

Prevalence of Dermatophytic Infection and Spectrum of Dermatophytes in the Patients Attending the OPD of Skin, A.K.T.C. Hospital A.M.U. Aligarh

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ABSTRACT

Dermatophytes are a group of parasitic fungi that live at the expense of the keratin in the skin, nails and hairs. They are generally confined to the stratum corneum of the epidermis and skin appendages, especially in the moist areas of the body, such as the regions between the toes, groin and below the breasts, The causative dermatophytes which are the groups of taxonomically related fungi have been classified into three genera, viz. *Trichophyton*, *Epidermophyton* and *Microsporum*. It has a high prevalence rate and has been estimated to infect 20-25% of the population. The prevalence has increased during the recent past and resistant against the Antifungal drugs is being reported from different corners. The present study was conducted to assess the prevalence of the Dermatophytic Infection was conducted on 100 patients attending the Skin OPD of the A, K, T, C, and Hospital A.M.U Aligarh, during the period from Jul 2017 to June 2019. The patients were registered on the basis of observation and clinical signs and symptoms and KOH Examination. The prevalence of Dermatophytic Infection was found to be 22.12%. The majority of patients were found in the age group of 20-30 years, followed by the age group

of 30-40 years. The Prevalence rate of Infection in males was found to be more than females. Maximum number of patients (44.0%) belonged to upper lower socio-economic class. In this study the lower economic patient percentage were higher than the middle and high economic patient because diseases are more common in overcrowded populations.

Keyword: Dermatophytic Infection; KOH Examination; prevalence rate.

INTRODUCTION

Dermatophytes are a group of parasitic fungi that live at the expense of the keratin in the skin, nails and hairs.^[1] They are generally confined to the stratum corneum of the epidermis and skin appendages, especially in the moist areas of the body, such as the regions between the toes, groin and below the breasts,^[2] It has a high prevalence rate and has been estimated to infect 20-25% of the population.^[3, 4] Over all the fungal infections are the fourth leading disease of all skin problems. Dermatophytosis is commonly designated as 'Tinea' or Ringworm. The causative dermatophytes which are the groups of taxonomically related fungi have been classified into three genera, viz. *Trichophyton*, *Epidermophyton* and *Microsporum*. They cause dermatophytic infection and are capable of infecting keratinized tissue such as the stratum corneum of epidermis, nails and hairs. By their metabolic activity they produce inflammatory responses in the form of erythema, scaling, postulation and micro-abscess formation giving rise to itching and discomfort. Central clearing is sometime seen particularly in Tinea corporis. This results in formation of a classic "ringworm" lesion. However, the clinical signs may vary, depending on the part affected. Dermatophytes commonly grow only on the keratinized tissues; but the fungus usually stops spreading when it comes in contact with the living cells or area of an inflammation. Dermatophytes are one of the most common superficial fungal infections around the globe.

Dermatophytes are commonly seen in countries of the tropical region such as India due to high levels of humidity. They also have the propensity to affect specific population groups living in overcrowded environments, with poor personal hygiene. ^[5] They are also called as ringworm infections due to characteristic ring-like appearance. But more scientific nomenclature is 'Tinea infections', which can be further labelled based on the region of the body affected like Tinea capitis for dermatophytosis of head, Tinea pedis for dermatophytosis of foot etc.^[6] Dermatophytes have been recorded all over the world but with variation in distribution, incidence, epidemiology, and target hosts from one location to another.

Geographic location, climate (temperature, humidity, wind, etc.), overcrowding, health care, immigration, environmental hygiene culture, and socioeconomic conditions have been incriminated as major factors for the sevariations. ^[7, 8] According to Havlickova et. al. and Ilkit, the prevalence of dermatophytosis has significantly reduced in many developed nations of the world compared to the developing ones due to improved social, economic, health care, and hygiene practice factors, evident in the former.^[7, 9] The clinical feature of the dermatophytic infection result from a combination of keratin distribution and an inflammatory host response. The wide variation in the clinical presentation depends upon the species and strain of the fungus, site of the infection and immune status. The variation in the pattern of prevalence and the presentation, have been even observed in different small regions. It requires that regional and local data of its prevalence be collected in order to identify the percentage of population affected with this disease along with the type of causative organism and the pattern and presentation of the disease. In view of the above the present demographic study was undertaken at skin OPD of AKTC hospital A.M.U Aligarh, to find the prevalence and related findings so that the suitable remedial measures could be decided about its management.

