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Original Research Article

Study of Hospital Based Epidemiology & Clinical Types of Cases of Dermatophytosis Presenting in Outpatient Department of Skin and Venereology

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Abstract: In India, which is a tropical country, the cause of dermatophytoses is adversely influenced by economic factors like poverty, poor hygiene and social conditions like overcrowding. Nature of dermatophytosis may change with the passage of time, living population, evolution of preventive measures and hygienic conditions in society. Dermatophytosis is more prevalent in India, due to favourable climatic conditions like temperature and humidity. The present study involved mycological analysis of 150 clinically suspected cases of dermatophytosis of skin, hair and nail attending the outpatient department of Dermatology and Venereology, AIMSR, Bathinda. Detailed history was taken. Samples of skin, hair and nail were taken depending upon the part affected. It was concluded that tinea cruris was the most common clinical presentation followed by tinea corporis. Young adults in the age group 21-30 years were mainly affected. The male: female ratio was 1.78: 1.
Keywords: Dermatophytosis, Epidermophyton, Microsporum, Trichophyton, Tinea Corporis, Tinea Cruris.

INTRODUCTION

The dermatophytes are a group of closely related fungi that have the capacity to invade keratinized tissues (skin, hair and nails) of human and other animals to produce an infection, dermatophytosis, commonly referred to as 'ringworm'. Infection is generally cutaneous and restricted to the non living cornfield layers because of the inability of the fungi to penetrate the deeper tissue or organs of immunocompetent hosts [1].

Reaction to dermatophyte infection may range from mild to severe as a consequence of the host's reaction to the metabolic products of the fungus, the virulence of the infecting strain or species, the anatomic location of the infection and local environmental factors [2].

Dermatophytosis is more prevalent in India, due to favourable climatic conditions like temperature and humidity. In India, which is a tropical country, the cause of dermatophytoses is adversely influenced by economic factors like poverty, poor hygiene and social conditions like overcrowding. Nature of dermatophytosis may change with the passage of time, living population, evolution of preventive measures and hygienic conditions in society [3].

Etiology:

The etiological agents of dermatophytoses are classified in three anamorphic (asexual or imperfect) genera- Epidermophyton, Microsporum, and Trichophyton, of anamorphic class Hypomycetes of The Deuteromycota (Fungi Imperfecti) [2].

Dermatophytes are keratinophilic fungi and can be zoophilic (those that infect animals), geophilic (that grow in soil) or anthropophilic (those that infect humans). Zoophilic and geophilic species are usually associated with inflammatory lesions in humans, whereas anthropophilic species more commonly cause non inflammatory lesions.

Epidermophyton

The macroconidia are broadly clavate with typically smooth, thin to moderately thick walls and one to nine septa, 20-60 by 4-13 µm in size. Microconidia are absent[3]. E. floccosum (anthropophilic) has yellow or

olive green colonies with a fine, fizzy texture and was the first agent to be identified in tinea pedis. It is now associated with tinea corporis, tinea cruris and tinea unguium [4].

Microsporum

Macroconidia are characterized by the presence of rough walls and are spindle shaped. Microconidia are sessile or stalked and are arranged singly along the hyphae or in racemose pattern [2].

M. canis is a zoophilic species and has a white colony with yellow or orange pigment on reverse. M. gypseum – a geophilic species, which is actually a complex of 3 species, produces rapidly growing brown coloured colonies. M. audouinii– Anthropophilic species, which has a white to tan colony, with thin, sometimes silky, growth. Others species in this genus includes M. equinum (zoophilic), M. ferrugineum etc. [5]

Trichophyton

Macroconidia when present, have smooth, usually thin walls and 1-12 septa, and are born singly or in clusters. Microconidia when abundant are useful in species identification. They are born singly along sides of hyphae or in grape like clusters [2].

- T. rubrum – is primarily an anthropophilic organism and is a morphologically variable species and have several distinct colonial forms. It causes tinea pedis and tinea cruris. T. mentagrophytes -- has anthropophilic and zoophilic forms and is common pathogen for tinea pedis. It can also cause tinea corporis, tinea capitis, tinea cruris and tinea barbae [6].
- T. tonsurans – is anthropophilic and causes tinea capitis. It has a velvety or powdery colony.
- T. violaceum –is anthropophilic species with a slow growing waxy colony.
- T. verrucosum –is zoophilic species which is very slow growing. It has a velvety colony which is heaped up.
- Other species in this genus are – T. Simii (Zoophilic) and T. Schoenleinii (anthropophilic).

Some dermatophytes, especially zoophilic and geophilic species of Microsporum and Trichophyton are also capable of reproducing sexually (Telomorphs) and are classified in genus Arthroderma [5].

The gross appearance of colony on SDA medium serves as the first important step in the recognition and identification of a dermatophyte. Colonies that are blue, black or dark green should be regarded as non-dermatophytes. Following characteristics should be noted: Rate of growth of the colony Texture, colour and shape of the upper thallus Production of pigment on the underside [7].

Clinical forms

Traditionally, infections caused by dermatophytes (Ringworm) have been named according to the anatomical locations involved, by appending the Latin term designating the body site after the word tinea.

Several anatomical sites may be infected by a single dermatophyte species, and different species may produce clinically identical lesions [2]. The wide variation in clinical presentation depends upon the site of body infected. Upon the species and its strain, the size of inoculum and the immune status of the host.

