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Research Article

A STUDY OF SUPERFICIAL FUNGAL INFECTIONS WITH ITS CLINICO-MYCOLOGICAL CORRELATIONS IN A TERTIARY CARE HOSPITAL

Nikita[1]., Shrutika Pundir[2]., Shipra Tomar[3]., Jaya Malik[4] and Rakesh Kaushik[5]

[1,2,3] Department of Microbiology, School of Medical Sciences & Research, Sharda University, Uttar Pradesh-201306
[4]Department of Microbiology, Noida International University, Noida, Uttar Pradesh-203201
[5]ICMR-National Institute of Malaria Research, Dwarka Sector-8, New Delhi-110077

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A B S T R A C T

Background: Infectious diseases involving skin and mucosal surfaces become a serious problem due to their lack of sanitation and awareness in people. The prime pathogens responsible for these skin infections are fungi. These fungi parasitize keratin-rich tissues, causing dermal inflammatory response and purities. The causative fungi rarely invade deeper anatomical sites, preferring to colonize the cornfield layer of the epidermis or suprafollicular areas of hair. Main reason, which favors the fungal infection, might be the hot and humid climate. This could be due to the frequent use of antibiotics, immunosuppressive drugs, and various conditions such as organ transplantation, leukemia, and HIV infections

Methodology: Using standard mycological techniques, samples were collected for microscopy and culture. For hair and nail examination, a 40% potassium hydroxide (KOH) wet mount was used, and a 10% KOH wet mount was used for skin scraping.Lacto phenol cotton blue stain was used to identify microscopic examinations of fungal growth.

Result: The highest number of cases were seen in the age group of 26-45 years (36.65%), followed by 46 years (32.17%). The total number of positive KOH mounts for fungal infection was found to be 38.69 percent. SDA culture medium whereas 158 (68.69%) samples showed no growth. Tinea corporis (49 percent) was found to be the most common type of clinical presentation.

Conclusion: The study concludes that, in addition to dermatophytes, dermatomycotic fungi are emerging as an important cause of superficial mycoses.

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INTRODUCTION

Infectious diseases involving skin and mucosal surfaces becomes a serious problem due to their lack of sanitation and awareness in people [1]. The prime pathogens responsible for these skin infections are fungi [1]. In developed and developing countries, fungal infections are very common in man due to illnesses [2]. Amongst these, superficial infections are more frequently isolated pathogens in humans [3]. Superficial mycoses are infections of nail, skin and hairs caused by group of fungi which includes *dermatophytosis, Pityriasisversicolor,* candidiasis & dermatomycotic molds[4]. These fungi parasitize keratin-rich tissues, causing dermal inflammatory response and pruritus [5]. The causative fungi rarely invade deeper anatomical sites, preferring to colonize the cornified layer of the epidermis or suprafollicular areas of hair [5].

Corresponding author:* **Nikita
Department of Microbiology, School of Medical Sciences & Research, Sharda University, Uttar Pradesh-201306

Several factors influence the development of superficial and cutaneous mycoses, such as promiscuity, sweating, prolonged contact with pets, and swimming pools with contaminated water are all examples of bioclimatic conditions for the development of fungi in saprophytic life [2]. Dermatophytes can recognize by their clinical, morphological & microscopic characteristics as *Epidermophyton, Trichophyton* and *Microsporum* [5]. Single species might be involved with their distinct pathology in several clinical types [6]. Though usually they are not causing mortality, but their clinical significance suggests their morbidity, cosmetic disfigurement, by which they are creating a major public health problem [7]. Main reason, which favors the fungal infection might be the hot and humid climate[7]. Epidemiology has changed of the clinically significant dermatophytosis, over the last few years [8]. This could be due to the frequent use of antibiotics, immunosuppressive drugs, and various conditions such as organ transplantation, leukemia, and HIV infections [1]. Now,

Trichophyton species are the most prevalent species throughout the world [8]. The current study was carried out to isolate and characterize superficial fungal infections of fungal strains using a phenotypic method from patients visiting a tertiary care center in India.

METHODOLOGY

A retrospective study was done from February 2019 to January 2020. A total of 230 specimens from clinically suspected cases of fungal infections were processed. A detailed history of the patients' age, gender, site of lesion, occupation, and associated illness was taken, and patients were clinically examined for the type and location of the lesion and classified accordingly.

