RESEARCH PAPER | Microbiology | Volume : 4 | Issue : 10 | October 2014 | ISSN - 2249-555X

Clinico-Mycological Study of Dermatophytoses Diagnosed at Medical College, Mehbubnagar (Andhra Pradesh), India

KEYWORDS: Dermatophytoses , Dermatophytes, Tinea

Neha Shah
MD., Department of Microbiology, SVS Medical College, Mehboobnagar, Andhra Pradesh, India
*corresponding author

T. Sarada.
MD., Department of Microbiology, SVS Medical College, Mehboobnagar, Andhra Pradesh, India

ABSTRACT *Introduction: The dermatophytes are a group of closely related fungi that have the capacity to invade keratinized tissues (skin, hair and nails) of humans and animal to produce an infection known as dermatophytoses .*

Aim & Objective: The study was a clinico-mycological approach to find out the various clinical types of dermatophytoses and as well as the species of dermatophytes in our locality.

Material & Methods: The study population comprised of 150 patients, diagnosed clinically as having dermatophytoses randomly selected from the out-patient department of Dermatology. Result: Maximum number of patients (27.3%) were in the age group 31 – 40 years.Males were slightly more affected than the females Tinea corporis was the commonest lesion accounting for 30% of the cases .Direct microscopy revealed fungal elements in 41.3% of the cases and 32% were positive on culture. Species of Trichophyton namely T.rubrum was the predominant isolate accounting for 56.25% of the isolates.

Addition of DMSO to KOH gave better and faster results when compared to plain KOH. 81.25% of the dermatophytes were isolated on DTM in the first week after inoculation while only 16.21% were isolated on SDA in the first week.

Introduction:
Dermatophytosis is a common fungal skin infection found worldwide. The hair, skin and nails are infected by a homogenous group of keratinophilic fungi called dermatophytes (Bindu V, 2002). Dermatophytoses is commonly referred to as ringworm or tinea infections. The name ringworm was coined to describe the circular lesion produced by the dermatophytes on the skin or scalp. The term tinea is derived from Latin word meaning "worm" or "moth". Infection is generally cutaneous and restricted to the nonliving cornified layers because of the inability of the fungi to penetrate the deeper tissues(Wetizman I and Summerbell RC, 1995). The serum fungal inhibitory factors in the extravascular space prevent the penetration of the fungi in the living tissue(Sehgal V N ,2004).

The dermatophytes are a group of closely related fungi that have the capacity to invade keratinized tissues (skin, hair and nails) of humans and animal to produce an infection known as dermatophytoses[2]. Dermatophyte literally means "skin plant". (The suffix 'phyte' implies that these organisms are plants and therefore in the present context, it is a misnomer because the fungi are phylogenetically not related to plants) (Chander J, 2002).

Etiological agents of dermatophytoses are classified in three anamorphic (asexual or conidial or imperfect) genera based on the appearance of large septate macroconidia. A variety of vegetative structures may also be produced such as spiral hyphae, racquet hyphae, nodular organs and favic chandeliers. These are of value in determination of identity. The three genera of dermatophytes are Trichophyton, Microsporum and Epidermophyton.(Emmon's CW, Bindford CH, Utz IP, Kwon – Chung K.L, 1977).

Species identification of the dermatophytes and knowledge of their host preference and ecology also play an important role in epidemiology, public health issues and infection control. The aim of this study was to find out the various clinical types of dermatophytoses and species of dermatophytes in this locality. Further, we aim to assess other predisposing factors contributing to the disease which will help in preventive measures in the population at risk. This study hence, aims to provide a more holistic picture about this disease in our locality.

Material & Methods:
The study population comprised of 150 patients, diagnosed clinically as having dermatophytoses randomly selected from the out-patient department of Dermatology at SVS Medical College and Hospital, Mahabubnagar from January 2007 to June 2008. The study was approved by hospital ethics committee.

After taking the patient's consent, a detailed clinical history was elicited from all the patients as per the proforma. Skin, hair and nail samples were collected from the affected sites under aseptic precautions. All the samples were processed as early as possible and examined microscopically with 10% or 20% KOH wet mount (10% for skin, hair and 20% for nail) & 10% KOH with 40% dimethyl sulfoxide (DMSO).