The division of tinea infection according to body sites has considerable merit in terms of diagnosis and management [5]. The clinical aspect of dermatophytosis is very variable and results from a combination of keratin destruction and an inflammatory host response. Important factors leading to the different clinical forms are the infecting fungus (zoophilic fungi tend to cause a more inflammatory reaction than anthropophilic dermatophytes), the site of the body infected and the keratinisation at that site, as well as the immune status of the host. The division of dermatophytosis can be done on the basis of the site of the body infected [8].

Tinea corporis

It is the ringworm of the glabrous skin. Terminal hairs in the affected parts may be invaded. It usually involves trunk, shoulders or limbs excluding the ringworm of specialized sites such as scalp, face, palms, feet and groin. The infection may be caused by any dermatophyte and ranges from mild to severe, commonly appearing as annular, scaly patches with sharply marginated, raised erythematous and sometimes vesicular borders [2].

The characteristic lesion is a circular, usually sharply marginated pink to slightly erythematous patch with a raised edge. As the lesion progresses, central clearing occurs and the lesion takes an annular shape. The advancing border is more or less scaling, but in inflammatory forms, in general caused by zoophilic or geophilic dermatophytes, crusts, vesicles, papules or even pustules can develop. Not all cases of tinea corporis reveal the characteristic features described above. Central clearing may be lacking. Scaling of the active border may be almost absent, and redness may be minimal. Tinea corporis must be differentiated from other dermatoses with an annular aspect [8].

Tinea cruris (—Jock Itch, —dhobi's Itch)

Infection of the groin, perianal and perineal areas, and the upper thighs is usually seen in adult men. They are usually bilateral and often asymmetric, extending down the sides of inner thighs [2]. It is associated with humid and hot climate, overpopulation and poor hygienic conditions. An association with atopy and diabetes was also seen [9]. Tinea cruris is more common in men than in women probably because men perspire more, anatomical differences and more use of occlusive clothing [10].

Autoinoculation from tinea pedis or tinea unguium is common, but infections transmitted from fomites (towels, sheets) are also possible. The lesions can begin unilateral, but very soon both groins are affected. Patches with erythema with central clearing are centred on the inguinal creases and take a semicircular aspect. Extension occurs both distally on the medial part of the thighs and proximally to the lower abdomen and pubic area, the perineum and buttocks. The peripheral activity is characterized by fine scaling and the presence of some papules and pustules. The borders are sharply demarcated. During the progression of the patches, the central erythema fades and hyperpigmentation is quite typical [8].

Tinea unguium

Invasion of the nail plate by dermatophytes is referred to as tinea unguium [2]. Certain local and systemic factors are considered important for the development and spread of tinea unguium especially of toe- nails. Among the systemic factors- impaired circulation, diabetes and peripheral nerve disease are included while in local factors repeated minor trauma, sports activities, wearing of occlusive sports shoes, use of common bathing facilities among young sportsmen are important [11].

Although fungal infections of the nails can be caused by moulds and yeast also, dermatophytes appear to be the chief organism capable of a primary attack on the nail [12]. Tinea unguium is a common nail problem accounting for upto 50% of all onychopathies [13]. Infections of the nails by dermatophytes (tinea unguium), yeasts or moulds are clinically almost indistinguishable and, therefore, the general term of onychomycosis is often used. Infections by dermatophytes are by far the most common cause. Toe nails and fingernails both can be infected, but toenails are more often affected. All 10 nails can be infected, but it is not rare to see that some nails are spared [8].

Tinea capitis

The infection can be located on the scalp, eyebrows, or eyelashes. The causative agents are fungi of the genera Trichophyton and Microsporum. Some dermatophytes grow inside the hair shaft, characterized by an invasion of chains of large spores known as endothrix. The cuticle surface of the hair remains intact. Endothrix tinea capitis is caused by anthropophilic fungi. Infected hair break off sharply at the follicular orifice, leaving a black dot. In some dermatophytes, multiple arthroconidia also surround the hair shaft and the cuticle is destroyed known as ectothrix. Ectothrix tinea capitis is caused by zoophilic fungi, including T. mentagrophytes from rodents and rabbits and T. verrucosum from cattle, although anthropophilic forms exist. All species of Microsporum are also ectothrix growing [8].

Factors influencing spread of tinea capitis may include contact at school, intrafamilial contact, common combs, common razor used by the barbers and contact with pet animals [14]. Tinea capitis is more frequent in South India [15]. Tinea capitis is a disease which is rare in adults, which may be due to increase of fungistatic action of fatty acids with change in the composition of sebum occurring at puberty [16]. The high susceptibility of boys is explained by the fact that boys reach puberty later than girls [17].

Tinea pedis

The feet especially the soles and toe webs are most frequently involved in tinea pedis [2]. Tinea pedis is less common in India as compared to the western world. The incidence is high in monsoon season. The infection rate is increased with use of community baths, swimming pools, use of occlusive footwear [10].

The skin of the palms and soles has a thick horny layer and is rich in eccrine sweat glands, although hair follicles and sebaceous glands are absent. The causative fungi will also influence the clinical presentation of infection. Trichophyton rubrum is often associated with chronic, non-inflammatory erythematosquamous reactions. Infections due to T. mentagrophytes often lead to vesicular or bullous inflammatory lesions. There may be a genetic predisposition for the plantar type of tinea pedis, caused by T. rubrum. Tinea pedis is the commonest form of dermatophyte infections in developed countries. The interdigital type is the most common subtype. Interdigital tinea pedis, commonly referred to as – 'athlete's foot', is a dermatophyte infection involving the web spaces of the feet. Some or all web spaces are involved, with the space between the fourth and fifth toes most commonly affected [8].