2. Materials and Methods

Sample Collection

Observational study was carried out on 100 patients of dermatophytic infection attending the OPD of skin, Ajmal Khan Tibbiya College and Hospital A.M.U., Aligarh. Data was collected from Monday and Saturday OPD per week during the period from Jul 2017 to June 2019. Patients were diagnosed by the inspection, signs and symptoms and KOH examination. Different other variables included the age, sex, religion, region, past history of dermatophytic infection, contact history of the Dermatophytic infection and economic status of the patients, site of the dermatophytic infection etc. The patients were selected on the basis of history, physical examination, and investigations. All the findings were recorded on the case record proforma, designed for the study. 100 patients were enrolled for the study and further analysis was performed on these patients.

3. OBSERVATION AND RESULT

The prevalence rate of the dermatophytic infection was found to be 21.94% among the total patients visited the skin OPD (Fig 1)

Table-1: Distribution of the Patients According to Age

S. No.	Age Groups	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	11-20	8	16.0	13	26.0	21	21.0
2	20-30	17	34.0	15	30.0	32	32.0
3	30-40	14	28.0	10	20.0	24	24.0
4	40-50	7	14.0	7	14.0	14	14.0
5	50-60	4	8.0	5	10.0	9	9.0
Means ± SD		30.70±8.94		28.38±10.98		29.54±9.77	

As depicted in Table 1, mean age in the group A was found to be 30.70±8.94 years, while in the group B it was 28.38±10.98 years. The mean age of all the patients was found to be 29.54±9.77 years. Patients were divided into 5 age groups (1=11-20, 2=20-30, 3=30-40, 4=40-50, 5=50-60 years). It was found that the maximum no of patients, that is 32 (32.0%), fell into the age group of 20-30 Years, followed by 24 (24.0%) in group 3, 21 (21.0%) in group 1, 14 (14.0%) in group 4 and the least, that is 9 (9.0%), in age group of 50-60 years (Table.1 and Graph.1). Out of 50 patients in group A, 8 (16.0%) were found in group 1, 17 (34.0%) in group 2, 14 (28.0%) in group 3, 7 (14.0%) in group 4, and 4 (8.0%) in group 5 (Table 1 and Graph 1). Similarly in group B 13 (26.0%) patients were found in group 1, 15 (30.0%) in group 2, 10 (20.0%) in group 3, 7 (14.0%) in group 4, 5 (10.0%) in group 5 (Table 1 and Graph 1).

Graph-1

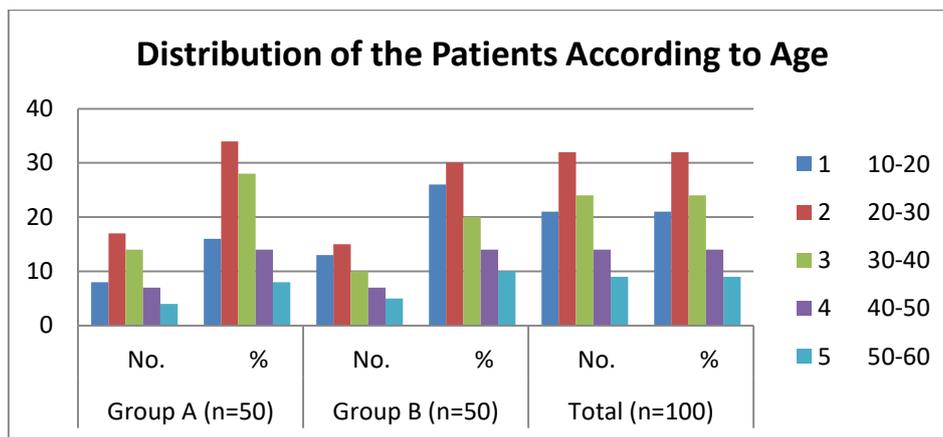


Table-2: Distribution of the Patients According to Sex

S. No.	Sex	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Male	30	60.0	23	46.0	53	53.0
2	Female	20	40.0	27	54.0	47	47.0
Male : Female		1.5:1		1:1.1		1.1 :1	

As shown in Table 2 and Graph 2, among all the 100 patients. 53 were male and 47 were females. The overall male to female ratio was 1.1:1. In group A, 30 (60.0%) patients were found to be males, while 20 (40.0%) were females patients (ratio = 1.5:1). In group B, 23 (46.0%) and 27 (54.0%) of the patients were males and females (ratio= 1: 1.1), respectively.

