



SPECTRUM OF SUPERFICIAL MYCOSIS IN A TERTIARY CARE HOSPITAL – A MATTER OF CONCERN

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ABSTRACT

BACKGROUND : Superficial mycosis has been recognized as a common fungal condition worldwide, including India. It refers to fungal infection of skin and its appendages.

AIM & OBJECTIVES : 1) To determine the frequency of fungal species isolated from clinically suspected cases of superficial mycoses, in a tertiary health care hospital. 2) To access the risk factors associated with it. 3) To analyse the demographic profile associated with superficial mycosis.

MATERIAL & METHODS: The prospective study was carried out, over a period of 12 months (January 2021 to December 2021), samples such as skin scraping, hair plugs and nail clipping obtained from patients were submitted to Department of Microbiology for the fungal etiology. Samples were subjected to direct microscopy by KOH mount and fungal culture as per standard conventional technique.

RESULTS: A total of 63 clinically suspected cases of superficial mycosis were enrolled in the study. Among the isolates recovered the most common were Dermatophytes (41.26%) followed by Candida (14.28%), Aspergillus (6.3%), Mucor (3.1%) and remaining 23.80% were sterile. Among the Dermatophytes, *T. rubrum* 42.30% was the predominant pathogen followed by *T. mentagrophytes* 34.61%. The most common age group affected was 21-40 years of age with male predominance of male to female ratio of 1.5:1. Out of total of 48 samples of superficial mycosis 26 were positive by direct microscopy and 48 samples were positive both by microscopy and culture. Most of the positive cases were recovered from immunocompromised individuals suffering from diabetes (37.5%) followed by prolonged antibiotic therapy (25.02%), long steroid therapy (12.5%) and chemotherapeutic agents (10.41%). The cases were mainly seen in the months between April to July which correlates the infection with the humid season.

CONCLUSION: The study pinpointed dermatophytes as the most common clinical pattern of superficial mycosis with a male predominance. Dermatophytic infection is one of the emerging fungal disease along with non dermatophytic molds, especially in immunocompromised individuals prompt treatment and management can herald the onset of ensuing complications, thereby limiting the morbidity and thus improving the quality of life.

KEYWORDS : Superficial mycosis, Dermatophytes, Non dermatophytic molds, *T. rubrum*

INTRODUCTION

Superficial mycoses refer to the diseases of skin and its appendages caused by fungi. This group includes dermatophytosis, pityriasis versicolor, candidiasis & non dermatomycotic molds¹. Dermatophytic infections also known as Ringworm/ tinea are one of the earliest known fungal infections of mankind and are very common throughout the world¹. Dermatophytes have the capability to produce keratinase, which allows them to metabolize and live on human keratin like skin, nail and hair². Although dermatophytosis does not produce mortality, it does cause morbidity and poses a major public health problem, especially in tropical countries like India due to the hot and humid climate¹. Over the last decade, an increasing number of non dermatophyte filamentous fungi have been recognized as agents of skin and nail infections in humans, producing lesions clinically similar to those caused by dermatophytes³.

The skin infections caused by nondermatophytic fungi are known as dermatomycoses whereas hair and nail infections are known as piedra and onychomycosis, respectively⁴. Apart from dermatophytes, *Aspergillus*, *Zygomycetes*, phaeo fungi and yeasts have also been encountered as the cause of superficial mycosis.^{5,2}

India is a large subcontinent with remarkably varied topography, situated within the tropical & sub-tropical belts of the world. Its climate is conducive to the acquisition and maintenance of mycotic infections³. Although dermatomycoses are worldwide in distribution, the endemic and most prevalent species of dermatophytes differ strikingly from one geographic locality to another⁵. Various studies have been done on the prevalence of dermatophytes in different parts of our country^{1-3,6,7}. This present study was undertaken to analyze the frequency of etiological agents and the risk factors from suspected cases of superficial mycosis in the belt of western U.P.

