Section: Microbiology

Original Research Article

DECODING CLINICOMYCOLOGICAL PROFILE OF DERMATOPHYTOSES IN A TERTIARY CARE HOSPITAL : A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Dermatophytoses is a superficial cutaneous fungal infection with major public health importance across the globe causing a significant morbidity with disfigurement of the areas involved and also recurrence. Hence, the characterisation of dermatophytic isolates and its epidemiological profile in a region are crucial for the early diagnosis, appropriate treatment and also to minimize the economical burden of treatment cost. The objective is to analyse in detail about the epidemiology, prevalence of different species of dermatophytes from newly diagnosed patients with dermatophytoses attending the Department of Dermatology in a Tertiary Care Hospital.

Materials and Methods: This cross sectional study was conducted in patients with suspected dermatophytosis attending the Dermatology OPD of Tertiary Care Hospital. A detailed history, clinical examination and specimen collection for mycological examination was done. Skin scraping, epilated hair and nail clipping were subjected to direct microscopy by using 10%, 20% ,40% potassium hydroxide (KOH) respectively and also cultured on Modified Sabourauds Dextrose Agar with cycloheximide & chloramphenicol and Dermatophyte Test Medium (DTM). Identification of the causative pathogen was done by performing slide culture, lacto-phenol cotton blue (LPCB) mount, hair perforation tests and urease tests.

Results: There was 100 newly diagnosed dermatophytosis patients were included in the study, with the male: female ratio of 1.8:1. The most commonly affected age group was 21 to 30 years followed by 31 to 40 years. Tinea corporis was the most common type observed. KOH positivity was seen in 62 samples (61%) and culture positivity was found in 43 samples (43%). The most common species isolated was Trichophyton rubrum (22 isolates) followed by Trichophyton mentagrophytes (10 isolates).

Conclusion: Dermatophyte infections are extremely common in our country where hot and humid climate along with the poor hygiene are predisposing conditions that favour the growth of these fungi. There is varying divergence in isolation of different species across the different parts of India. In this study, the predominant species isolated was the Trichophyton rubrum followed by Trichophyton mentagrophytes.

Keywords: Dermatophyte, KOH, DTM, Slide culture, LPCB, Tinea corporis, Trichophyton rubrum, Trichophyton mentagrophytes.

INTRODUCTION

Fungal diseases constitute a substantial health problem all over the world and have attracted the attention of physicians, dermatologists and microbiologists in the recent years owing to variety of reasons such as haphazard use of antibiotics, anticancer remedy and immunodeficient diseases like Acquired Immuno Deficiency Syndrome.[1] They are broadly classified into three groups:

superficial mycoses, subcutaneous mycoses and systemic mycoses.[2]Dermatophytoses is the most commonly encountered superficial cutaneous fungal infection in dermatology out-patient department worldwide. The World Health Organization estimates that dermatophytes affect about 20% to 25% of world population. It is more prevalent in tropical and subtropical countries like India where heat and moisture play a vital role.

Studies on dermatophytoses in India have received increased attention in recent years because one fifth of the world's population suffers from superficial mycosis. It is a widespread superficial mycosis affecting hair, skin and nails of human beings and domestic animals.[1] It is caused by a group of keratinophilic fungi called dermatophytes that are capable of invading keratinized tissues and can use keratin as a nitrogen source. It tends to grow outwards on skin producing a ring like pattern. Hence, they are universally called as tinea or ringworm.[3] They are classified into three genera namely Trichophyton, Microsporum and Epidermophyton based on their colony characteristics and microscopic morphology.

The common virulent pathogenic species were T.rubrum, T.mentagrophytes, T.tonsurans, T.violaceum, M.audouinii, M.gypseum, M.canis and E.floccosum. Depending on their natural habitat (human, animals or soil) they are categorized into anthropophilic (human), zoophilic (animals) and geophilic (soil).[4] It is acquired by direct contact with soil, animals or humans infected with fungal spores. Clinically dermatophytoses may be classified according to the site involved. Scalp- Tinea capitis [Figure 1a], Face- Tinea faciei [Figure 1b], Hands- Tinea manuum[Figure 1c], Nail bed- Tinea unguium[Figure 1d], Beard & Moustache area– Tinea barbae,[4] (Barber's itch or tinea sycosis) [Figure 1e], Groin –Tinea cruris (jock itch) [Figure 1f], Body including trunk & arms –Tinea corporis [Figure 1g] and Feet-Tinea pedis (Athlete foot) [Figure 1h].