Graph-2

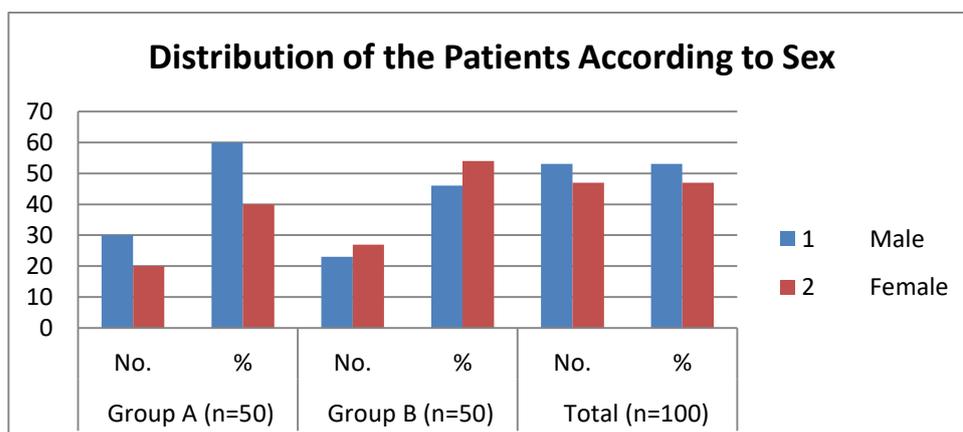
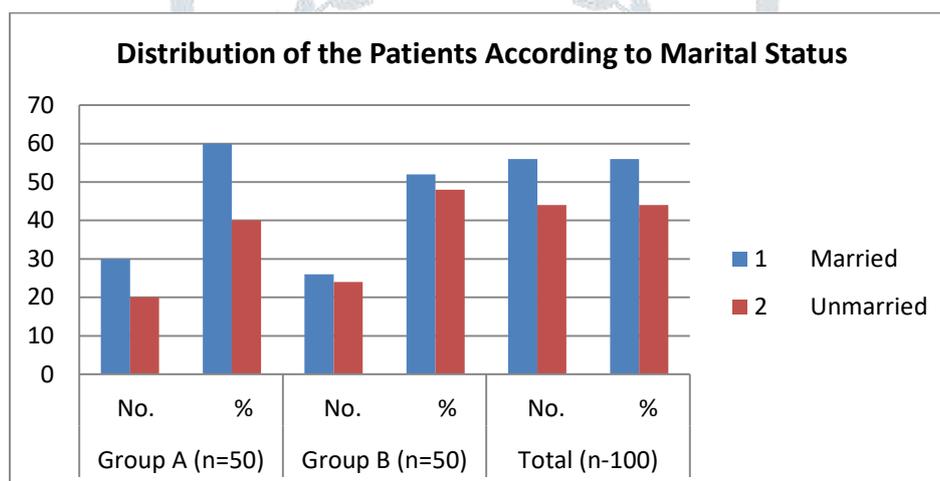


Table-3: Distribution of the Patients According to Marital Status

S.No.	Marital Status	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Married	30	60.0	26	52.0	56	56.0
2	Unmarried	20	40.0	24	48.0	44	44.0

It was observed that 30 (60.0%) patients in group A were married and 20 (40.0%) patients were unmarried, while in group B, 26 (52.0%) were married and 24 (48.0%) were unmarried. However, out of all the patients of *Qooba*, 56 (56.0%) were married and 44 (44.0%) were unmarried (Table 3 and Graph 3).

Graph-3**Table-4: Distribution of the Patients According to Residence**

S. No.	Residence	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Urban	27	54.0	32	64.0	59	59.0
2	Rural	23	46.0	18	36.0	41	41.0
Urban: Rural		1.2 : 1		1.8 : 1		1.4 : 1	

Among the patients of group A, 27 (54.0%) were urban dwellers and 23 (46.0%) were rural (urban: rural = 1.2: 1). Similarly, among the patients of group B, 32 (64.0%) were urban and 18 (36.0%) were rural (urban: rural = 1.8: 1). Of all the patients, 59.0% were urban and 41.0% were rural (Table 4 and Graph 4).

