DOI: 10.14260/jemds/2014/3041

ORIGINAL ARTICLE

CLINICO-MYCOLOGICAL PROFILE OF DERMATOPHYTOSIS IN PATIENTS ATTENDING A TERTIARY CARE HOSPITAL IN EASTERN BIHAR, INDIA

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HOW TO CITE THIS ARTICLE:
Partha Pratim Maity, Krishan Nandan, Sangeeta Dey. "Clinico-Mycological Profile of Dermatophytosis in Patients Attending a Tertiary Care Hospital in Eastern Bihar, India". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 29, July 21; Page: 8263-8269, DOI: 10.14260/jemds/2014/3041

ABSTRACT: BACKGROUND: Dermatophytes are closely related keratinophilic fungi that cause dermatophytosis. Dermatophytosis is caused by three genera of fungi imperfectii viz. Microsporum, Trichophyton and Epidermophyton and where the perfect state of the species has been identified to the genus Arthroderma in the class Ascomycetes. Their keratinophilic nature allows them to degrade keratin and thus invade skin, hair and nails. **AIMS:** This study aimed to establish the identity of fungal isolates from clinically suspected cases of dermatophytosis and to correlate the occurrence of dermatophytosis with clinico-epidemiological profile of patient. **MATERIALS AND METHODS:** A total of 372 samples from patients attending outpatient department from March 2010 to May 2011 were included in the study. A brief clinical history was obtained from the patients and samples were collected and processed as per standard protocol. Fungal growth was identified by gross colony morphology, lactophenol cotton blue mount, and color change on dermatophyte test medium (DTM) and microslide culture. **RESULTS:** The most common dermatophyte was Trichophyton rubrum (12.1%) whereas Aspergillus niger (5.6%) was the commonest isolate among non-dermatophyte. Among clinical forms, majority of the patients had tinea corporis (55.3%). **CONCLUSIONS:** Dermatophytosis was found to be more prevalent in young adults (21-30 years). Culturing specimen on Sabouraud Dextrose Agar (SDA) with antibiotics was found to be the best method for diagnosis and this medium proved to be better than DTM. The most common dermatophyte was Trichophyton rubrum and the most common clinical form of dermatophytosis was tinea corporis. Fungal infection of the skin tends to be chronic and lead to disfigurement, which may be a source of embarrassment to the person concerned. Diagnosis of these fungal infections in the laboratory must be encouraged, as they are easy to perform and require minimum infrastructure.

KEYWORDS: Dermatophytes, Epidermophyton, Microsporum, Trichophyton.

INTRODUCTION: By broad definition, the term dermatophyte might be taken as all fungi causing disease in man and animals by invasion of the skin, but usage has tended to restrict the label of fungi capable of causing skin changes of the type known as ringworm. Thus defined the ringworm species are all moulds belonging to three genera of the fungi imperfectii viz. Microsporum, Trichophyton and Epidermophyton and where the perfect state of the species has been identified to the genus Arthroderma in the class Ascomycetes.[1]

The dermatophytes are closely related keratinophilic fungi that cause dermatophytosis (ringworm/tinea). Their keratinophilic nature allows them to degrade keratin and thus invade skin, hair and nails. The dermatophytes capable of reproducing sexually belong to the genus Arthroderma in the family Arthrodermataceae. Physiologically, dermatophytes are distinct because of their ability to tolerate high concentrations of cycloheximide and by their ability to utilize proteins as the sole source of carbon.[2]

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The prevalence of dermatophytes depends on environmental conditions, personal hygiene and individual's susceptibility from place to place. Dermatophytosis is prevalent throughout the world. Some species are endemic in certain parts of the world and have limited geographic distribution. Trichophyton soudanense, Trichophyton gourvilli and Trichophyton yaoundei are found in Central and West Africa. Microsporum ferrugineum is seen in Japan and surrounding areas. Trichophyton concentricum is confined to South Pacific, Central and South America. However, in recent time due to mass migration of people from one part of the world to another, these barriers have broken down.[3]

Dermatophytosis and other cutaneous fungal infections, tends to be a chronic, are disfiguring and is associated with social stigma. Moreover an epidemiological data regarding the prevalence and incidence of dermatophyte species actually causing these infections is not known because patients are by and large treated based on clinical diagnosis. The present study was therefore undertaken to establish the identity of fungal isolates from clinically suspected cases of dermatophytosis and to correlate the occurrence of dermatophyte infection with clinico-epidemiological profile of the patient.

MATERIALS AND METHODS: This prospective study was conducted during March 2010 to May 2011 after approval from Institutional Ethics Committee. Patients attending Dermatology, Medicine and Pediatrics. Out Patient Department (OPD) with suspected dermatophyte lesion of skin, hair or nail were included in the study. Clinical profile of the patients were recorded by taking a brief clinical history from the patient regarding occupation, history of living in institutions e.g. hostels, old age homes, children attending crèches etc., personal history regarding standard of hygiene, owning pets like cats or dogs, family history whether other family members were affected and past history regarding suffering from diabetes mellitus, eczema, tuberculosis, psoriasis, leprosy and also history of any form of treatment in the past.