Figure 1: Different types of dermatophytoses considered in this study

Environmental circumstances such as hot and humid climate, personal hygiene, overcrowding and the susceptibility of individual which varies from place to place influence the occurrence of dermatophytoses. Certain habitual practices such as frequent cleaning of extremities with water without drying, wearing tight ill- fitting clothing such as jeans, leggings, synthetic garments, sarees tied tightly around the waist, sharing of instruments for mass shaving, live fungal stock, shoe and socks wearers, exchange of foot wears confer with greater existence of dermatophytoses. Exchanging of clothes, linen and towels either directly or via substandard communal laundering are other recognized risk factors. Farmers, Sportsmen, agriculturists, wrestlers, outdoor labourers and those associated with history of contact with soil and animal keeping are at privileged risk of acquiring dermatophytic infection. Majority of these patients have household contacts and at times the entire family is affected. Damp foot conditions may intensify the symptoms of dermatophytoses and resultant bacterial infections in immunocompromised individuals.

Various dermatophyte species are endemic in certain parts of the world which have a limited geographic distribution. The cumulative migration of world's population is disrupting quite a lot of epidemiological patterns. Some dermatophytes like T.tonsurans, T.rubrum and E.floccosum are globally distributed. The Severity of infection is determined by the infecting fungi,immune status of the host and the site of lesion.The predictable life time risk for a person to acquire dermatophyte infection is 10% to 20%.It affects all the age groups and both sexes.The incidence of dermatophytosis is increasing over recent years particularly in paediatric, geriatric and immunocompromised patients. Tinea corporis infection is utmost conjoint worldwide followed by tinea cruris.[5]Tinea capitis is most common among the children. T.rubrum is the most common species isolated worldwide followed by T.mentagrophytes.[5] Males are more commonly affected than females as progesterone is inhibitory to dermatophyte growth and also the anatomic site involved. The diagnosis of dermatophytic infection is mostly done clinically, but very often the clinical presentation is confused with other skin disorders like contact dermatitis, eczema, psoriasis, etc. and making the laboratory diagnosis and confirmation obligatory by using 10% to 40% Potassium hydroxide mount and culture in Modified Sabourauds Dextrose Agar with cycloheximide and chloramphenicol or gentamycin. The primary objectives of the study are as follows

- To demonstrate the dermatophytes among the clinical samples - skin scrapings, nail clippings, epilated hair by direct microscopic examination using 10 %-40 % KOH mount.
- To isolate and identify the dermatophytes by conventional mycological techniques.
- To study the prevalence of different species of dermatophytes.
- To correlate the outcome in relation to varied clinical presentation environmental and host factors associated with the disease.

Hence, the present study is conducted with an aim to isolate, speciate dermatophytes to reveal the

changing trend in the prevalence and correlate the outcome in relation to the anatomical site involved and the host risk factors.

MATERIALS AND METHODS

This hospital based cross sectional study was carried out in the Department of Microbiology in association with the Department of Dermatology at a Tertiary Care Hospital for a period of one year after obtaining Institutional Ethical Committee approval. An Informed written consent was obtained from the patients before their enrollment in this study. All patients satisfying the inclusion criteria were documented.

Inclusion Criteria

Patients with clinical features suggestive of dermatophytoses attending the Dermatology Out Patient Department who were newly diagnosed, Patients of all age group irrespective of sex and Patients with co-morbid systemic illness.

Exclusion Criteria

Patients who were on antifungal therapy (oral, topical, systemic), Defaulter, Patients who did not provide informed consent and Patients with other bacterial and fungal infections in the skin folds, hair, nails.

Specimen Collection

Clinical specimens were collected from all the patients who have history of lesions involving hair, skin or nail and those clinically newly diagnosed as Dermatophytoses. After taking detailed case history, clinical examination was conducted. The patient was made to sit in the good source of light and proper clinical examination of lesion was done. The specimens were Skin scraping, Nail clipping and Epilated hair.

Skin Scrapings

Skin lesions were sampled from the peripheral, erythematous, actively growing margin of the lesions. The affected area of the skin is thoroughly decontaminated with 70% ethyl alcohol to eliminate surface bacterial contamination. The skin was allowed to dry by evaporation of alcohol. An open, sterile petri dish with black paper was held instantly below the area to be sampled and the skin scales in the active growing edge of the lesion,[6] were scrapped into the black paper kept inside the sterile petridish by means of the blunt edge of a sterile scalpel.

