

Original Article**Clinico-Mycological Profile of Dermatophytosis in a Tertiary Care Hospital of Eastern Nepal****Kewal Shrestha*, Sujit Kumar Bhattacharjee, Kumari Ragani Yadav**

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Article Received: 24th May, 2021; Accepted: 14th October, 2021; Published: 31st December, 2021**DOI: <https://doi.org/10.3126/jonmc.v10i2.41565>****Abstract****Background**

Dermatophytes are keratinophilic and keratinolytic fungi which are responsible for dermatophytosis. There are three genera of dermatophytes; Trichophyton, Microsporum and Epidermophyton. As they have affinity to keratin rich tissue, they produce dermal inflammatory response, intense itching and cosmetically poor appearance. The varied clinical presentation of tinea results in delay in diagnosis, poor compliance in follow up of cases, and consequently spread of infection in the community has rekindled interest in rapid identification of species.

Materials and Methods

A hospital based cross sectional study was carried out in the department of Microbiology, Nobel medical college from January 2019 to December 2019. Clinically suspected 200 cases of dermatophytosis attending Out Patient Department were studied. Isolation and identification was done by various tests like macroscopic, microscopic and biochemical tests.


Results

Out of 200 specimens, 138 (69%) were skin scraping, 42 (21%) were nail clipping and 20 (10%) were hair stubs. Highest incidence was seen in the age group 21-40 years with 115 (57.5%) cases followed by 41-60 years 46 (23%) cases. In our study male preponderance of 158 (79%) and female of 42 (21%) were seen. Tinea corporis was found to be the commonest clinical type with 96 (48%) cases followed by Tinea unguinum, 42 (21%), Tinea cruris 10 (11.36%), Tinea capitis 5 (5.68%), Tinea faciei 4 (4.54%), Tinea pedis 2 (2.27%). Among the fungal isolates Trichophyton rubrum (67.04%) was the most common etiological agent followed by Trichophyton mentagrophytes (13.63%), Epidermophyton 10 (11.36%), Trichophyton violaceum 4 (4.54%) and Epidermophyton floccosum 3 (3.4%).

Conclusion

The most common clinical presentation was tinea corporis followed by tinea unguinum. T. rubrum was the most common etiological agent of dermatophytosis.

Keywords: Dermatophytes, Tinea, Trichophyton

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Introduction

Dermatophytes are keratinophilic and keratinolytic fungi which are responsible for dermatophytosis [1]. They have been classified as geophilic, zoophilic and anthropophilic species on the basis of their primary habitat associations. Zoophilic and anthropophilic dermatophytes are the most frequent agents of superficial mycosis in humans infecting the stratum corneum, hair and nail. They utilize the keratin as a nutrient source by secreting proteases enzyme which digest it into short peptides and amino acids to be assimilated via transporters [2]. There are three genera of dermatophytes; Trichophyton, Microsporum and Epidermophyton [1].

As they have affinity to keratin rich tissue, they produce dermal inflammatory response, intense itching and cosmetically poor appearance. Superficial fungal infections are common worldwide and affect 20% to 25% of the world population and dermatophytes are responsible for most of the cases. The infections caused by dermatophytes are also known as ringworm or tinea. Clinically, depending on the site of involvement tinea can be classified as tinea capitis, tinea corporis, tinea cruris, tinea pedis, tinea barbae and tinea unguinum [3]. Distribution of the dermatophytes varies with the geographical area and course of time [4].

Any clinical diagnosis needs to be supported by laboratory diagnosis and culture is a necessary adjunct to direct microscopic examination for the definitive identification of the etiological agent. The choice of the therapy depends upon the specific identification of the molds especially in the nail and skin. The varied clinical presentation of Tinea results in delay in diagnosis, poor compliance in follow up of cases, and consequently spread of infection in the community has rekindled interest in rapid identification of species [1]

Materials and Methods

A hospital based cross sectional study was carried out in the department of Microbiology, Nobel medical college from January 2019 to December 2019. This study was started after acquiring approval from the Institutional Review Committee of Nobel Medical College. Informed consent was taken from the patient. All skin, hair and nail samples from clinically suspected cases of dermatophytosis were included in the study and patients who were already on treatment for dermatophytosis were excluded from the study. [1] The sample size was calculated by using the formula, $n = Z^2 P (1-P)/e^2$, where Z is confidence level at 95% (1.96); e is margin of error taken as

10% and p is expected prevalence from literature [3]. The sample size of our study was calculated as $n=72$. However, we have included 200 samples within one year which was more than calculated size.