Tinea manuum

The palmar and interdigital areas of hands are usually involved in tinea manuum [2]. Trichophyton rubrum is the commonest infecting dermatophyte, and in most cases, there is a pre-existing foot infection, with or without nail involvement (two feet- one-hand-syndrome). Usually the clinical presentation of tinea manuum consists of diffuse dry scaling lesions, with

accentuation of the flexural creases of the palms. As T. rubrum is the most common infecting agent, a chronic reaction can be expected, but less frequently, inflammatory (vesicular or pustular) lesions can be found when other dermatophytes are involved [8].

Tinea barbae

It is the infection of the beard and moustache areas of the face of adult men. In tinea barbae, the fungal agents may be contacted through occupational exposure to animals infected with zoophilic dermatophytes [18].

Tinea faciei

It is the infection of the glabrous skin of the face with a dermatophyte fungus excluding the moustache and beard areas of the adult male [5]. Tinea faciei escapes correct diagnosis in a large number of cases [19].

Aims & Objectives

To study the hospital based epidemiology and clinical types of cases of dermatophytosis presenting in outpatient department of Skin and Venereology.

MATERIAL & METHODS

The present study was conducted on suspected cases of dermatophytosis attending the Dermatology, Venereology & Leprology department of AIMSR, Bathinda from 1st April 2014 to 30th September 2015. Ethical approval from institutional ethical committee of Adesh University was taken before start of the study.
To study hospital based epidemiology of cases of dermatophytosis, details of the patient and sample collection were taken as:

- Name of the Patient
- OPD / CR.No.
- Father‘s/Husband‘s name
- Date
- Address
- Age & Sex
- Occupation
- Income
- Educational Status
- Residence Rural/Urban
- History of Present Illness
- Duration
- Initial site
- Progression and other site involved
- H/o any lesion on any other part of the body
- H/o trauma to nail & skin
- H/o aggravating factors
- H/o drug intake (steroids, immunosuppresives)
- H/o Dermatitis of hand & other parts of body
- H/o Diabetes Mellitus
- History of Past Illness
- Family History
- Occupational History
- Duration
- Type of work
- Personal History

EXAMINATION

- **General Physical Examination**
- **Dermatological Examination**
- Site of lesion
- Symmetry
- Description
- Type
- Size & Shape
- Margins
- Surface
- Scaling
- Oozing
- Erythema
- Mucosal involvement

NAIL EXAMINATION

- Description of nail fold
- Lateral & proximal
- Colour
- Specimen collected
- Wet preparation KOH examination
- Gram staining
- Culture on modified SDA
- LCB mount
- Further tests if required

OBSERVATIONS

The present study involved mycological analysis of 150 clinically suspected cases of dermatophytosis of skin, hair and nail attending the outpatient department of Dermatology and Venereology, AIMSR, Bathinda. Detailed history was taken. Samples of skin, hair and nail were taken depending upon the part affected.

In the present study of 150 cases of dermatophytosis, 8 cases were in the age group of 0-10 years, 18 were in the age group of 11-20 years, 49 were in the age group of 21-30 years, which was the most affected age group. 39 were in the age group of 31-40 years, 13 were in the age group of 41-50 years, 10 were in the age group of 51-60 years, 8 were in the age group of 61-70 years and only 5 were in the age group of 71-80 years which was the least affected age group. In the present study of 150 cases of dermatophytosis, 96 were males and 54 were females. The male: female ratio was 1.78:1. Clearly our study comprised predominantly of male patients.

Table 1: age & sex distribution in 150 clinically suspected cases of dermatophytosis

Age group(in years)	No. of Patients	Male	Female	Male/Female Ratio
0-10	8	5	3	1.78:1
11-20	18	11	7	
21-30	49	35	14	
31-40	39	23	16	
41-50	13	8	5	
51-60	10	7	3	
61-70	8	4	4	
71-80	5	3	2	
Total	150	96	54	

Table 2: Rural/Urban Distribution of 150 Clinically Suspected Cases of Dermatophytosis

Social set up	Male	Female	Total number of cases
Rural	**43**	**23**	**66**
Urban	**53**	**31**	**84**

In the present study of 150 cases of dermatophytosis, 84 patients were from urban background while 66 were from rural background. Clearly our study comprised more of urban patients. Out of 66 cases of rural population involved 43 cases were males and 23 cases were females. Out of 84 cases of urban population involved 53 cases were males and 31 cases were females. So we clearly see that males were predominantly affected in rural as well as urban population.

Table 3: occupation wise distribution of 150 clinically suspected cases of dermatophytosis

Occupation	No. of cases
Farmers	**52**
Labourers	**26**
Housewives	**21**
Students	**19**
Sportsmen	**14**
Business class	**9**
Army	**6**
Servicemen	**3**

In the present study, out of 150 cases of dermatophytosis, farmers formed the major group which constituted 52 cases and second largest group was of labourers constituting 26 cases followed by housewives 21 cases, students19 cases, sportsmen 14 cases , business class 9 cases, army personnel 6 cases and servicemen 3 cases.