Graph-4

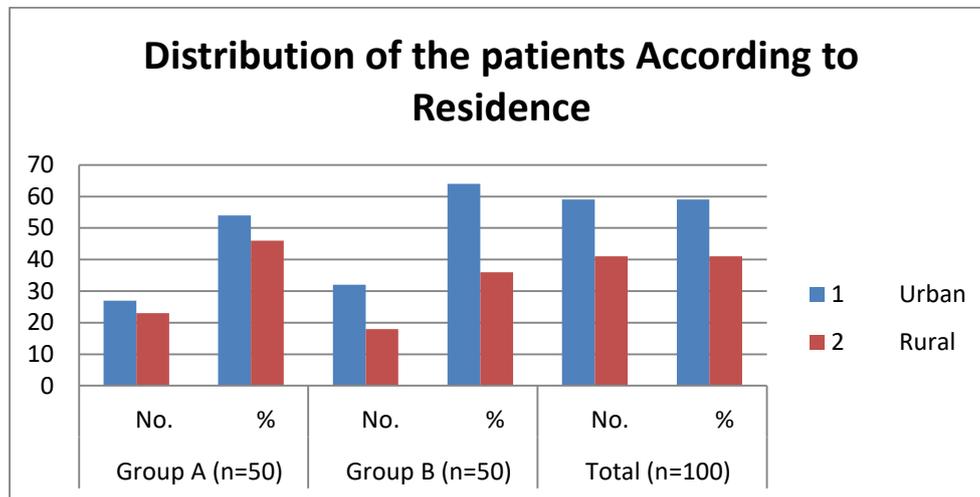


Table-5: Distribution of the Patients According to Past History of Dermatophytic infection

S. No.	Past History	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Present	29	58.0	22	44.0	51	51.0
2	Absent	21	42.0	28	56.0	49	49.0

25.0% of all the patients had a previous history of Dermatophytic infection (Table 5). A majority of them which amounted to 49.0% had no such history. Past history of Dermatophytic infection was found positive in 29 (58.0%) patients of group A, while it was negative in 21 (42.0%) patients. In group B, it was positive in 22 (44.0%) patients and negative in 28 (56.0%) patients (Table 5 Graph 5).

Graph-5

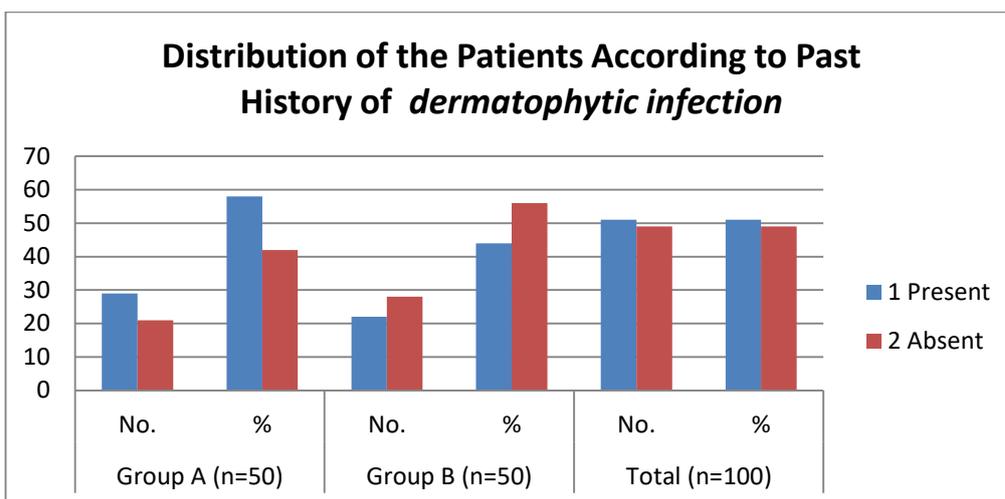


Table-6: Duration of the Patients According to Contact with Patient of Dermatophytic infection

S. No.	Contact History	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Present	14	28.0	14	28.0	28	28.0
2	Absent	36	72.0	36	72.0	72	72.0

A total of 28 (28.0%) patients had a positive history of contact with infected individuals at the time of presentation or in the recent past. Out of these, 24.0% had a positive family history, while 4.0% had a history of contact with non family members. 14 (28.0%) patients were form group A and 14 (28.0%) were form group B (Table 6 and Graph 6).