Further all the samples were inoculated on Sabouraud's dextrose agar with chloramphenicol (50mg/lt) and cycloheximide (500mg/lt) and Dermatophyte test medium (DTM) – Himedia. The cultures were incubated at (25°C & 37°C on SDA with antibiotics and cycloheximide) and (25°C on DTM) for 4 weeks and 2 weeks respectively. The culture isolates were identified by rate of growth, Cultural characteristics such as Topography, texture, surface pigmentation, pigmentation on the reverse. Microsopic morphology studied in LPCB mount. Special tests done are slide culture, urease test, hair perforation test .

Volume : 4 | Issue : 10 | October 2014 | ISSN - 2249-555X

Results:
A total of 150 cases of clinically suspected dermatophyte infection were taken up for the study from department of Dermatology at SVS Medical College and Hospital,Mahabubnagar. Maximum number of patients (27.3%) were in the age group 31 – 40 years, followed by 22.66% in the age group 21 – 30 years (Table.1). Males were slightly more affected (55.33%) than the females (44.67%). Male to female ratio was 1.23:1.

Duration of the symptoms ranged from 15 days to 4 years and most common symptom was pruritus. Tinea corporis was the commonest lesion accounting for 30% of the cases (Table1). Direct microscopy revealed fungal elements in 62 (41.3%) of the cases and 48 (32%) were positive on culture. Out of these 48 cases, 8 (5.3%) were negative on microscopy. Forty (26.7%) were negative on microscopy as well as culture (Table2).

Addition of DMSO to KOH gave better and faster results when compared to plain KOH. All the isolates were obtained on DTM while 77.08% were isolated on SDA. More number of culture isolates were obtained from males (56.25%) than from females (43.75%). 81.25% of the dermatophytes were isolated on DTM in the first week after inoculation while only 16.21% were isolated on SDA in the first week and 54.05% in the 2nd week.

Species of Trichophyton namely T.rubrum, T. mentagrophyte, T.violaceum were the common isolates obtained. One species of Microsporum viz., M.gypseum was isolated. T.rubrum was the predominant isolate accounting for 56.25% of the isolates (Fig.1)

Discussion:
The epidemiology of superficial fungal infections has significant variation throughout the world. Also within India it has significant variation which reflects changes in socioeconomic conditions, lifestyle, and migration. It is difficult to ascertain reliably the overall incidence and prevalence of the various skin diseases caused by superficial mycoses in different parts of the country because studies of one region may not be a true representation of the overall disease pattern of that country. The present study highlights the clinical pattern of different dermatophyte species implicated in different tinea/ringworm infections in our locality.

Tinea corporis was the commonest lesion (30%) encountered in the present study followed by tinea capitis (16%), tinea pedis and tinea unguium (14%) each, tinea cruris (8%), tinea manuum (6%), tinea barbae and tinea faciei (2%) each. Mixed site ringworm infection was found in (8%). Tinea corporis was also found to be the predominant lesion according to the earlier studies in India(Kandhari KC & Sethi KB,1964; Mehta JP,1977; Vernekar MP, 1991) . Other earlier studies in India revealed varied predominance of clinical types. Tinea capitis was the commonest clinical type (61.45% (Mahajan VM & Mohapatra LN,1968a; Mahajan VH& Mohapatra LN, 1968b). The predominance of tinea pedis in western countries could be because of the regular use of shoes and socks, predisposing to perspiration and maceration (Singh S & Beena PM,2003).

Incidence of infection was found to be more in adults aged 31 – 40 years (27.33%) in the present study. According to our study next common age group showing predominance was the third decade of life (22.66%) The increased prevalence in this age group could be attributed to increased physical activity predisposing to increased perspiration in this age group compared to a sedentary lifestyle in the later years. In some earlier studies 3rd decade age group was found to be the predominant(Kalra SL, Mohapatra LN & Gugnani HC, 1964) .