The anatomical site (skin, hair and nail) in which the organism may be present was carefully selected. Specimens were collected aseptically in sufficient amount into sterile collection device or container before institution of antifungal agents and properly labeled. Specimen of skin was obtained by scraping at the active margin of lesion with a scalpel blade after cleaning the surface with 70% isopropyl alcohol. Infected nails were clipped by sterile nail trimmer. A portion of infected nail was scraped from the nail bed. Infected hair was epilated from the scalp with a sterile forceps.

Precautions were taken so that hair for culture was free from topical medications, conditioners and dressings.

10% or 20% KOH mount: A drop of 10% KOH was placed on a slide. The specimen was mixed with the drop and a cover slip was placed on it. The preparation was then passed over a flame for 2-3 times and examined under the microscope with 10x and 40x magnification to look for fungal elements. For nail scrapings and clippings 20% KOH was used.[4]

Culture: Each sample was inoculated on Dermatophyte Test Media (DTM) and Sabouraud Dextrose Agar (SDA) with and without antibiotics (cycloheximide and chloramphenicol) and incubated as per standard protocol. Both media were obtained from HiMedia Laboratories Pvt Ltd, Mumbai. The cultures were examined twice during the 1st week and weekly thereafter, for 4 weeks.

Identification: Fungal growth was identified by gross colony morphology on SDA media, Lactophenol Cotton Blue (LPCB) mount, color change on DTM and microslide culture.

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Clinical outcome of the patient could not be followed as all the subjects included in this study belonged to outpatient department and revisit by such patients is highly irregular.

STATISTICAL ANALYSIS: Statistical analysis was performed using Chi-square test. P <0.05 was considered significant.

RESULTS: A total of 372 samples were collected during the study period of which 141 samples showed growth of dermatophytes, 57 of Non dermatophyte, 36 contaminants while 138 samples showed no growth.

Among patients with skin, hair and nail infections majority of patients belonged to the age group 21-30 years and the overall male to female ratio was 2.6:1. Muslims were more frequently affected as compared to Hindus and the Muslim to Hindu ratio was 1.4:1. Maximum number of cases was seen in the month of June to September. In patients with dermatophytosis males were more commonly affected than females 102/141 (72.3%) vs. 39/141 (27.7%).

This finding was statistically significant (p= 0.000). Maximum numbers of dermatophytes were isolated from male patients in the age group of 21-30 years (35.3%) whereas in females maximum isolations were in the age group of 31-40 years (46.6%). The Muslim to Hindu ratio in cases of dermatophyte infection was 1.9:1, which was statistically significant (p=0.000) – [Table 1].

SDA with antibiotics supported the growth of 123/141 (87.2%) strains as compared to DTM, which showed growth of 114/141 (80.8%) strains. Direct microscopy with 10% or 20% KOH was less sensitive (46.8%) than culture on SDA with antibiotics (87.2%).

The most common dermatophyte isolated was Trichophyton rubrum 45/372 (12.1%) followed by Trichophyton tonsurans 36/372 (9.7%), Trichophyton mentagrophytes 30/372 (8.1%), Microsporum gypseum 18/372 (4.8%), Epidermophyton floccosum and Microsporum canis 6/372 (1.6%) each. Among non-dermatophyte species Aspergillus niger 21/372 (5.6%) was the commonest isolate followed by Aspergillus flavus and Rhizopus sp. 9/372 (2.4%) each. Aspergillus fumigatus, Penicillium sp., Fusarium sp., and Sepedonium sp. were isolated from 3/372 (0.8%) each. Candida sp. were isolated from 6/372 (1.6%) cases only – [Table 2].

Among clinical forms of dermatophytosis, majority of the patients had tinea corporis 78/141 (55.3%) followed by tinea cruris 18/141 (12.8%), tinea unguium and tinea pedis was seen in 15/141 (10.6%) each. In patients with tinea corporis Trichophyton rubrum was the most common organism 24/78 (30.8%) followed by Trichophyton tonsurans 21/78 (26.9%), Trichophyton mentagrophytes 12/78 (15.4%), Microsporum gypseum 9/78 (11.5%), Epidermophyton floccosum and Microsporum canis 6/78 (7.7%) each. In patients with tinea cruris, Trichophyton mentagrophytes was the commonest isolate 9/18 (50.0%) followed by Trichophyton tonsurans 6/18 (33.3%) and Trichophyton rubrum 3/18 (16.7%).

In tinea unguium Trichophyton rubrum and Trichophyton tonsurans were the commonest isolates 6/15 (40.0%) each whereas for tinea pedis Trichophyton mentagrophytes was the commonest 6/15 (40.0%). In tinea faciae and tinea capitis Trichophyton rubrum and Microsporum gypseum were isolated in 3/6 (50.0%) of cases. In all the 3 cases of tinea mannum only Trichophyton rubrum was isolated – [Table 3].