MATERIALS & METHODS

The prospective study was carried out, over a period of 12 months (January 2021 to December 2021), in a tertiary care hospital in western Uttar Pradesh. The study included the clinical cases of superficial mycosis. Samples such as skin scrapings, hair plugs and nail clippings, received from the Dept of Dermatology were processed for detection of fungal elements by direct microscopy (10% KOH mount) and further cultured on SDA, as per standard mycological techniques³². A

detailed history regarding age, gender and the demographic data was noted. Before collection of sample, patient was explained about the procedure and informed consent was taken. The collected material was divided into two parts. One of which was put in a drop of 10% KOH solution on the slide and covered with a cover slip for direct microscopic examination. The skin scraping and hair were examined after keeping for one hour at room temperature. For nail scraping the microscopic examination was performed after overnight incubation in 10% KOH solution. The KOH mount preparations were examined for presence of fungal elements.

The other portion of the sample was used for the culture on the following media:

1. Sabourauds dextrose agar
2. Sabourauds dextrose agar with chloramphenicol 6.05 mg/ml
3. Sabourauds dextrose agar with chloramphenicol and Actidione (0.5 mg/ml)

RESULTS

One set of the above media was incubated at 25°C and the other at 37°C. Tubes were observed for growth at least twice during the first week, and once a week thereafter, for a total of 3 weeks before discarding them as negative. Dermatophytes isolated were further identified by inoculating onto DTM at 25°C. DTM were observed for colour change to red indicates alkalinity generated by dermatophyte growth. Isolates were also separated on the basis of slide culture. The microscopic examination of dermatophytes was characterized by duration of growth, surface morphology and pigment production. *Candida* species were classified as albicans and non-albicans groups by the production of chlamydospores on corn meal agar, germ tube test and sugar fermentation tests. The samples negative by KOH mount and culture were subjected to gram staining and bacterial culture as per standard protocol.³³

Of the 63 clinical samples (skin, nail and hair) enrolled in the study only 48 isolates were positive for dermatomycoses. Thus the frequency was 76.19% (48/63x100). The maximum number of positive cases of dermatomycoses belonged to dermatophytes. Isolates belonged to 2 genera and 3 species of dermatophytes, out of which the predominant isolates of dermatophytes were *T. rubrum* 17.46% (11/63

x 100), *T.mentagrophytes* 14.28% (9/63x100) followed by *Epidermophyton floccosum* 6.34% (4/63x100) and *T.tonsurans* 3.17% (2/63x100). The remaining 37 samples of superficial mycosis showed growth of dermatomycotic molds as *Aspergillus fumigatus*, *Aspergillus niger* and *Mucor*. *Candidiasis* were seen in 14.28% (9/63x100) of the cases, as *candida albicans* the most common species. *Staphylococcus aureus* was the commonest type isolated among bacterial isolates 7.93% (5/63x100) and remaining 15 samples were found sterile.(Table 2).

Among the total clinically suspected cases of dermatophytosis, only a total of 26 were positive by direct microscopy and 48 samples were positive both by microscopy and culture.(Table 4).

Dermatophytosis was more common in the age group of 21-40 years and was more predominant among the male with male to female ratio of 1.5: 1.(Table1).

Most of the dermatophytic infections were recovered from immunocompromised individuals. The commonest risk factor involved was diabetes (37.5%) followed by prolonged antibiotic therapy (25.02%), long steroid intake (12.5%) and chemotherapeutic agents (10.41%). Only 7 patients were not suffering from any systemic illness.(Table3). The cases were mainly seen in the months between April to July which correlates the infection with the humid season.