Clinically suspected 200 cases of dermatophytosis attending Out Patient Department of Nobel Medical College were studied. The samples were collected in a good light source with proper examination of a lesion. Under proper sterilization and aseptic conditions sufficient clinical specimens were collected for microscopic examination and culture. For the collection of skin specimens the affected area was first swabbed with 70% alcohol to remove the surface contaminants and after the alcohol dried, the skin scrapings were collected from the border of the active lesions with sterile scalpel blades in a sterile black paper envelope. Hairs from the scalp were plugged with a flame sterilized forceps and the active border area was scraped with a scalpel to collect epidermal scales on a sterile black paper envelope. The affected nail was first cleaned with 70% alcohol and the portion of the infected nail was scraped away and material were collected from the deeper part of the distal end of the nail on to sterile black paper envelop. [3] The skin and hair samples were subjected to 10% KOH and 20% KOH preparation for nail. After 15-20 minutes, the samples were examined for the presence of fungal elements. The specimens were also inoculated into Sabouraud's Dextrose agar (SDA) containing Chloramphenicol and Cycloheximide. Each sample was inoculated into two tubes, one tube with antibiotics and other without antibiotics. They were incubated at 27°C and examined daily for 4 weeks. If no growth was obtained then they were discarded. When growth was obtained on SDA, they were observed to study the colony morphology, colour of the surface, the reverse of the colony, the texture of the surface, the topography and rate of growth. On the other hand microscopic examination was done after staining the growth sample by LactoPhenol Cotton Blue stain on slide. Urease test was done to differentiate Trichophyton mentagrophytes from Trichophyton rubrum where former hydrolyse urea gives deep red colour [1].

The collected data were entered in Microsoft Excel 2007 and analyzed using SPSS version 20.

Results

Out of 200 specimens, 138 (69%) were skin scraping, 42 (21%) were nail clipping and 20 (10%) were hair stubs. Tinea corporis was found



to be the commonest clinical type with 96 (48%) cases followed by tinea unguinum 42 (21%), tinea cruris 24 (12%), tinea capitis 20 (10%), tinea faciei 12 (6%), tinea pedis 6 (3%). Highest incidence was seen in the age group 21-40 years with 115 (57.5%) cases followed by 41-60 years 46 (23%) cases, as shown in table 1. In our study male preponderance of 158 (79%) were seen and female preponderance of 42 (21%) were seen. Male to female ratio was 3.761:1, as shown in table 2

Among 200 cases of dermatophytosis 95 (47.5%) cases were positive in direct microscopic examination (KOH) and 88 (44%) cases were positive by culture. 82 (41%) specimens were positive for both in direct microscopic examination and by culture. 13 (6.5%) cases were positive in direct microscopy but negative by culture. Similarly 6 (3%) cases were negative in direct microscopy but positive by culture and 99 (49.5%) specimens were negative by both, as shown in table 2 and 3.

Among 88 culture positive cases, 49 (55.68%) isolates were from tinea corporis where *T. rubrum* was found to be 30. Other isolates were *T. mentagrophytes* 8, *T. violaceum* 4, *Epidermophyton floccosum* 3, *Microsporum audouinii* 4. In 18 (20.45%) isolates of tinea unguinum 15 isolates were *T. rubrum*, 3 isolates were *T. mentagrophytes*. In 10 (11.36%) isolates of tinea cruris 7 isolates were *T. rubrum* and 3 isolates were *M. audouinii*. In 5 (5.68%) isolates of tinea capitis 2 isolates were *T. rubrum*, 3 cases were *M. audouinii*. In 4 (4.54%) isolates of tinea faciei, 3 isolates were *T. rubrum* and 1 isolate was *T. mentagrophytes*. In 2 (2.27%) isolates of tinea pedis 2 were *T. rubrum* as shown in table 4.