Nail Clippings

The affected nail was meticulously cleaned with 70% ethyl alcohol and the nail was clipped or scrapped deeply enough to obtain recently invaded nail tissue by a flame sterilized tweezer [6]. Nail clippings were taken from the discoloured, dystrophic or brittle parts of the nails. Specimens were also taken from the nail plate, nail bed and subungual region of the nails.

Epilated Hair

In suspected tinea capitis, after cleaning the affected area with 70% ethyl alcohol, Lustreless hair and hair stubs are preferred and epilated along with root portion by a pair of flame sterilized surgical forceps [6]. Hair stubs can also be collected by scraping with the sterilized blunt edge of the scalpel. Skin scrapings also collected from the site adjacent to the basal portion of infected hair.

The samples were collected, labelled with the patients name, age, sex, date of collection and the site of infection and immediately transported to laboratory in sterilized black paper sachets so that the scales will be seen easily. The samples were divided into two portions: one for microscopic examination and one for culture

Direct Microscopic Examination

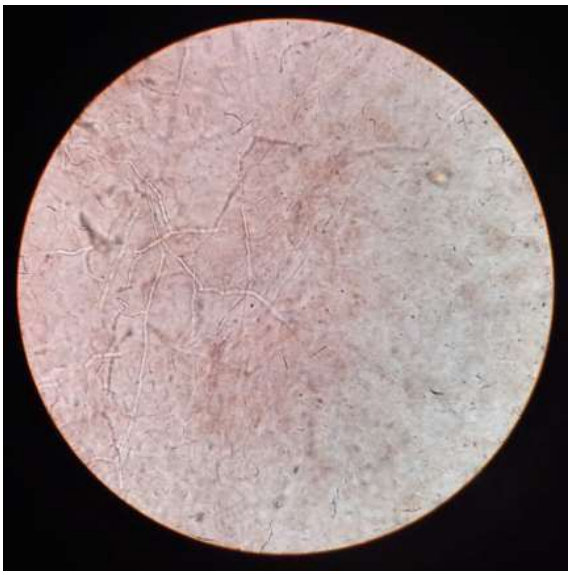

Figure 2: KOH mount of specimen showing narrow septate hyphae

Direct microscopic examination with 10% to 40% Potassium hydroxide was performed [Figure 2] for all the clinical specimens.[4] After gentle warming over the low flame, the specimen was observed under low power and high-power objectives of light microscope for the presence of narrow, septate, branching hyphae with or without arthroconidia. In hair specimens, endothrix and ectothrix types of infection were also observed.[7]

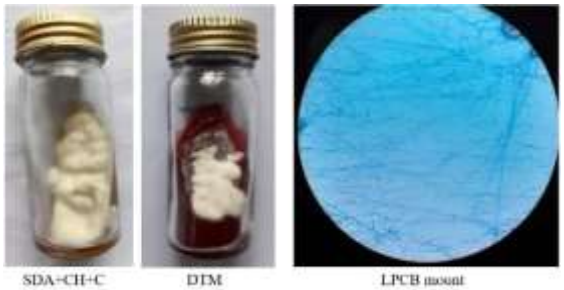

Figure 3: Culture growth of Trichophyton rubrum in SDA with Cycloheximide, Chloramphenicol & DTM and LPCB Mount.

Culture

The samples were inoculated in duplicate sets into screw capped bottles containing slopes which includes one set of Modified Sabourauds Dextrose Agar with chloramphenicol and cycloheximide to avoid contamination with saprophytic fungi and bacteria and one set of Dermatophyte Test Medium containing gentamicin and cycloheximide were inoculated.[8] One set of screw capped bottles with Sabourauds Dextrose Agar with cycloheximide & chloramphenicol and Dermatophyte test medium were incubated at 37°C and second set at room temperature or 25°C at BOD incubator and observed daily for growth for 4 weeks [Figure 3].