Table 1: Age and sex wise distribution of cases of Dermatromycosis (n=48)

AGE GROUPS	MALES	FEMALES	TOTAL
< 20	04	02	06
21-30	08	05	13
31 -40	09	05	14
41 -50	04	04	08
>50	04	03	07
TOTAL	29 (60.41%)	19 (39.58%)	48

Table 2: Distribution of etiological agents of clinically suspected cases (n=63)

TYPE	NAME OF SPECIES	NUMBER OF SPECIES	PERCENTAGE
DERMATOPHYTES	<i>Trichophyton rubrum</i>	11	17.46%
	<i>Trichophyton mentagrophytes</i>	09	14.28%
	<i>Epidermophyton floccosum</i>	04	6.34%
	<i>Trichophyton tonsurans</i>	02	3.17%
CANDIDA	<i>Candida.albicans</i>	04	6.34%
	<i>Candida.guilliermondii</i>	03	4.76%
	<i>Candida.krusei</i>	02	3.17%
NON DERMATOPHYTE MOLDS	<i>Aspergillus.fumigatus</i>	03	4.76%
	<i>Aspergillus.niger</i>	03	4.76%
	<i>Mucor</i>	03	4.76%
BACTERIAL ISOLATES	<i>Staphylococcus aureus</i>	05	7.93%
	<i>Pseudomonas aeruginosa</i>	02	3.17%
STERILE		15	23.80%
TOTAL		63	

Table 3: Risk factors associated with cases of Dermatromycosis (n=48)

Risk factors	No of samples	Percentage
Diabetes	18	37.50%
Prolonged antibiotic therapy	12	25.02%
Steroid intake	06	12.50%
Chemotherapeutic agents	05	10.41%
No risk factor	07	14.58%
Total	48	

Table 4: Microscopy v/s culture positivity of Dermatromycosis (n=63)

	No of samples	Percentage
KOH +ive	26	41.26%
KOH +ive + Culture +ive	48	76.19%



FIGURE 1: Macroscopic view of T.mentagrophytes **FIGURE 2: Macroscopic view of Aspergillus fumigatus**

DISCUSSION

Superficial mycosis can cause devastating effects on a patient's condition, thereby results in morbidity and compromising patient's quality of life¹. Most of the cases are manageable with medication.³. In the present study the clinically suspected cases of superficial mycosis, the laboratory proven cases were found to be 48 . Thus the frequency of dermatomycosis was 76.19%.

Higher incidence of dermatomycosis in males than in females has been reported both from India and other parts of the world⁵. This finding is consistent with our finding of male predominance with ratio of 1.5:1. Superficial mycoses were more common in males(60.41%) than in females(39.58%). Similar study, conducted by Grover and Roy in 2003, also reported superficial mycosis more in males(81%) as compared to females(19%) with male to female ratio of 4.2:1⁸. Other studies conducted by Hitendra et al. also supported our study that incidences of superficial mycoses were more common in male than females (68.16% and 67.5%, respectively.)^{9,10}. According to Philpot, males may be more prone to infection than females probably due to higher exposure of males to infection in the schools, public bathrooms, sporting activities and wearing of closed type footwear¹¹.

In our study, superficial mycosis was more common in the young age group of 21–40 years (56.25%). Higher frequency in this age is comparable with other studies conducted by Lyngdoh et al. (34.4%), Sumana and Rajagopal (52%), and Sen and Rasul (44%)^{12,13,14}. This may be due to increased physical activity in young individuals and changes in hormonal pattern.¹⁵

Diagnosis of superficial mycosis is based on KOH mount and fungal culture. Identification of fungal isolates upto species level is helpful for therapeutic domain. In this study, KOH positive rate was 41.26% and cases positive by both KOH and culture positive rate were 76.19%. Grover et al.⁸ and Sen et al.¹² could also observed the higher yield by culture, compared to KOH mount. The positive rate by KOH mount by Grover et al and Sen et al were 53% and 49% respectively, whereas culture positive cases were 79.1% and 51% respectively. The KOH positivity rate varied from 35.6% to 88.6% in various studies and the culture positivity rate from 36% to 53.6%^{13,14}. In studies, the proportion of KOH negative samples turning positive on culture differed widely from 5.6% to 56.7%¹⁶.