Table 4: Distribution of 150 clinically suspected cases of dermatophytosis depending upon duration of infection

Duration	No. of cases
0-3 months	**68**
3-6 months	**42**
6-12 months	**28**
1-2 years	**7**
2-5 years	**3**
5-15 years	**2**

In the present study of 150 cases of dermatophytosis, the duration of disease ranged from 7 days to 12 years. The cases in whom duration of disease was from 0 month to 3 months was 68, the most common group, followed by 42 cases in 3 months to 6 months duration, 28 cases in 6 months to 12 months duration, 3 cases in 2 years to 5 years duration, 7 cases in 1 year to 2 years duration and 2 cases in 5 years to 15 years duration which was the least common group.

Table 5: distribution of 150 clinically suspected cases of dermatophytosis with family history

Family history	No. of cases
POSITIVE	**21**
NEGATIVE	**129**

In the present study of 150 cases of dermatophytosis, a positive family history of tinea infection was seen in 21 cases (14 %) only.

Table 6: Distribution of 150 Clinically Suspected Cases Of Dermatophytosis According To Predisposing Factors

Factors	No. of cases
Occlusive clothing	**19**
Wet occupation	**13**
Occlusive footwear	**9**
Topical corticosteroids	**8**
Oral corticosteroids	**3**
Total	**52**

In the present study of 150 cases of dermatophytosis, 52 (34.66%) cases exhibited certain environmental factors or personal habits, which predisposed them to a certain type of dermatophytosis. 19 (36.54%) cases wore occlusive clothing, 13 (25%) cases had wet occupation, 9 (17.31%) cases wore occlusive footwear. 8 (15.38%) cases were using topical corticosteroids while 3(5.77%) patient were using oral corticosteroids.

Table 7: distribution of 150 clinically suspected cases of dermatophytosis with associated diseases

Associated diseases	No. of cases
Atopy	**21**
Diabetes mellitus	**13**
Psoriasis	**2**
Pulmonary tuberculosis	**2**
SLE	**1**
Total	**39**

In the present study of 150 cases of dermatophytosis, 39 (26%) cases had associated diseases. 21 cases had atopy (which included atopic dermatitis, bronchial asthma and hay fever) followed by 13 cases of diabetes mellitus, 2 cases of psoriasis and pulmonary tuberculosis each and 1 case of SLE .

Table 8: distribution of 150 clinically suspected cases of dermatophytosis according to site of involvement

Type of Tinea	No. of Patients
Tinea cruris	**60**
Tinea corporis	**35**
Tinea pedis	**16**
Tinea unguium	**15**
Tinea capitis	**10**
Tinea manuum	**7**
Tinea faciei	**5**
Tinea barbae	**2**
Total	**150**

In the present study of 150 cases of dermatophytosis, tinea cruris was the most common type present in 60 cases followed by tinea corporis in 35 cases, tinea pedis in 16 cases. Tinea unguium was seen in 15 cases, tinea capitis in 10 cases, tinea manuum in 7 cases, tinea faciei in 5 cases and least cases were tinea barbae in 2 cases.

Table 9: distribution of 150 cases of dermatophytosis according to occupation and type of tinea infection

Occupation	T. crur.	T. corp.	T. pedi.	T. ung.	T. capi.	T. manu.	T. faci.	T. barb.	Total
Farmers	**26**	**18**	**2**	**1**	**1**	**1**	**2**	**1**	**52**
Labourers	**10**	**7**	**3**	**1**	**1**	**1**	**2**	**1**	**26**
Housewives	**6**	**4**	**1**	**7**	**-**	**3**	**-**	**-**	**21**
Students	**7**	**3**	**-**	**-**	**8**	**1**	**-**	**-**	**19**
Sportsmen	**7**	**2**	**3**	**1**	**-**	**-**	**1**	**-**	**14**
Business man	**2**	**1**	**5**	**1**	**-**	**-**	**-**	**-**	**9**
Army	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**6**
Service class	**-**	**-**	**-**	**2**	**-**	**1**	**-**	**-**	**3**
Total	**60**	**35**	**16**	**15**	**10**	**7**	**5**	**2**	**150**

In the present study of 150 cases of dermatophytosis, out of 60 cases of tinea cruris, farmers formed the most affected group with 26 cases (43.33%). Of 35 cases of tinea corporis, farmers constituted 18 cases (51.42%) & of 16 cases tinea pedis, businessman constituted 5 cases (31.25%). Students formed the most affected group with 8 cases (80%) out of total 10 cases of tinea capitis & housewives (46.6%) in tinea unguium. In tinea mannum, it was housewives, with 3 cases (42.85%). In tinea faciei, it was both farmers and labourers at 40% each and in tinea barbae it was both labourers and farmers at 50% each.

DISCUSSION

The present study involved mycological analysis of 150 cases of dermatophytosis of skin, hair and nail attending the outpatient department of Skin and Venereology, AIMSR, Bathinda. Detailed history was taken. Samples of skin, hair and nail were taken depending upon the part affected. Out of the material collected, part of it was used for direct KOH examination and remaining part was used to inoculate SDA medium for culture. Results of KOH preparation and culture along with relevant history were noted in Proforma. The observations and data obtained from the study were compiled and analyzed. Dermatophytosis is widely prevalent infection in our part of the world due to favorable environmental and climatic conditions. Dermatophytosis is classified according to the anatomical sites infected by the dermatophytes. Classically, eight types of tinea infections of skin, hair and nail are considered.

