporum nanum*, a geophilic fungus was isolated for the first time in this zone

which could be accounted due to patient's interaction with soil.

To conclude, the conventional methods for dermatophytic indentification using direct microscopy (KOH examination) and fungal culture are both important in definitive diagnosis. The sensitivity of these diagnostic tests depends on the method of sampling, sample preparation, failure rate of microscopy/culture and final interpretation of results.

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