Our findings of higher culture positive rate were consistent with Milne, in his work he stated.this may due to the drying procedure¹⁷. Our study also correlated with results of Madhavi et al. in 2011 that showed 43% KOH positive and 58% culture positive¹⁸. These results reflects the significance of culture as well as KOH mount for accurate diagnosis of superficial mycoses. On the other hand, Aggarwal et al., Patel et al., and Nawal et al. had reported KOH positive rate (59.20%,62.12%, and 72.40%, resp.) was greater than culture positive rate (20.15%, 29.29%, and 62.80%), respectively^{19,20,21}. The failure of growth of fungus could be due to use of antifungal agent before specimen collection and lack of standard methods for identification of fungus²².

Among 48 isolates of Dermatromycosis, majority growth of 26 (41.26%) isolates were of dermatophytes, followed by 9 (14.28%) isolates of non dermatophytes molds, and 9 (14.28%) were of candida. Similarly, Prasad et al. in 2013 reported that majority growth of 105 (92.10%) isolates was dermatophyte among 114 cases, 5(4.38%) isolates was nondermatophytes, and of 4 (3.50%) isolates was yeasts²³. *Trichophyton* species has been isolated with increasing rate as compared to *Microsporium* and *Epidermophyton* species²⁴. In Asia, *T. rubrum* and *T. mentagrophytes* were the most commonly isolated dermatophytes from superficial mycoses²¹. In our study, out of 63 cases of suspected superficial mycoses, *Trichophyton* was isolated in 22 (34.92%) cases, the most frequently isolated genus, with *T.rubrum* 11 (17.4%) followed by the *T.mentagrophytes* 9 (14.28%). *T.*

rubrum were differentiated from *T.mentagrophytes* based on urea hydrolysis test and pigment production on DTM and macroscopic observation. Our findings were consistent with Aggarwal A et al., Patel P et al., and Nawal P et al. who had also reported *T. rubrum* as the commonest isolate^{19,20,21}. On the other hand, results of Pakshir et al. showed that *T.mentagrophyte* was the most common isolate followed by *T. rubrum* (32.5% and 25% respectively)^{25,26,27}. The variation could be attributable to environmental condition and geographical distribution⁸.

A distinct finding in our study was the isolation of dermatomycotic molds in 14.28% of clinically suspected cases of superficial mycosis. Though NDM commonly considered as contaminants, they have been seen to colonize compromised tissues and cause secondary destruction. The role of NDM in causing cutaneous infections and hence primary pathogenic role is controversial²⁸. These isolates are increasingly implicated in causing primary invasion of the nail in onychomycosis^{29,30}. We isolated 9, NDM (18.75%) out of 48 samples of Dermatomycosis, the common isolates were *Aspergillus niger*, *Aspergillus fumigatus* and *Mucor*. A study has reported that, among the nondermatophytes 31/111 (27.9%) cases, *Aspergillus* spp.16 (14.5%) were the most common isolate followed by *Cladosporium* spp.5 (4.5%) and *Scopulariopsis* 4 (3.6%)³¹. Prasad et al. in 2013 showed that *Aspergillus* spp. (35.1%) were the most common isolates from the nondermatophytes.²³

Our study showed that the majority of cases were associated with diabetes, followed by prolonged antibiotic therapy, steroid intake and usage of chemotherapeutic agents, thus indicating the occurrence of superficial mycosis more commonly in immunocompromised hosts, which at times, may be refractory to the therapeutic options³²

CONCLUSION

The present study gives an insight about the frequency, the aetiological agents the risk factors and the distribution pattern of superficial mycosis. Dermatophytes is the most common cause of superficial mycosis with *T.rubrum* followed by *T.mentagrophytes* as the predominant species isolated. One of the possible reasons for fungal infection could be poor hygienic status, non bathing habits and sharing of towel. It is concluded that along with dermatophytes, other dermatophytic fungi and yeasts are emerging as an important cause of superficial mycosis, especially in immunocompromised individuals. Hand hygiene, sanitation and use of fungicidal sprays and washes are effective methods for prevention of such infections.

Limitations

1. Due to limited resources anti fungal sensitivity testing could not be performed.
2. The results could have been more promising if the study had been carried out for a prolonged duration.

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