Graph-6

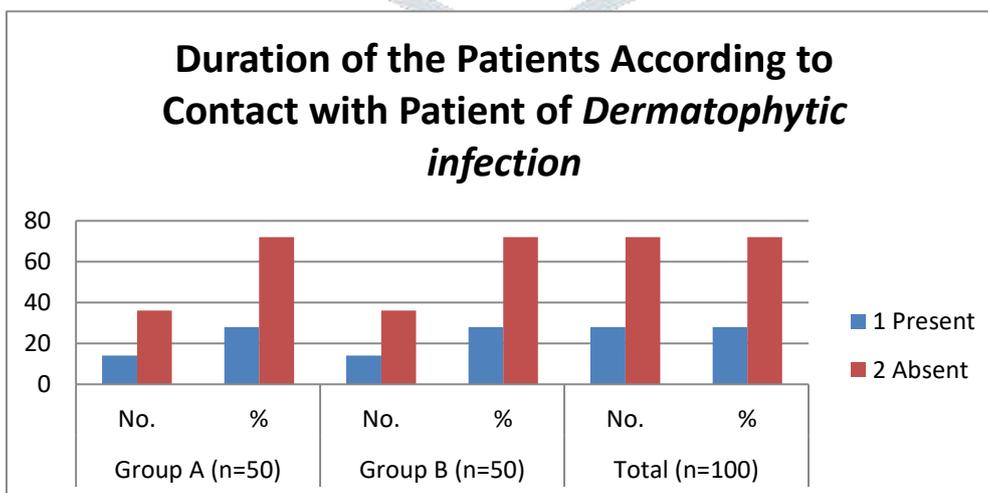


Table-7: Distribution of Patients According to Socio-economic Status

S. No.	Socioeconomic Status	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Upper (I)	2	4.0	3	6.0	5	5.0
2	Upper Middle (II)	6	12.0	7	14.0	13	13.0
3	Lower Middle (III)	10	20.0	11	22.0	21	21.0
4	Upper Lower (IV)	23	46.0	21	42.0	44	44.0
5	Lower (V)	9	18.0	8	16.0	17	17.0

According to the socio-economic scale (Kuppuswami., 2007). Patients were divided into 5 groups (Table 7 and Graph 7). It was observed that the maximum number of patients (44.0%) belonged to upper lower class, followed by 22 (22.0%) lower middle and 16 (16.0%) in the upper Lower classes. The share of Upper Middle and Upper classes was 13 and 5 percent, respectively. Only 2 (4.0%) patients in group A and 3 (6.0%) in group B belonged to the upper class. 6 (12.0%) patients in group A and 7 (14.0%) in group B belonged to the upper middle class. 10 (20.0%) patients in group A and 11 (22.0%) in group B were from lower middle class. 9 (18.0%) patients in group A and 8 in group B belonged to lower class.

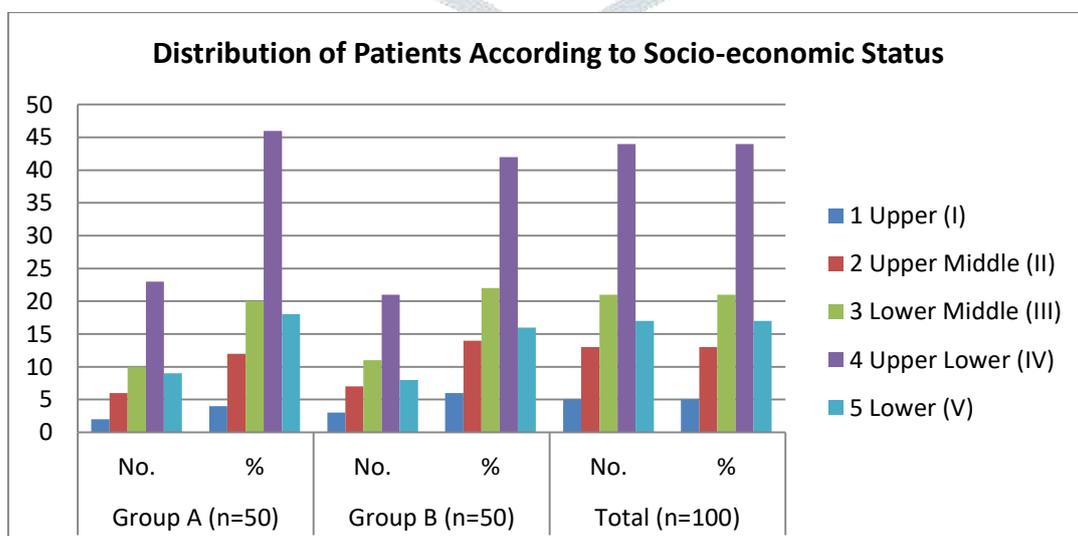
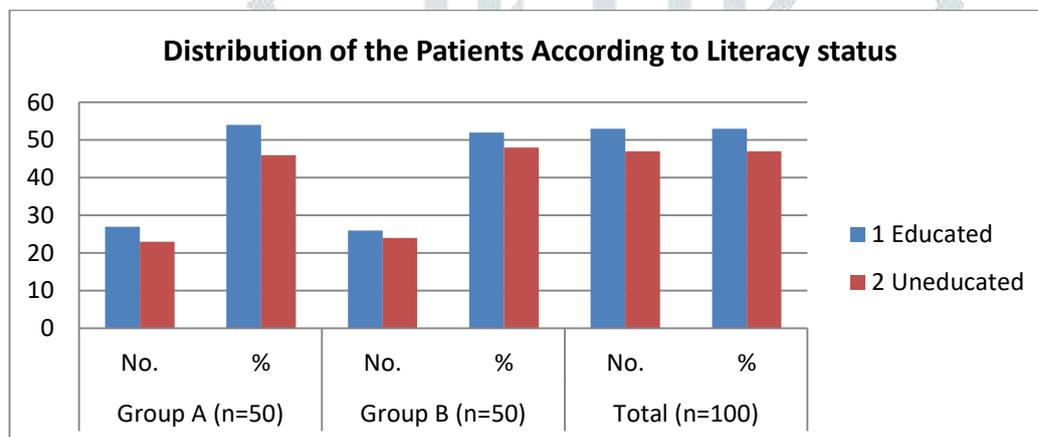
Graph-7