Clinical observations

Age Distribution

In the present study of the 150 cases of dermatophytosis, the age of patients ranged from 5 years to 76 years. 49(32.66%) cases were in 21-30 years age group which was the most affected age group followed by 39(26%) cases in the 31-40 years age group. So collectively they formed 88(58.66%) cases which were more than half of the cases. The least represented age group was 71-80 years with only 5 cases. 11-20 years age group had 18 cases; 41-50 years age group had 13 cases followed by 10 cases of 51-60 years age group and 8 cases of 61-70 years age group and 0-10 year's age group each.

The results of our study are in accordance with a study by Poria *et al.* [20] who observed that tinea was maximum (70%) in 21-50 years age group.

Verenker *et al.* [21] found that the incidence of dermatophytosis was low at the two extremes of age and the age group 21-30 years accounted for 34% of cases while 51-70 years age group accounted for 12% of cases and 0-10 years age group accounted for 5%.

Mishra *et al.* [22] also reported that most of their cases were between 15-35 years age group and attributed this to the active nature of young adults and participation in outdoor activities.

Jain *et al.* [23] reported that tinea infections were more common in the 31-40 (23.33%) followed by 1-10 (22.5%), 21-30 (19.17%) and 11-20 (17.5%) age groups.

Sharma and Borthakur [24] found that maximum number of cases were found in the age group of 21-30 years (39%) followed by 11-20 years (19%).

Patel *et al.* [25] in their study of 190 cases of superficial mycosis observed that commonest age group affected was 21-30 years in 58 cases (29.30%) followed by 11-20 years,31-40 years, >50 years and 41-50 years in 40 (20.20%), 24(12.12%), 19(9.59%) and 16(8.08%) respectively.

Nawal *et al.* [26] in their study of 215 cases of superficial mycosis found that commonest age group was adults of 19-59 years in 142/215 (66.5%) cases followed by 12-18 years in 38/215(17.7%) cases.

Singla B *et al.* [27] in their study of 100 cases of dermatophytosis observed that commonest age group was 21-30 years in 34% cases followed by 31-40 years in 27% cases. From the above study it is concluded that high incidence of fungal infection is in adults as compared to children and old age.

Sex wise Distribution

In the present study of the 150 cases of dermatophytosis, 96(64%) were male patients and 54(36%) were female patients. The male: female ratio was 1.78:1. Male preponderance has been observed in several studies too. Jain *et al.*[23] reported that tinea infections were dominant in males (67.5%) than females (32.5%).

Mahmoudabadi [28] also recorded 66.1% of males versus 33.9% of females. Patel *et al.* [25] in their study of 198 cases of superficial mycosis found that 127(64.14%) patients were male and 71(35.86%) patients were female.

Bhavsar *et al.* [29] found in their study on 377 patients of superficial mycosis that 257(68.16%) were male and 120 (31.83%) were female.

Nawal *et al.* [26] found in their study of 215 cases of superficial mycosis that 138/215(64.2%) were male and 77/215 (35.8%) were female.

Singla B *et al.* [27] found in their study of 100 cases of dermatophytosis that 62% were male and 38% were female. Male: Female ratio being 1.63:1.

Male population was predominant which can be explained by higher mobile life of males which can be the reason of contacting the disease more frequently.

They are more exposed to trauma, to moist conditions in fields and factories which predisposes to infection. They work under the sun which leads to sweating that predisposes to infection.

Urban/Rural Variations

In the present study, 84 cases were from urban background while 66 cases were from a rural background. This study comprised more of urban patients which can be explained that urban patients seek medical attentions sooner due to more awareness and easy accessibility of medical care.

While in rural areas, early lesions are neglected and only chronicity compels people to seek medical advice[30]. Singla B *et al.* [27] found in their study of 100 cases of dermatophytosis that (53%) cases were from urban background and (47%) were from rural background.

Occupation

In the present study, farmers formed the major group with 52 cases(34.66%) followed by labourers with 26 cases(17.33%), housewives with 21 cases(14%) and students with 19 cases(12.66%). Other occupational groups constituted sportsmen 14 cases (9.33%), business class 9(6%) cases, army personnel 6 cases (4%) and service men 3 cases (2%).

Occupational conditions like wet humid environment, contact with soil and animal, occlusive clothing or footwear etc. can determine the morphological variants of tinea. In the present study the most involved occupational group in tinea cruris was that of farmers (43.33%), in tinea corporis, it was farmers (51.42%) and it was the businessmen (31.25%) in tinea pedis.

In the tinea capitis students (80%) were most affected, in tinea unguium, it was housewives (46.66%) while in tinea mannum housewives constituted (42.85%) of the cases. In tinea faciei, farmers and labourers constituted 40% cases each and in tinea barbe, farmers and labourers formed 50 % cases each.

Occupation has an important influence on dermatophytosis. This can be explained by that housewives who have to immerse their hands in water for long hours for washing clothes or utensils are more predisposed to tinea unguium. This has been observed by Roberts *et al.* [31] and Tao-Xiang *et al.* [32]. Labourers and daily earners formed a major group affected by tinea infections in studies by Lal *et al.* [33] and Ranganathan *et al.* [34].