The growth in Dermatophyte Test Medium resulted in colour change of medium from yellow to red due to the presence of phenol red indicator and production of alkaline by-products. Positive cultures were examined both macroscopically and microscopically. Subculturing of colony into Potato Dextrose Agar was done to stimulate the sporulation. Species identification was done macroscopically by colony texture, rate of growth, pigmentation, colony characteristics and microscopically by tease mount with Lacto phenol cotton blue based on Macroconidia, Microconidia and specialized hyphae such as spiral hyphae, racquet hyphae, favic chandeliers.

Further identification was done by performing Slide culture technique, Cellophane or Scotch Tape Preparation, In vitro hair perforation test and urea hydrolysis test. If there was no growth after 4 weeks the culture was declared as negative.

Statistical Data Analysis: Data entry was made in the Excel software and analysis was done with SPSS26 computer package. P value of < 0.05 was considered as statistically significant.

RESULTS

The above study was conducted in a tertiary care hospital with 100 samples including skin scraping, epilated hair and nail clipping of clinically diagnosed dermatophytosis patients.

Table 1: Age wise Distribution of Dermatophytosis among Study Population (n=100)

Age group(years)	Total number of persons affected	Male	Percentage (%)	Female	Percentage (%)
LESS THAN 10	4	4	6.3%	0	0%
11 TO 20	19	6	9.3%	13	36.1%
21 TO 30	27	20	31.3%	7	19.4%
31 TO 40	25	19	29.7%	6	16.7%
41 TO 50	15	8	12.5%	7	19.4%
51 TO 60	10	7	10.9%	3	8.4%
Total	100	64	100%	36	100%

Among study population, 64 patients affected were males whereas 36 patients were females and the male to female ratio was 1.8:1. The age of the patients commonly affected were ranging from 5 to 60 years. It was observed that the most frequently affected age group was 21-30 years with 27 patients followed by 31-40 years age group with 25 patients. Majority of affected males were in the age group of 21-30 years with 20 males. The p value by Chi-square test was 0.012 and found to be statistically significant (Table 1).

Maximum occurrence of Dermotophytosis seen in 66 (66%) patients were belonged to low socioeconomic status while 34 patients (34%) were belonged to middle socioeconomic status. In respect to residential locality, out of 100 patients, 56 patients were reported from rural area, 27 patients from semi urban and 17 patients from urban area. The p-value by Chi-square test was <0.001 which was observed to be statistically significant [Figure 4].

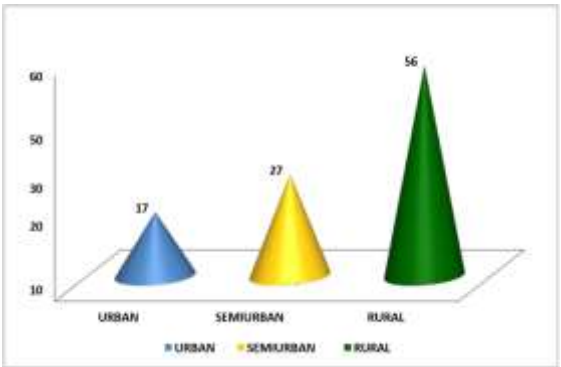

Figure 4: Distribution of Dermatophytosis According to Locality (n=100)

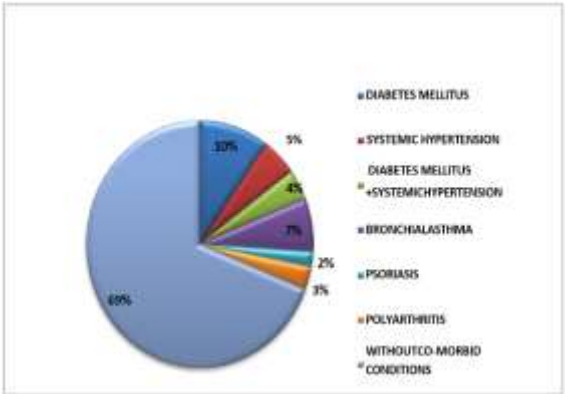

Figure 5: Co-Morbid Diseases Wise Distribution of Dermatophytosis among Study Population (n=100)

The maximum number of dermatophytoses cases were reported in summer season 68 (68%) followed by rainy season 22 patients (22%) and winter season 10 (10%) patients. In respect to association with co-morbid conditions, among study population, 10 patients were associated with diabetes mellitus, 5 patients with hypertension, 4 patients both hypertension and diabetes mellitus,7 patients with bronchial asthma, 2 patients with Psoriasis, 3 patients with polyarthritis and 69 patients did not have any associated co-morbid conditions. The p-value by Chi- square test was <0.001 which was found to be statistically significant [Figure 5].