Table-8: Distribution of the Patients According to Literacy Status

S. No.	Education	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Educated	27	54.0	26	52.0	53	53.0
2	Uneducated	23	46.0	24	48.0	47	47.0

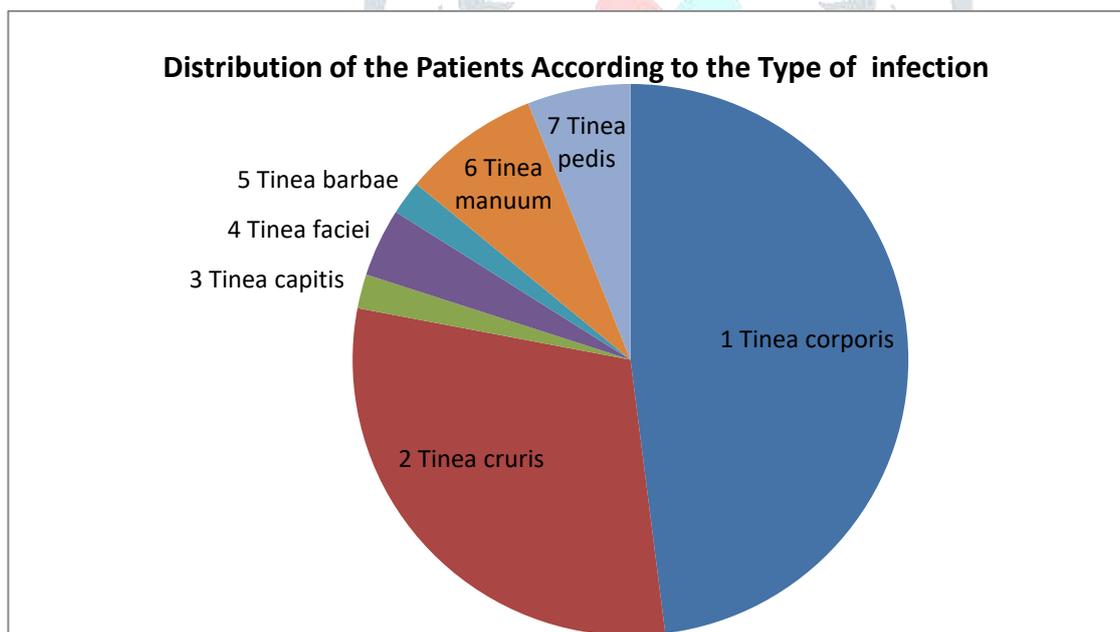
Table 8 shows distribution of patients according to the literacy status. 53 (53.0%) patients in the study were literate, while 47 (47.0%) were illiterate. In group A there were 27 (54.0%) literate patients whereas in group B they were 26 (52.0%). Illiterate patients were accounted 23(46.0%) and 24 (48.0%)s in group A and group B, respectively (Table 8 and Graph 8).

Graph-8**Table-9: Distribution of the Patients According to the Type of Dermatophytic infection**

S. No.	Type of Qooba	Group A (n=50)		Group B (n=50)		Total (n=100)	
		No.	%	No.	%	No.	%
1	Tinea corporis	24	48.0	23	46.0	47	47.0
2	Tinea cruris	15	30.0	16	32.0	31	31.0
3	Tinea capitis	1	2.0	2	4.0	3	3.0
4	Tinea faciei	2	4.0	3	6.0	5	5.0
5	Tinea barbae	1	2.0	1	2.0	2	2.0
6	Tinea manuum	4	8.0	3	6.0	7	7.0
7	Tinea pedis	3	6.0	2	4.0	5	5.0