According to Prasad *et al.* [30] excessive sun exposure precipitating sweating favoured the growth of dermatophytosis. Greater contact with soil and animals predisposes farmers and labourers to higher risk of tinea infections[35]. Occlusive footwear for long hours predisposes business class people to tinea pedis[36]. Army personnel also are at higher risk for the similar reason [37].

Sarma and Borthakur [24] found in 100 cases of fungal infections that most cases were engaged in agriculture (39%) followed by students and unskilled labourers (15%).

Duration of Disease

In the present study, the duration of disease varied greatly and ranged from 7 days to 12 years. While most cases 68 (45.33%) were seen in 0-3 months followed by 42 cases (28%) in 3-6 months, 28 cases(18.66%) in 6-12 months,7 cases (4.66%) in 1-2 years, 3 cases(2%) in 2-5 years and 2 cases(1.33 %) in 5-15 years duration which was the least common group.

So we see that 73.33 % cases had duration of disease which was till 6 months and 26.67 % cases had duration of disease more than 6 months. So this study showed that fungal infections of skin, hair and nail have a chronic character where duration may extend up to 12 years.

Lal *et al.* [33] also observed a wide variation in duration of ranging from 7 days to 8 years with most patients presenting within 3 months of onset of symptoms. Chronicity of dermatophytosis in some people is related to waning of delayed type of hypersensitivity[38].

Recurrences are most commonly seen in low socio-economic strata and in them recurrences could be due to inadequate and incomplete treatment [34].

Sentamilselvi *et al.* [39] have observed that duration of dermatophytosis ranged from 1 year to 30 years and they observed that chronicity was related to low socio-economic status as well as systemic conditions like atopy, diabetes mellitus, body surface area involved and increased sweating.

Prasad *et al.* [30] in their study found associations of chronicity with onychomycosis, diabetes mellitus, body surface area involved and increased sweating and inadequate treatment.

Family History

In the present study, out of 150 cases, 21 cases (14%) reported a positive family history. An infected family member is an important source of infection in dermatophytosis.

The two independent studies reported positive family history in 29% cases. While Kalla *et al.* [40] attributed it to shared towels and combs, Kumar *et al.* [41] blamed overcrowding, bathing habits and household pets. Bindu [42] observed a positive family history in 16.6% of cases.

Predisposing factors

In the present study, patients were also observed for certain predisposing factors which play an important role in different types of tinea infections. While 19 cases of tinea cruris wore occlusive clothing, 9 cases of tinea pedis wore occlusive footwear. Wet occupation was observed in 13 cases of tinea unguium. Immunosuppression by corticosteroids very often lead to changed picture of tinea infection as seen in patients who used topical corticosteroids 8 cases and oral corticosteroids 3 cases.

Lal *et al.* [33] have noted wearing of occlusive undergarments by many of his male patients of tinea cruris. Similarly Bindu [42] reported use of occlusive clothing in 64% of the male patients.

Sharma *et al.* [36] reported that tinea pedis was common in Shimla as people wore occlusive footwear almost throughout the year.

Yoshimura *et al.* [43] also reported that increased humidity due to wearing of occlusive footwear led to easy penetration by fungal elements into skin. This explains the higher incidence of tinea pedis in urban business class people in the present study.

Bindu [42] has also reported the occurrence of extensive disease with mixed clinical types in patients on immunosuppressant. While Lin *et al.* [44] remarked that tinea treated with topical steroids may lose some of its characteristics features.

Romano *et al.* [19] also emphasized the modification of clinical form by steroids. In our study; topical corticosteroids were mainly used by rural people, who while unable to get easy medical assistance, got these from local quacks. Oral corticosteroids were also regularly prescribed by unregistered medical practitioner for ailments like bronchial asthma, arthritis and skin diseases.

Associated Diseases

Co-existing ailments may be a coincidence or may play an aggravating role in tinea infections. In present study, most common association was found with atopy 14% (21 cases) followed by diabetes mellitus 8.66% (13 cases), psoriasis 1.33% (2 cases), pulmonary tuberculosis 1.33% (2 cases).

Various studies have shown a similar association. Raja and Menon [9] found atopy in 35.9% patients, diabetes in 14.4% cases. Sentamilselvi *et al.* [39] reported atopy in 7.3% and diabetes in 7% cases. Malignancies and pulmonary tuberculosis were also found. Romano *et al.* [19] observed that in diabetics, tinea infection of foot and nail was common.

Prasad *et al.;* (2005) [30] found atopy in 13.3% patients, diabetes in 17.3% cases. Sarma and Borthakur [24] found associated predisposing conditions included diabetes (11%), eczema (8%), tuberculosis (4%), systemic lupus erythematosus (3%), psoriasis (3%) and leprosy (2%).

Site of involvement

In the present study out of 150 cases of dermatophytosis, maximum cases were of tinea cruris 60 cases (40%), followed by tinea corporis 35 cases (23.33%), tinea pedis 16 cases (10.66%), tinea unguium 15 cases (10%), tinea capitis 10 cases (6.66%), tinea manuum 7 cases (4.66%), tinea faciei 5 cases (3.33%) and tinea barbae 2 cases (1.33%).

In the present study in 14 cases (9.33%), patients had associated nail infection with skin infection. This may be due to the fact that first nail gets involved and later on skin gets involved. As the infection of nail is more chronic and requires at least six

months of treatment before it becomes negative for fungus. If the initial infection of nail is not treated properly then also it spreads to the skin.