Among 100 specimens collected, 72 samples were skin scrapings, 16 samples were nail clippings and 12 samples were epilated hair samples.

Table 2: Distribution of Clinical Types of Dermatophytosis among Study Population (n=100)

Specimen	Clinical diagnosis	Number of persons(n)	Percentage (%)	Males	Percentage (%)	Females	Percentage (%)
Skin Scrapings (n=72)	TINEA CORPORIS	43	59.7%	25	34.7%	18	25%
	TINEA CRURIS	24	33.3%	17	23.6%	7	9.7%
	TINEA PEDIS	2	2.8%	0	0%	2	2.8%
	TINEA MANUUM	2	2.8%	0	0%	2	2.8%
	TINEA FACIEI	1	1.4%	1	1.4%	0	0%
Nail Clippings(n=16)	TINEA UNGUIUM	16	100%	11	68.8%	5	31.2%
Epilated Hair (n=12)	TINEA CAPITIS	6	50%	4	33.3%	2	16.7%
	TINEA BARBAE	6	50%	6	50%	0	0%

Among 72 skin scraping specimens (n=72), Tinea corporis was the principal dermatophytic lesion accounted for 43 cases followed by tinea cruris 24 cases in this study. Tinea pedis and tinea manuum were seen in 2 (2.8%) patients each. Tinea faciei was seen in 1 (1.4%) case. From epilated hair (n=12) specimens, 6 (50%) were from Tinea capitis, 6 (50%) were from Tinea barbae (Table 2). The direct microscopic examination (KOH) was positive in 62 (62%) samples and was negative in 38(38%) samples. The total number of samples which showed growth in culture was 43 (43%) and the total number of samples which showed no growth in cultures was 57 (57%) [Table 3].

Table 3: Evaluation of Culture (n=100) among Study Population

Specimen	Total(n)	CulturePositive	Percentage(%)	CultureNegative	Percentage(%)
Skin scrapings	72	30	69.77%	42	73.68%
Nail clippings	16	7	16.28%	9	15.79%
Epilated hair	12	6	13.95%	6	10.53%
Total	100	43	100%	57	100%

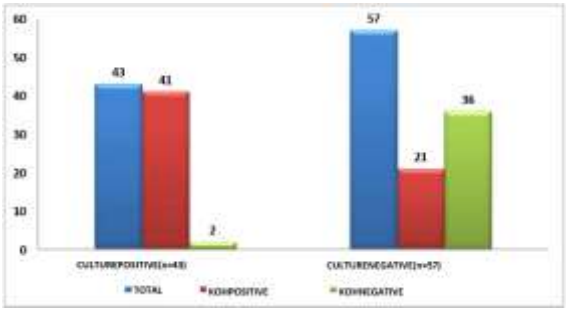

Figure 5: Correlation between Direct Microscopy (KOH Examination) and culture (n=100) among Study Population

Out of 100 samples, 62 (62%) isolates were KOH positive and 38 (38%) isolates were KOH negative. 43 (43%) isolates were culture positive and 57 (57%) isolates were culture negative for dermatophytes.

Out of 100 samples, a total of 41 (41%) samples were positive in both direct KOH microscopic examination and culture and 36 (36%) samples were negative by both the techniques. Samples positive by direct examination and negative on culture was 21 (21%). Further 2 (2%) samples isolated on culture were negative on direct KOH microscopic examination [Figure 5]. Out of 100 Samples collected, dermatophytes isolated were 43 (43%) in number and 57 (57%) samples did not show any growth. Out of 43 culture positives, 30 (70%) of them were isolated from the skin scrapings, 7 (16.28%) of them were from nail clippings and 6 (13.95%) of them were from the epilated hair samples.