Table 9 and Graph 9 shows that Tinea corporis is the commonest type of the Dermatophyte infection (47.0%), followed by Tinea cruris (31.0%). In group A, Tinea corporis (48.0%) was the commonest type of pathogen, and Tinea cruris was (30.0%). While in group B, Tinea corporis 23 (46.0%) was the commonest type and Tinea cruris was 16 (32.0%) patients. In the rest of the type both the groups followed the same trend. Tinea pedis and Tinea faciei shared equal occurrence, i. e. 5.0% of all the patients. However, in group A, Tinea pedis was 6.0% and in group B it was 4.0%. 4.0% patient of group A and 6.0% of group B had Tinea faciei. It was followed by Tinea manuum, with 8.0% and 6.0% in group A and B respectively. Of all the patients' Tinea capitis and Tinea barbae were found to be 3.0% and 2.0 % respectively. 2.0% patients of group A and 4.0% of group B had Tinea capitis. While the Tinea barbae patients were found to be 2.0% in each group.

Graph-9



4. DISCUSSION:

The present study attempted to determine the dermatophyte infections. 100 clinical samples collected from patients who were attending the skin OPD A.K.T.C. Hospital, Aligarh Muslim University, Aligarh from Monday and Saturday OPD per week during the period from Jul 2017 to June 2019. Dermatophytic infections are more prevalent in the developing world where it is increasing day by day. The pattern of its prevalence has been reported to be varying and different sectors of the population show differences in

prevalence rate, pattern and presentation of disease and causative factors etc. Therefore it assumes importance that the demographic studies should be conducted on a relatively smaller population because the management strategies for different locations may be different. Studies on dermatophyte infections in Aligarh district are scanty therefore we have to rely upon the disease pattern of the country.

It was found that the dermatophytic infection is more common in the most active phase of life when an individual remains involved in his/her respective job and often comes in contact with different classes of people, different working environment and different objects and articles. The majority of patients were found in the age group of 20-30 years, followed by age group of 30-40 years. The present study is in coincidence with the study conducted by Bindu, *et al.*,^[10] Peerapur^[11] and Grover *et al.*^[12] Agrawal *et al.*,^[13] and Nawal *et al.*^[14] Bhavsar, *et al.* have reported highest incidence in adults followed by adolescents.^[15] The mean age in the current Study was found to be 30.62 ± 14.08 years. This is close to the findings reported by Madhavi, in which the mean age was found to be 28.5 ± 6.23 years.^[16] Overall our findings are in agreement with other studies conducted on dermatophytosis. It can be concluded that the higher the chances of exposure and contact with infected people, higher the chances of incidence of dermatophytic infections.

The present study has found a slight preponderance of dermatophytosis among males. 53% of the cases were found to be males while 47% were females. Male to female ratio was found to be 1.1:1. It is evident from the data that percentage of male patients was little more than female patients but there was no significant difference in male and female as far as the incidence of dermatophytosis is concerned. In other studies also males have been reported to outnumber the females. Bindu *et al.* has reported a ratio of 2.06:1,^[10] and Bhavsar *et al.* of 2.1:1.^[15] but the highest ratio of 4.3:1 has been recorded by Grover *et al.*,^[12] while Agarwal and Nawal have found a ratio of 1.8:1.^[13, 14] Degreef *et al.*^[16] have also reported the higher prevalence in males. So, in all these studies a male preponderance was found. The higher incidence among the male may be due to relatively more chances of exposure to external environments, which predispose them more to have contact with soil, animals and the infected persons etc. Also the higher incidence in male could be due to greater physical activity and field work as compared to females causing increased sweating and moistness. Similarly, decreased incidence in the person below 20 and above 40 years was observed in comparison of the mid age as described above. It appears that the age itself is not responsible for the infection rather the chances of contact of a person with another infected person, soil,

cattles etc determine its incidence. The lower incidence of the disease amongst the females may be due to poor reporting rate because of certain social reservations associated with women, which put some sort of restriction to freely seek medical advice and visit the health facilities.

According to the present study, marital status does not seem to play any significant role in the rate of occurrence of dermatophytosis, as 56% patients were married and 44% were unmarried. The higher incidence among the married may be due frequent contact with infected partners so the chances of infection in married individuals are high. However since the difference is not too much therefore marriage could not be taken as an important factor responsible for dermatophytic infections. Rather the age, physical activity and chances of contact may be the main factors behind it. In the present study 59.0% of the patients were urban dwellers, while 41.0% belonged to rural areas. Higher incidence among the urban dwellers may be due to the location of the hospital in the city area.

The current study has found that only 28% of the patients had a positive history of contact with other infected individuals. Out of this, 24% had a positive family history, while 4% had a history of contact with non-family members. The study by Bindu *et al.* has revealed that history of contact with infected family members was 16.6% and with non-family members it was only 2.6%.^[10] The high family contact history in our study may be because of the location of the hospital in urban area and the high percentage of urban patients as discussed earlier. Since the population in urban areas is usually found dense therefore the chances of frequent contact with family members always remain high.