This is comparable with the study of Blank and Mann [45] who studied tinea pedis with tinea unguium. Similarly, Summerbell *et al.* [46] studied cases of tinea manuum, tinea pedis, onychomycosis in association with each other.

Also the present study was comparable with the study of Kuijpers and Tan [47] who also studied skin and nail infections.

Clinical types

Tinea Cruris:

In the present study, tinea cruris was observed to be the most common type of dermatophytosis. Out of the 150 cases, tinea cruris accounted for 60 cases (40%), 42 cases (70%) of these were male patients and 18 cases (30%) of these were female patients. Majority of the cases were young adults. 23(38.33%) cases were from the 21-30 years age group, 15 cases (25 %) were from the 31-40 years age group.

These results are corroborated by most studies. Poria *et al.*[20] reported tinea cruris to be the commonest tinea infection at 40%. They also found a male preponderance at a young age.

Damle *et al.* [48] reported tinea cruris in 34.4% cases and majority of their patients were males and from the third decade. Similar results were obtained by Lal *et al.* [33] and Khare *et al.* [49] who reported an incidence of 52% and 26.5% respectively.

Male preponderance was also reported by Verenkar *et al.* [21], Bindu [42] and Mahmoudabadi [28]. Al- Sheikh [50] in his study on 250 samples found that tinea cruris dominated in the age group of 16-30 years. Singla B *et al.*[27] in their study of 100 cases of dermatophytosis observed that T.cruris was the most common clinical type with 40 out of the 100 cases.

Tinea Corporis

In present study, tinea corporis was the second most common clinical type observed in 35 cases (23.33%). A male dominance was observed with (65.71%) 23 cases. Here the most represented age group was seen to be 11-20 years with 9 cases(25.7%) followed by 31-40 years age group with 8cases(22.85%).
All other age groups were also affected but to a lesser degree.

Damle *et al.* [48] have reported tinea corporis to be the second most common clinical type after tinea cruris with 23.8% of the cases. Similarly, Poria *et al.* [20] observed tinea corporis to be the second most common type with 36% cases. Patwardhan and Dave [3] observed an incidence of 24.5% and stated that, while it is common in young adults, it was seen to occur in all age groups.

Jain *et al.* [23] reported that tinea corporis was the most predominant clinical type and higher incidence was observed in 21-30 and 31-40 age groups. Sarma and Borthakur [24] found tinea corporis most common (42%) followed by tinea cruris (11%). Al-Sheikh [50] in his study on 250 samples found that the percentage of infection of T. corporis was higher in age group of 0-15 years.

Tinea Pedis

In present study, tinea pedis was the third most common clinical type with (10.66%) 16 cases. Out of these, 10 (62.5%) were male patients and 6 (37.5%) were female patients. It was most commonly seen in 21-30 years age group 8 cases(50%) followed by 31-40 years with 5 cases(31.25%).

This male preponderance was also observed by other authors; 76.5% by Damle *et al.* [48], 83% by Khare *et al.*[49] and 70% by Verenkar *et al.* [21].

An overall incidence of 12.5 % was reported by Verenkar *et al.* [21], 7.14% by Tandon *et al.* [51] and 11.53 % by Singh and Beena [52].

Singh and Srivastava [53] observed that tinea pedis was more common in young adults due to wearing of shoes, hyperhidrosis and active life style.

Djeridane *et al.* [54] observed that tinea pedis was common in 20-29 years age group which is in concordance with present study. Abanami *et al.* [55] found in their study on 119 patients of superficial fungal infections that tinea pedis was most common (11.8%) in adults. Saunte *et al.* [56] found tinea pedis in 5% cases.

Jahromi and Khaksari [17] in their study found that it was higher in men than in women, higher in 16-60 year age groups than in the 0-15 year and 61 year and above age groups.

T. rubrum was the most frequent etiological agent. Highest number of cases occurred in summer months. These findings are well comparable with our study.

Al-Sheikh [50] in his study on 250 samples found that the percentage of infection of tinea pedis dominated in the age group of 16-30 years.

Tinea capitis

In the present study, 10 cases (6.66%) of tinea capitis were observed. 8 cases (80%) were below 10 years of age and2 cases (20%) of cases were from 11-20 years age group. 60 % of cases were males while 40% were females. This male preponderance was also observed by Rajagopal *et al.* [14] with 81.4% cases and 58% by Kumar and Lakshmi [15].

The percentage of tinea capitis in the studies of dermatophytosis was reported to be 10% by Verenkar *et al.*[21], 8% by Bindu [42] and 6.9% by Singh and Beena [52]. Jain *et al.* [23] in their study on 24 cases of tinea capitis found that it was second most common clinical type reported only in the 1-10 and 11-20 age groups.

Jahromi and Khaksar [17] in their study found that while 65% of their subject were 3-11 years of age, 10% of these cases were >18 years of age and the age ranged from 8 months to 75 years. Abanami *et al.* [55] found in their study on 119 patients of superficial fungal infections that tinea capitis was most prevalent (15.1%) in children.

Saunte *et al.*[56] found that the most common clinical presentation was tinea capitis (46%) followed by skin infections (20%). Chepchirchir *et al.* [57] in their study which included 6-11 years age group found that tinea capitis was the most common type of dermatophytosis.