Incidence of T.capitis was predominant in the age group of 0 – 10 years (79.2%), 11 – 20 (20.8%) according to the present study. This is in correlation with earlier studies(Kumar AG & Lakshmi N, 1990; Reddy BSN et al, 1991; Kalla G et al, 1995). Tinea capitis was more common in prepubertal children. Tinea capitis was not found in ages between 21 – 70 years in our present study. The post-pubertal changes in hormones, resulting in acidic sebaceous gland secretions, are responsible for the decrease in incidence with age(Singh S & Beena PM, 2003). Emmons et al (1977) explained the higher incidence of tinea capits in children than in post pubertal age group due to fungistatic effects of long chain fatty acids in sebum after puberty.

The prevalence of dermatophytoses was more in males (55.33%) than in females (44.67%). The male to female ratio was 1.23:1 These observations comply with the results obtained in various studies where males outnumbered the females and the male to female ratio ranged from almost 1:1 to 3:1. The higher incidence in males could be due to greater physical activity and increased sweating (Bindu V, 2002 ; Singh S & Beena PM, 2003) . The duration of symptoms ranged from 15 days to 4 years. chronic sympton were specially noticed in cases of tinea unguium.

Out of 150 clinically diagnosed cases of dermatophytoses ,41.3% were positive by direct microscopy only, 26.7% were positive by microscopy and culture, 5.3% were positive by culture only and 26.7% were negative by microscopy and culture. This underlines the importance of both microscopy as well as culture(Vernekar MP, 1991). KOH mount was easy to perform, rapid, inexpensive test and can prove to be an important, office investigation in dermatology that gives diagnostic information.
However, it must be remembered that the test is not highly specific in onychomycosis or dermatophytosis and can't be specifically used for monitoring the treatment in these conditions(Bindu V, 2002).

Out of all the cultures isolated, T.rubrum was the predominant accounting for 56.25%. T.rubrum (27) were isolated, 8 from tinea corporis, 3 from tinea cruris, 2 each from tinea pedis, tinea unguium and tinea manuum, 1 each from tinea barbae, tinea faciei and 4 each from tinea capitis and from lesions at multiple site. Simillar to most other studies from India T.rubrum was found to be the predominant organism isolated(Kandhari KC & Sethi KB, 1964; Kalra SL, Mohapatra LN & Gugnani HC, 1964).The second common isolate was T.mentagrophyte (33.33%). Nine (out of 16) isolates were recovered from tinea corporis, 1 each from tinea capitis, tinea pedis, tinea manuum and 2 each from tinea unguium and tinea cruris. T.mentagrophyte was also the second common isolate in other studies (Kalra SL, Mohapatra LN & Gugnani HC, 1964; Rani V, 1983). T.violaceum accounted for 4.16%. All these (2) isolates were recovered from tinea capitis. These finding correlate with other studies in which T.violaceum was the most common isolate from tinea capitis (Kumar AG & Lakshmi N, 1990; Reddy BSN et al, 1991; Kalla G et al, 1995) . M.gypseum 3 (6.25%) was mainly isolated from mixed site infection (2 isolates) and one from tinea corporis.

Similar to Singh S et al (2003) ,our study also shows that

Volume : 4 | Issue : 10 | October 2014 | ISSN - 2249-555X

addition of 40% DMSO to the KOH mount while performing direct microscopic examination of skin, hair and nail for dermatophytes gave better and faster (within 5 minutes) results when compared to plain KOH mount (15 – 30 minutes) – depending on thickness of scales (Singh S & Beena PM , 2003). Addition of DMSO to the KOH aids in rapid clearing of keratin and almost immediate examination of sample without warming of slide. It also prevents rapid drying of the fluid. KOH preparation tends to absorb carbon dioxide from air and form carbonate crystals thus reducing the effective hydroxide. Hydroxide preparation also tends to saponify when gently heated thus forming fat globules in the slide and reducing effective visualization of fungal hyphae. The faster keratolysis by addition of DMSO is probably due to increased transport of chemicals through the stratum corneum.