In the present study, patients were divided into five groups according to Kappuswamy socioeconomic status scale (modified for 2007). Maximum number of patients (44.0%) belonged to upper lower socioeconomic class. This indicates that dermatophytic infections are closely related to socio-economic status. This finding is in accordance with the finding of Bassari-jahromi *et al.*, who reported that dermatophytosis was most common in low socioeconomic group.^[17] Similar findings were also reported from a field area of Kuwait.^[18] It may be due to improper maintenance of principles of personal hygiene. Another reason behind this may be the living condition, large family size, and close contact, either directly or by sharing facilities, including combs and towels which is common in family members.^[19] Low protein diet has also been reported to be linked with increased incidence of dermatophytosis.^[20] People belonging to lower socio-economic status are usually malnourished. This factor may predispose the individuals to

acquire the infection; they may also experience the recurrence of the infection. Unani physicians were also in agreement with the above views., unhygienic habits such as not bathing regularly and wearing dirty clothes, may cause dermatophytic infections.^[21, 22] The role of poor diet and undernourishment has also been associated with such diseases by Unani scholars.^[21] As mentioned earlier, protein deficiency predisposes the occurrence of the said disease as it may alter the immune status and pave the way for the development of dermatophytic infections. Immunological aspect of dermatophytosis has been well established. Altered immune status can be correlated with deficient quwat (faculty), which has been colligated with skin and other diseases.^[23]

53.0% of the patients were found to be literate, while 47.0% were illiterate. The number of illiterate appears to be high given the location of hospital in urban are, however since the study was conducted in a government hospital where the treatment is almost free of cost therefore a sizable number of patients of poor background and the slum dwellers visit the hospital along with the well off and literate class. Among the illiterate people the disease is prevalent probably because of their unhygienic living condition and unawareness about the disease. Side by side, among literate people it is prevalent probably due to their substandard living style. For example continuous use of occluded shoes which is common in urban class is a major risk factor for Tinea pedis in even highly educated people. Tinea capitis occurs mostly in non school going children probably because they spent their times in an unhygienic ambience. Whereas in school going children it may be due to infection received following the contact with their classmates.

The commonest form of dermatophytosis observed in the study was Tinea corporis which amounted to 48.0%. The finding corroborates well with other studies conducted in the field area of Calicut (54.6.0%).^[10] Ahmedabad (52.78%),^[15] Jaipur (50.0%), Amritsar (36.1%) and Moinabad (27.0%).^[24] Tinea corporis was followed by Tinea cruris 31.0%. In most of the studies discussed above similar pattern has been reported and prevalence of Tinea cruris has been found to be 38.6% in Calicut^[10] 28.1%, in Amritsar^[13] 27.8%,^[14] in Surat 15.64% in Ahmedabad^[15] and 17.5% in Jaipur^[25] However, in most of the studies the percentage of the patients, presenting with Tinea cruris is lower than that of the present study. The prevalence of the two forms of dermatophytosis as described above may be due to the common practice of wearing tight clothes, which induces hot and humid environments and also impairs proper aeration and in turn facilitate fungal growth. Students have the habit of sharing objects like towels

and clothes, which may contribute to transmitting the infection. Moreover, study conducted on military recruits in North East region, of India by Grover *et al.*^[12] involving soldiers as a major group, showed Tinea pedis as the commonest manifestation, which could be well correlated to the profession of army personnel as they have to wear tight shoes for longer hours of the day.^[12] During the current study, Tinea pedis was observed in 5.0% of patients. Tinea faciei was found in 6.0% of all the patients, while much lower percentage i.e. 1.0% was reported by study conducted in Rajkot.^[12] The present study has found Tinea manuum in 7.0% of the patients, where as in another study it has been reported in 9.5% of the patients.^[19] Tinea capitis is usually found in children, but children below 11 year of age in the present study were under the exclusion criteria therefore its prevalence was found low (3.0%). In another study, Tinea barbie was found in 1% of the patients.^[19] The findings suggested that Tinea corporis is the most common presentation of dermatophytosis which is in conformity with the other reports from India and abroad.

5. CONCLUSION

This study has revealed that the prevalence of microscopic and culture infections in the study subjects was high. The present study has also depicted that Tinea corporis was the dominant clinical manifestation involving 67.45% of the total cases of dermatophytosis. And second most common infection of the Tinea cruris was (48.60%). In this study the lower economic patient percentage were higher than the middle and high economic patient because diseases are more common in overcrowded populations.

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