Table4: Distribution of Fungal Isolates among the Dermatophytosis Group (n=43)

Genus of the Fungal Isolates	Fungal Isolates	Total number of Fungal Isolates(n=43)	Percentage (%)
Trichophyton (n=35)	Trichophyton rubrum	22	51.16%
	Trichophyton mentagrophytes	10	23.26%
	Trichophyton tonsurans	2	4.65%
	Trichophyton verrucosum	1	2.33%
Microsporum(n=3)	Microsporum fulvum	3	6.98%
Epidermophyton(n=5)	Epidermophyton floccosum	5	11.62%
Total(n=43)		43	100%

Out of 43 isolates of dermatophytes, 35 (81.4%) isolates belonged to the Trichophyton species of which Trichophyton rubrum 22 (51.16%) was the predominant isolate, followed by Trichophyton mentagrophytes 10 (23.26%), Trichophyton tonsurans 2 (4.65%) and Trichophyton verrucosum 1 (2.33%). five isolates were belonged to Epidermophyton floccosum (11.62%). Three (6.98%) isolates were belonged to Microsporum fulvum[Table 4].

In Tinea corporis, Trichophyton rubrum 11/17 (64.7%) was the predominant isolates followed by Trichophyton mentagrophytes 3/17 (17.6%), Microsporum fulvum 2/17(11.8%), Trichophyton verrucosum 1/17 (5.9%) In Tinea cruris, Epidermophyton floccosum 4/10 (40%) was the predominant isolates followed by Trichophyton rubrum3/10 (30%) and Trichophyton mentagrophytes3/10 (30%). One case 1/1 (100%) of Trichophyton rubrum was isolated from Tinea manuum, Tinea pedis and Tinea faciei. Out of 4 dermatophytes isolated from Tinea capitis, 2/4 (50%) were Trichophyton tonsurans and 1/4(25%) was Trichophyton mentagrophytes and 1/4 (25%) was Microsporum fulvum. The 2 isolates of Tinea barbae (100%) were Trichophyton mentagrophytes. Trichophyton mentagrophytes 3/6(50%) was the predominant isolate in hair sample followed by Trichophyton tonsurans 2/6 (33.33%) and Microsporum fulvum 1/6 (16.67%). Out of the 7 isolated dermatophytes in Tinea unguium, Trichophyton rubrum was the predominant isolate 5/7(71.42%), followed by Trichophyton mentagrophytes 1/ 7 (14.29%) and Epidermophyton floccosum 1/7 (14.29%).

DISCUSSION

Dermatophytoses is a significant public health problem in tropical and subtropical countries like India, yet remains unresolved. With regard to the increasing trend of antifungal resistant dermatophytes, the requirement of rapid and precise identification of causative fungi become vital. So, this hospital based cross-sectional study was conducted in the Department of Microbiology at a Tertiary Care Hospital, for a period of 1 year. The study included a total of 100 patients attending the Dermatology Outpatient Department who were newly diagnosed clinically as a case of dermatophytoses. Skin scrapings, nail clippings and epilated hair samples were collected and processed. The fungi were isolated and speciated.

Age & Gender Incidence

In this study, the age groups of the patients were ranging from 5 to 60 years with the mean age of 32.5 years. This is in accordance with the study conducted by Madhavi et al at Hyderabad where the mean age of the affected patients was 28.5 ± 6.32. In our study, the highest incidence of dermatophytosis was seen in 27 patients in the age groups of 21-30 years followed by 25 patients (25%) in the age group of 31 to 40years.The increased incidence of dermatophytosis in this age group may be due to the fact that this age group people only take part in maximum outdoor activities like agriculture and manual labour which were predisposing them to acquire infection from environment and increased perspiration which produces a hot humid environment in the body that favours the growth of dermatophytes.

The excessive secretion of sebum by the post pubertal hormone changes were responsible for declining incidence of dermatophytosis with age. The male preponderance could be due to occupational hazards related to their nature of work, greater physical activity, increased sweating because of environmental conditions such as hot and humid weather, the frequent interaction with different people of the society, poor personal hygiene and illiteracy. The lower incidence in females (36%) may be due to non-reporting of female patients to hospitals because of prevailing social stigma in rural population,[9] ignorance to seek medical advice and also less exposure to the environment that helps in the spread of fungi.

These findings correlate with the studies done by Priyam Basak et al,[10] Singh S et al,[4] Vijayakumar Ramaraj et al,[11] and Sudha M et al,[9] in Madurai in which the common age group affected are 21 to 30 years followed by 31 to 40 years and male: female ratio 1.5:1, 73:27, 70:30 and 1.8:1 respectively.