DISCUSSION: On the basis of present study, the age distribution and sex distribution of dermatophytosis could be correlated with the studies conducted by other authors[5-9]. The Muslim to

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Hindu ratio of patient with dermatophytic infection was 1.9:1 which was statistically highly significant. The exact reason for this could not be ascertained as demographically speaking majority of patients from both groups' belonged to rural areas, were involved in agricultural work and also belonged to low socio-economic strata.

SDA with antibiotics was found to be much superior to DTM for culture of dermatophyte species. Culture also provide to be a better diagnostic tool when compared with microscopic examination with 10% or 20% KOH. The difference in the isolation of Trichophyton species as compared to others viz. Microsporum and Epidermophyton was found to be statistically significant (p= 0.000). Among non-dermatophyte species isolated Aspergillus species was the commonest, the other isolates being Rhizopus, Candida, Fusarium and Penicillium. Similar isolation patterns were also seen in other parts of India.[10, 11, 12]

The incidence of tinea corporis and the involvement of Trichophyton rubrum, which is the commonest isolate in this region, confirms the earlier findings regarding dermatopytosis in India.[5,13,14]

CONCLUSION: Dermatophytosis was found to be more prevalent in young adults (21-30 years). Culturing specimen on SDA with antibiotics was found to be the best method for diagnosis and this medium proved to be better than DTM. The most common dermatophyte was Trichophyton rubrum and the most common clinical form of dermatophytosis was tinea corporis. Fungal infections of the skin are not serious but their propensity to persist and lead to chronicity and disfigurement may have personal and social implications.

Though clinical diagnosis of these cases is easy enough for an experienced clinician or dermatologist, there is a lot of room for misdiagnosis as many of these skin lesions may mimic other skin disorders. This may in turn lead to unwarranted use of anti-fungal agents or use of steroids which may lead to flaring up of dermatophytic or non-dermatophytic fungal skin infections.

Diagnosis of these fungal infections in the laboratory needs to be encouraged not because of the fact that treating the patient requires so but because of the ease with which these organisms can be identified even in a laboratory with minimum basic infrastructure before initiating use of anti-fungal drugs. Microscopic examination also needs to be encouraged as reports can be generated very rapidly and may be helpful in preventing misuse of drugs. Culture on the other hand will help in ascertaining the changing scenario of the causative agents in a particular area.

Age (in years)	Male*		Female*	
	Hindu	Muslim	Hindu	Muslim
<10	1	2	0	0
11-20	7	11	2	1
21-30	11	25	3	9
31-40	8	16	7	11
41-50	5	4	2	4
51-60	1	5	0	0
>60	2	4	0	0
Total	**35**	**67**	**14**	**25**

Table 1: Age and sex distribution of patients with dermatophytosis

(* p= 0.000)

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Organism	Number of isolations	Percentage
*Trichophyton rubrum	45	12.1
*Trichophyton tonsurans	36	09.7
*Trichophyton mentagrophytes	30	08.1
*Microsporum gypseum	18	4.8
*Epidermophyton floccosum	6	1.6
*Microsporum canis	6	1.6
Aspergillus niger	21	5.6
Aspergillus flavus	9	2.4
Rhizopus sp.	9	2.4
Aspergillus fumigates	3	0.8
Penicillium sp.	3	0.8
Fusarium sp.	3	0.8
Sepedonium sp.	3	0.8
Candida sp.	6	1.6
Contamination	36	9.7
No growth	138	37.2
Total	**372**	**100.0**

Table 2: Overall distribution of organisms isolated from patients with skin, hair and nail infection

(* p= 0.000)

Dermatophyte isolated	Clinical forms						
	Tinea corporis (%)	Tinea cruris (%)	Tinea unguium (%)	Tinea pedis (%)	Tinea faciae (%)	Tinea capitis (%)	Tinea mannum (%)
Trichophyton rubrum	24 (30.8)	3 (16.7)	6 (40.0)	3 (20.0)	3 (50.0)	3 (50.0)	3 (100.0)
Trichophyton tonsurans	21 (26.9)	6 (33.3)	6 (40.0)	3 (20.0)	0	0	0
Trichophyton mentagrophytes	12 (15.4)	9 (50.0)	3 (20.0)	6 (40.0)	0	0	0
Microsporum gypseum	9 (11.5)	0	0	3 (20.0)	3 (50.0)	3 (50.0)	0
Epidermophyton floccosum	6 (7.7)	0	0	0	0	0	0
Microsporum canis	6 (7.7)	0	0	0	0	0	0
Total	**78 (100.0)**	**18 (100.0)**	**15 (100.0)**	**15 (100.0)**	**6 (100.0)**	**6 (100.0)**	**3 (100.0)**

Table 3: Distribution of clinical forms of dermatophytosis

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Date of Submission: 12/06/2014.
Date of Peer Review: 13/06/2014.
Date of Acceptance: 11/07/2014.
Date of Publishing: 21/07/2014.