DTM was found to be better than SDA in isolation of dermatophytes in the present study. More number of isolates were obtained in DTM – 48 (100%) than in SDA – 37 (77.08%). Nearly 81.25% of isolates were obtained in the 1st week after inoculation on DTM while 16.21% and 54.05% of isolates were obtained in 1st and 2nd week respectively on SDA. Contrary to present study, efficiency of SDA and DTM was found almost equal by other studies (Singh S & Beena PM , 2003; Yavuzdemir S ,1992) .

Dermatophytoses is a common, albeit under-reported, healthcare problem in our locality due to the hot and humid tropical climate. The disease though, rarely life threatening, causes much discomfort and distress to the patient. Treatment is often initiated without any laboratory support or confirmation and without addressing the underlying causative factors. Hence, local data about the disease are severely lacking. The present study underlies the importance of institutional studies on dermatophytoses as it is difficult conduct and comply multi-institutional observational studies. Also combing different studies from various geographic areas is also questionable due to variation in the epidemiological factors.

Conclusion:

The findings of this study showed that 4th decade is most common age group affected with dermatophytosis with varied duration of symptoms. Tinea corporis was the commonest lesion. Species of Trichophyton namely T.rubrum was the predominant isolate. Addition of DMSO to KOH gave better and faster results when compared to plain KOH.

Dermatophytoses is a major public health problem is intricately linked with socioeconomic standard of the population. Health education among the population at risk and awareness of preventive measures by following better standards of personal hygiene will help in reducing the prevalence of this disease among the community.

Fig. 1: Dermatophyte species isolated

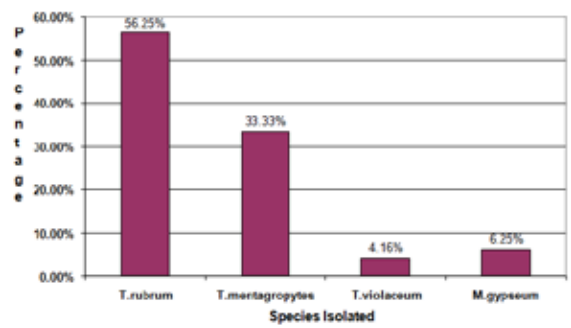

Table 1: Age & Sex distribution of different clinical types of dermatophytoses

Clinical types	Age (in years)												Sex total		Ground total
	0-10		11-20		21-30		31-40		41-50		51-70		M	F	
	M	F	M	F	M	F	M	F	M	F	M	F			
T.corporis	-	-	3	3	6	4	8	6	6	3	5	1	28	17	45(30%)
T.capitis	15	4	3	2	-	-	-	-	-	-	-	-	18	6	24(16%)
T.pedis	-	-	-	2	3	4	3	4	1	2	1	1	8	13	21(14%)
T.unguium	-	-	1	2	2	4	1	5	2	2	1	1	7	14	21(14%)
T.crusis	-	-	-	-	2	2	3	3	1	-	1	-	7	5	12(8%)
T.manuum	-	-	1	-	2	1	2	1	1	1	-	-	6	3	9(6%)
T.barbae	-	-	-	-	1	-	1	-	1	-	-	-	3	-	3(2%)
T.faciei	-	1	1	1	-	-	-	-	-	-	-	-	1	2	3(2%)
Mixed sites	-	-	1	1	1	2	2	2	1	1		1	5	7	12(8%)
Total	15	5	10	11	17	17	20	21	13	9	8	4	83 (55.33%)	67 (44.67%)	150(100%)
	20 (13.33%)		21 (14%)		34 (22.66%)		41 (27.33%)		22 (14.66%)		12 (8%)				

Table 2: Analysis of Mycologically confirmed cases

Sl. No.	Lesions	Total cases	Microscopy and culture positive	Microscopy positive and culture negative	Microscopy negative and culture positive	Microscopy and culture negative
1.	T.corporis	45	16	18	2	9
2.	T.capitis	24	6	8	1	9
3.	T.pedis	21	2	8	1	10
4.	T.unguium	21	2	9	2	8
5.	T.crusis	12	4	6	1	1
6.	T.manuum	9	3	4	-	2