Jahromi and Khaksari[17] in their study found that tinea capitis is mainly a disease of infant, children and young adolescents. Al-Sheikh [50] in his study on 250 samples found that the percentage of infection of T. capitis was higher in age group of 0-15 years which is well comparable with our study.

Tinea Unguium

In our study, 15 cases (10%) of tinea unguium were found. Out of these, 6 cases (40%) were males and 9 cases (60%) were females.8 cases (53.33%) were from 21-30 years age group and 4 cases (26.66%) cases were from 31-40 years age group.

While Khare *et al.;* (1985) [49] observed tinea unguium in 4.75% of their subjects, Verenkar *et al* [21] observed an incidence of 6.25% and 11% was reported by Sen and Rasul[58].

Female preponderance was reported by Patwardhan and Dave [3] with 71.4% cases. Saunte *et al.* [56] found tinea unguium in 18% cases. Al-Sheikh [50] in his study on 250 samples found that onychomycosis dominated in age group of 31-45 years followed by 45-60 years.

Tinea Manuum

In the present study, tinea manuum was observed in 7 patients (4.66%) with 4 cases (57.14%) being males. Majority of cases were observed in working age groups 4 cases (57.14%) in 31-40 years age group.

In their study, Poria *et al.* [20] found tinea manuum in 3 % of cases while Damle *et al.* [48] reported it in 4.6% of cases. These results are in accordance with the present study. Arenas [49] reported that tinea manuum affects mostly men (70%). Mahmoudabadi [28] also reported a male preponderance.

Tinea Faciei

Tinea Faciei was seen in 5 cases (3.33%), with 3 cases (60%) of them being male patients and 2 cases (40%) were female patients. 60% of the cases were seen in the 21-30 years age groups. In other studies, Khare *et al.*[49] observed tinea faciei in 1.25% of their subjects while Tandon *et al.*[51] reported in incidence of 0.7%.

Bindu [42] reported tinea faciei in 6% of cases. It accounted for 3% of all dermatophytosis [44]. So these studies had a similar incidence of tinea faciei as the present study.

Tinea Barbae

In the present study, tinea barbae was seen in 2 cases (1.33%). Majority of men were of younger age groups while the extremes of age were not represented. the cases were between 21-40 years. Various studies also have similar incidences. Poria *et al.*[20] reported tinea barbae in 2% of their patients and commonly involved 21-50 years age group.

Tandon *et al.* [51] reported an incidence of 1.43%, Patwardhan and Dave [5] reported an incidence of 2.85% and commonest age group was 21-30 years. Other studies reported similar incidences are those by Bindu [42] at 2% and Mahmoudabadi [28] at 1.7%.

SUMMARY

The present study involved mycological analysis of 150 cases of dermatophytosis of skin, hair and nail attending the outpatient department of Skin and Venereology, AIMSR, Bathinda during the period of 1st April 2014 to 30th September 2015. Detailed history was taken. Samples of skin, hair and nail were taken depending upon the part affected. Out of the material collected, part of it was used for direct KOH examination and remaining part was used to inoculate SDA medium with antibiotics for culture. Results of KOH preparation and culture, along with relevant history, were noted in Proforma. The observations and data obtained from the study were compiled and analyzed. Salient features of the study were:-

1. The age of patients ranged from 5 years to 76 years. Most patients were seen in 21-30 years age groups i.e. 49 cases (32.66%), followed by those in 31-40 years age group i.e 39 cases (26%), 18 cases (12%) in 11-20 years, 13 cases (8.66%) in 41-50 years, 10 cases (6.66%) in 51-60 years, 8 cases (5.33%) in 61-70 years and 0-10 years each, and only 5 cases (3.33%) in 71-80 years which was the least affected age group. So the majority of the patients fell in the young working age group. The extremes of age were least represented.
2. There was a male preponderance in the study 96 cases (64%). The male: female ratio was 1.78:1.
3. In the present study, 84 (56%) patients came from urban background compared to 66 (44%) patients from rural areas.
4. Occupational study revealed that farmers formed the largest group at 52(34.66%) cases followed by labourers 26(17.33%) cases and housewives 21(14%) cases. So the people with wet occupation and those doing hard work in hot sweaty conditions formed the majority of cases.
5. The duration of disease ranged from 7 days to 12 years. Maximum number of cases was seen in 0-3 month's duration 68 cases (45.33%).
6. A positive family history was seen in 14% of cases.
7. In predisposing factors, 19 cases wore occlusive clothing, 9 cases wore occlusive footwear and 13 cases had wet occupations. 11 cases were using oral/topical corticosteroids. 39 cases (26%) had associated diseases. Most common association was with atopy 21 cases and diabetes mellitus 13 cases.
8. According to site of involvement, out of 150 clinically suspected cases of dermatophytosis, tinea cruris was the most common clinical type with 60 cases followed by tinea corporis with 35 cases, tinea pedis with 16 cases, tinea unguium in 15 cases, tinea capitis in 10 cases, tinea manuum in 7 cases, tinea faciei in 5 cases and tinea barbae in 2 cases.

CONCLUSION

In conclusion, the present study of 150 cases at AIMSR, Bathinda shows that: Tinea cruris was the most common clinical presentation followed by tinea corporis. Young adults in the age group 21-30 years were mainly affected. The male: female ratio was 1.78: 1. Farmers are most commonly affected.

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