Socioeconomic Status

In our study, the majority of cases in this study were belonging to low socio economic status (66%) followed by middle class (34%). This incidence may be increased due to sweating from strenuous outdoor physical activity, poor hygiene practices like sharing of fomites, overcrowding, exposure to infected animals &soil, poor nutritional status of the population and lack of awareness about the disease. These findings are in accordance with the studies done by Priyam Basak et al,[10] Singh S et al,[4] and Lakshmi Vasantha Poluri et al,[12] and B. Janardhan et al,[13] in which majority of patients i-e 63%, 67.74%, 70.5% and 66% belonged to low socio economic status respectively followed by middle and high socio economic status.

Incidence Based on Locality

In our study, maximum number of patients (56 patients) belonged to rural areas followed by 27patients to semiurban area and 17 patients to urban area. The higher occurrence in rural population may be due to lack of personal hygiene, more exposure to environmental dust and ignorance and overcrowding. These findings correlate with the studies of Vijayakumar Ramaraj et al,[11] and B.Janardhan et al,[13] in which majority of cases & 64% of cases found in rural population and contrary to Lakshmi vasantha Poulri et al,[12] in which 80.65% of urban population &19.35% rural population reported. The residential locality among

study population was found to be statistically significant.

Seasonal Incidence: In the present study, maximum number 68 (68%) of dermatophytosis cases were reported in summer season followed by 22 (22%) patients in rainy season and least (10%) by winter season. Incidence of dermatophytosis in summer season may be increased due to increased heat which in turn leads to increased perspiration. Excessive perspiration also washes away the sebaceous gland secretion of skin making it more prone to dermatophyte infection. These observed findings were similar to the study done by B. Janardhan et al,[13] in which 64%in summer season followed by rainy (28%) and winter (8%), Monika K et al 40% of cases reported in summer and contrary to the study done by Dr. Nilekar. S.L et al in which 44.37%cases reported in rainy season followed by winter &least by summer.

Co-Morbid Conditions: The Co-existing diseases may be a co-incidence or play a role as aggravating factor in Tinea infections. In this study, Diabetes mellitus was the most common association seen in 10 patients followed by systemic hypertension was observed in 5 patients, both Diabetes mellitus and Systemic hypertension in 4 patients, Psoriasis was found in 2 patients &Bronchial asthma in 2 patients. This is concordance with the studies done by Vignesh D et al in Kanchipuram in which DM accounts for 20% & 16% Hypertension, Dr.BinduMitruka et al in which 14% Atopy, 9% DM, 1.3% Psoriasis, 1.3% Pulm. TB & 0.7% SLE, Lakshmi Vasantha Poluri et al,[12] in which 8.06% diabetics, 6.45% anaemic, 3.23% atopy & 1.61% HIV Positive and B.Janardhan et al,[13] in which DM 22%, HT 9%, Atopy 2% & HIV 2% reported.

Collection of Specimens: In this study, Majority 72 of samples was skin scrapings, 16 nail clippings and 12 epilated hair specimens. These findings are in accordance with the studies done by Dr.Raghavendra Rao M et al,[14] in which Skin 73.33%, Hair 16.66% &Nail 10% and Kumaran et al,[15] in which Skin scraping 54%, Hair samples 39% & Nail clippings 7% were reported.

Clinical Types of Dermatophytosis: In our study, among the skin lesions, tinea corporis was the predominant clinical presentation which occurred in 43(59.7%) patients followed by tinea cruris in 24patients (33.3%), tinea manuum in 2 patients (2.8%), tinea pedis in 2 (2.8%) patients and tinea faciei only 1 patient (1.4%).

The higher incidence of tinea corporis followed by tinea cruris was probably due to its symptomatic (pruiritic) nature which leads the patient to seek medical advice. It was observed that most of the patients with tinea infection were involved in exhausting physical work and prolonged exposure to sun that result in profuse sweating. The tight fittings and synthetic clothing may also provide damp, sweaty and warm skin conditions that favour dermatophytic infection. The most common site of Tinea corporis involved in females was the waist area due to the patterns of clothing i.e. sarees and salwars which were worn by the women act as predisposing factors because of friction, excessive sweating, collection of dust and fungal spores at belt line. A low incidence of tinea pedis in 2 (2.8%) patients correlate with the study of Venkatesan et al,[16] with the incidence of 4patients (5.6%) in Chennai. The predominance of Tinea pedis in office employees & in western countries could be due of the habitual use of occlusive footwears like socks & shoes, resulting in clamminess and warmness of the feet thereby facilitate the dermatophyte growth.