Volume : 4 | Issue : 10 | October 2014 | ISSN - 2249-555X

7.	T.barbae	3	1	2	-	-
8.	T.faciei	3	1	1	-	1
9.	T.cruris & T.corporis	5	2	3	-	-
10.	T.corporis & T.manuum	2	1	1	-	-
11.	T.corporis & T.pedis	2	1	1	-	-
12.	T.corporis & T.capitis	2	1	1	-	-
13.	T.pedis & T.manuum	1	-	-	1	-
	Total	150	40 (26.7%)	62 (41.3%)	8 (5.3%)	40 (26.7%)

REFERENCE

1. Bindu V, (2002). Clinico-mycological study of dermatophytosis in Calicut. . Indian J Dermatol Venerol Leprol. 68, pp.259 – 261. | 2. Chander J , (2002 April). Textbook of Medical Mycology ,Dermatophytoses, . 2nd ed. | 3. Emmon's CW, Bindford CH, Utz IP, Kwon – Chung K.L, (1977). 'Dermatophytoses, Chapter 10'.In: Lea & Febiger (ed), Medical Mycology. 3rd ed. Philadelphia: pp.117 – 67. | 4. Kalla G, Begra B, Solanki A, Goyal A, Batra A, (1995). Clinicomycological study of tinea capitis in desert district of Rajasthan. Indian J Dermatol Venereol Leprol. 61 (6), pp.342 – 345 | 5. Kalra SL, Mohapatra LN, Gugnani HC, (1964). Etiology of Dermatomycoses in Delhi. Indian Journal of Medical Research. 52 (6), pp.553 – 558 | 6. Kandhari KC, Sethi KB, (1964). Dermatophytosis in Delhi area. Journal of the Indian Medical Association. 42 (7), pp.324 – 326 | 7. Kumar AG, Lakshmi N, (1990). Tinea capitis in Tirupati, . Indian J Pathol Microbiol. 33 . (4), pp. 360 – 363 | 8. Mahajan VH, Mohapatra LN , (1968b). Study of human and animal dermatophytoses in rural areas II. Mykosen . 11 (11), pp.793 – 798 | 9. Mahajan VM, Mohapatra LN, (1968a). of human and animal dermatophytosis in rural areas.Mykosen. 11 (10), pp. 687 – 696 | 10. Mehta JP, Deodhar KP, Mehta VR, Chaphekar PM, (1977). A study of Dermatophytoses in Bombay. Indian J Pathol Microbiol . 20 (1), pp.23 | 11. Rani V, Saigal RK, Kanta S, Krishan R, (1983). study of dermatophytes in Punjabi Population.Indian J Pathol Microbiol . 26 (), pp.243 – 247 | 12. Reddy BSN, Swaminathan G, Kanungo R, D' Souza M, Garg BR, (1991). Clinico-mycological study of tinea capitis in Pondicherry. Indian J Dermatol Venereol Leprol . (57), pp.180-182 | 13. Sehgal V. N, (2004). Textbook of Clinical Dermatology . 4th ed. : pg 48. | 14. Singh S, Beena PM, (2003). Comparative study of different microscopic techniques and culture media for the isolation of dermatophytes. Indian J Med Microbiol. 21, pp.21-24 | 15. Singh S, Beena PM, (2003). Profile of dermatophyte infections in Baroda. Indian J Dermatol Venereol Leprol, . 69 , pp. 281 – 283 | 16. Vernekar MP, Pinto MJM, Rodrigues S, Reque WP, Singh, (1991). Clinicomicrobiological study of dermatophytes. Indian Journal of Pathol Microbiol. 34 (3), pp.186-192 | 17. Wetizman I and Summerbell RC, (1995). The dermatophytes. Clinical Microbiol Rev. 8 (2), pp.240 – 259 | 18. Yavuzdemir S, (1992). Comparative evaluation of the isolation of the dermatophytes by direct laboratory evidence and MSDA with MDTM culture media. Microbiol Bulletin . 26 (4), pp.367 – 372. |