Table 1: Age wise distribution of fungal infections

Age group	<20 years	21 – 40 years	41 – 60 years	>61 years	Total
	32 (16%)	115 (57.5%)	46 (23%)	7 (3.5%)	200 (100%)

Table 2: Gender wise distribution of fungal infections

Gender	Total	KOH positive	Culture positive	Both Culture and KOH positive
Male	158	66	58	55
Female	42	29	30	27
Total	200 (100%)	95 (47.5%)	88 (44%)	82 (41%)

Table 3: Correlation of result between KOH and Culture examination

	KOH positive	KOH negative	Total
Culture positive	82 (41%)	6 (3%)	88 (44%)
Culture negative	13 (6.5%)	99 (49.5)	112 (56%)
Total	95 (47.5)	105 (52.5%)	200 (100%)

Table 4: Distribution of superficial fungal infection by clinical type

Clinical disease	<i>T. rubrum</i>	<i>T. mentagrophytes</i>	<i>T. violaceum</i>	<i>E. floccosum</i>	<i>M. audouinii</i>	Total
Tinea corporis	30	8	4	3	4	49 (55.68%)
Tinea unguinum	15	3				18 (20.45%)
Tinea cruris	7				3	10 (11.36%)
Tinea capitis	2				3	5 (5.68%)
Tinea faciei	3	1				4 (4.54%)
Tinea pedis	2					2 (2.27%)
Total	59 (67.04%)	12 (13.63%)	4 (4.54%)	3 (3.4%)	10 (11.36%)	88 (100%)

Discussion

Superficial fungal infections tend to be one of the world wide problems constituting a large number of cases attending to dermatology outpatient clinics [5]. Dermatophytes are the distinct group of fungi that infects the skin, hair and nails of humans and animals producing a variety of cutaneous infections. The epidemiology of superficial fungal infections has changed significantly in the last century due to change in socioeconomic conditions, lifestyles and migrations [6]. The increasing prevalence of fungal infection is attributed to an increase in the number of cases living in close proximity to each other and severity of infections depends on location and host immunity [5]. Thus, the results from clinico-mycological studies of dermatophytosis are expected to assist in selection of appropriate treatment.

The highest incidence was found in age group of 21- 40 years followed by 41 - 60 years which was in accordance with the studies conducted by Beena and Urvashi et al [7, 8]. The increase in the incidence of dermatophytosis in younger population could be because of more often exposed to occupation-related trauma and increased indoor/outdoor activity. Also an increased cosmetic consciousness in younger people with increased outpatient visit [9].

The present study shows that the male (79%) were affected more than females (21%), which correlates with the result of various studies [1,8,9]. This may be attributed to the fact that males are more involved in outdoor physical activities, which leads to excessive sweating making a favourable environment for the fungal infections [10, 6].

In this study, Tinea corporis (48%) was the most common clinical type followed by onychomycosis (21%) which was similar to the other studies [3, 7].

Among 200 cases of dermatophytosis 47% was positive by direct microscopic examination (KOH), 44% was positive by culture which was close to observation made by sundar et al [3] and 41% was positive by both KOH and culture which



was near to observation made by Urvashi et al [8]. 6.5% was KOH positive but culture negative. Similarly 3% were KOH negative but culture positive and 99 cases were both KOH and culture negative. The possible reason for KOH positive and culture negative could be due to non-viability of fungal elements during culture or prior receiving antifungal treatment [7].

Out of all fungus isolated in the culture medium the most common was *T. rubrum* (67.04%) followed by *T. mentagrophytes* (13.63%). Similar findings were observed in various studies. [1,5,7]. *T. rubrum* was the commonest fungal isolate due to its better adaptation, more virulence and easily colonization on hard keratin [10]. In contrast to our study, *T. mentagrophytes* was the most common dermatophytes isolated by Sundar et al [3]. In the present study *M. audouinii* isolated was 11.36% , *T. violaceum* 4.54% and *E. floccosum* 3.4%. Trichophyton species have been isolated with increasing incidence as compared to *Microsporum* and *Epidermophyton* and in Asia, *T. rubrum* and *T. mentagrophytes* were most commonly isolated dermatophytes from superficial mycoses [3].

Conclusion

This study showed that dermatophytosis commonly occurs in the age group between 21 to 40 years with male preponderance. The most common clinical presentation was tinea corporis followed by tinea unguinum. *T. rubrum* was the commonest etiological agent of dermatophytosis. Dermatophyte infections are common and should be confirmed by laboratory diagnosis.

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Conflicts of interests: None

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