In the present study, among 12 hair samples Tinea capitis was detected in 6 and Tinea barbae in 6 patients. Tinea capitis is less common in India than in other countries, this may be attributable to the topical application of hair oil by Indians which has been revealed to have an inhibitory consequence on dermatophytic infection of scalp. These findings are in accordance with the studies done by Sudha M et al, Vijayakumar Ramaraj et al,[11] and Srinivasan Balakumar et al.[9]

Direct Microscopy (KOH) Vs Culture: Out of 100 clinically diagnosed cases, direct microscopic examination (KOH) showed positivity in 62 samples (KOH+veCulture+ve 41, KOH+veCulture-ve 21) and culture positivity in 43 samples (KOH+ve Culture +ve 41, KOH-veCulture+ve 2).Among 100 samples 41 samples were both KOH &Culture positive,21 samples were positive by KOH &negative by culture, 2 samples were positive by culture &negative by KOH and 36 samples did not show any evidence of positivity of fungi either by direct (KOH) microscopy or culture. The probable causes for this variation could be due to non-viability of fungal elements which may be due to insufficient amount of fungal elements in clinical specimen collected from very small lesions used for culture or non-reporting of partial treatment with anti-fungal agents prior to specimen collection. Thus, all KOH negative samples should be cultured. Non visualization of hyphae on direct microscopy could possibly due to a severe inflammatory reaction which obscures them and also the inactive sporulating phase of fungi which was very difficult to observe under microscope. In this present study, 21 specimens show KOH positivity alone and 2 specimens show culture positivity alone that elucidate the importance of both direct microscopy and culture to establish definitive diagnosis. These findings of our study correlate with the studies of Nisha Majeed et al,[8] Priyam Basak et al,[10] and Dr.Raghavendra Rao M et al.[17]

Fungal Isolates: Most of the isolates were from skin scrapings (30%) followed by 7% from nail clippings and the least 6% from epilated hair samples. All the three genera of dermatophytes such as Trichophyton 35(81%), Microsporum 3 (7%) and Epidermophyton 5(12%) had been isolated as the causative agent in the present study. Out of 43 isolates of dermatophytes, 35(81%) isolates belonged to the Genus Trichophyton of which

Trichophyton rubrum was the predominant isolate 23 (65.7%). The high preponderance of Trichophyton rubrum was explained by the persistent characteristic pattern of infection and the variation of dermatophyte to skin of human beings. Out of 23 isolates of Trichophyton rubrum, 12 (52.1%) isolated from tinea corporis, 3 isolates (13%) from tinea cruris, one isolate (4.3%) from tinea pedis, only one isolate (4.3%) from tinea mannum, one isolate (4.3%) from tinea faciei and 5(21.7%) from tinea unguium followed by Trichophyton mentagrophytes 10(23%), Trichophyton tonsurans 2 (4.7%), Trichophyton verrucosum 1(2.3%), Microsporum fulvum 3(7%) and Epidermophyton floccosum 5(11.6%) which could be due to the interaction of patients with domestic animals and soil. These findings were substantiated by the studies of Sudha M et al, Vijayakumar Ramaraj et al,[11] and Srinivasan Balakumar et al.[9]

Limitation: It was a hospital-based study and may not reflect the true pattern in the community. Pan fungal PCR and MALDI-TOF MS were not carried out.

CONCLUSION

Dermatophytosis is chiefly a universal superficial fungal infection of young and middle-aged adults particularly in males due the chances of exposure to sun and their indulgent strenuous physical work which leads to increased perspiration. It is most commonly seen in people working in hot and humid atmospheric conditions. The affected populations principally belong to low socio economic status group due to overcrowding, poor personal hygiene, contact with infected persons & poor nutritional status. Tinea corporis and tinea cruris are the most common clinical types of dermtophytosis and Trichophyton rubrum was the principal etiological agent encountered in this study. Similar to scabies, there has been an increase in familial clustering of cases. Embarrassment and hesitancy lead to significant under reporting of cases especially in women. Counseling during the first visit of the patient towards lifestyle modifications regarding compliances and proper precautionary measures like improvisation of personal hygiene, wearing loose fitting cotton clothing, keeping the feet clean and dry, avoidance of sharing fomites like towels, dresses, comb, soap, footwear, bed linen with their family members and laundering dresses at 60°C should be taken to brought down the incidence of this dermatophytic infection and is very important for good clinical outcome.

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