Sample Processing

To remove dirt and other ointments, the infected areas or lesions were wiped with 70% alcohol. Clinical specimens, which included skin scales, hair, hair roots, nail clippings, and swabs, were collected in sterile, dark, dry paper sachets so that the small amount of specimens could be easily seen for processing. Using standard mycological techniques, samples were collected for microscopy and culture. For hair and nail examination, a 40% potassium hydroxide (KOH) wet mount was used, and a 10% KOH wet mount was used for skin scraping.

KOH wet-mount preparation

On a well labelled clean glass slide, few drops of 10% KOH solution were added in the portion of sample. After placing a cover slip over it, the slide was gently heated over a flame without boiling. The slide was then carefully examined under the microscope to detect the presence of fungal elements. To improve visibility, nail samples were immersed in 40 percent KOH overnight for complete clearing and softening.

Following confirmation of the presence of fungal elements, the samples were cultured on Sabouraud Dextrose Agar (SDA) slants with and without antibiotics (Cycloheximide and Chloramphenicol). Temperatures of 28°C and 37°C were used to incubate the culture tubes. The culture tubes were checked every two days and discarded after six weeks if no growth was observed.Culture identification was done on the basis of growth rate, temperature, colony characteristics, color, texture and pigment production.

Lacto Phenol Cotton Blue (LPCB) Stain

Lacto phenol cotton blue stain was used to identify microscopic examinations of fungal growth. On a clean glass slide, place a drop of LPCB. Remove a small portion of the colony from the agar surface using a sterile bent dissecting needle or loop, and place it in a drop of LPCB.With the two dissecting needles, gently tease apart the colony's mycelial mass on the slide, then place a coverslip on top and examine under the microscope with low power (10X) and high-dry (40X) objective lenses.

Statistical analysis

For the analysis of various data, the results were expressed as percentages. Microsoft Excel was used to interpret these findings.

RESULTS

A total of 230 patients were included in the study. Out of these maximum patients were in the age group of 26-45 (36.65%) in which females (29.27%) patients were less than the males (70.73%). In this age group 32.93% samples were reported positive for KOH. In the age group above 46 years (32.17%), the number of females (27.03%) was less than the males (72.97%) and about 27.03% showed positive result for KOH. In the age group between 16-25 years (25.65%), the number of males (64.41%) was more than the number of females (35.59%). Out of which only 32.20% samples were reported positive for KOH. For the age group of <15 years (6.52%), the ratio of females (7.33%) were more than the males (26.67%). In this age group 13.33% samples were reported positive for KOH, as shown in Table.1.

Maximum number of superficial mycosis strains were recovered from skin sample (55.21%) as followed by nail (29.14%) and hair (15.65%), shown in Table.2, Figure.1.Out of all the samples, only 72 (31.30%) isolates showed growth on SDA agar while 158(68.69%) showed no growth as shown in Table.3.

T.mentagrophyte was the most common commensal isolate, accounting for 33 percent of all isolates, followed by *Candida* species (26 percent), *T.rubrum* (25 percent), *Microsporum* (10 percent), and *Epidermophyton* (6 percent) as shown in Figure.2.

Tinea corporis (49%) was the most common type of superficial mycosis in our study, followed by Tinea capitis (17%), Tinea crusis (15%), Tinea pedis (11%) and Tinea faciae (8%) as shown in Figure.3.

Table 1 Age distribution of patients with superficial mycoses according to the age-group

Age Group	Classification of Age Group	Obs.	Sex (%)		KOH(%)		Age distribution%
			Male	Female	Negative	Positive	
<15 year	Children	15	26.67	73.33	86.67	13.33	6.52
16-25 year	Adult	59	64.41	35.59	67.80	32.20	25.65
26-45 year	Young	82	70.73	29.27	67.07	32.93	36.65
>46	Old	74	72.97	27.03	72.97	27.03	32.17

Table 2 Distribution of superficial mycosis based on different clinical sample type

Type of sample	Number of sample percentage
Hair	36 (15.65%)
Skin	127 (55.21%)
Nail	67 (29.14%)

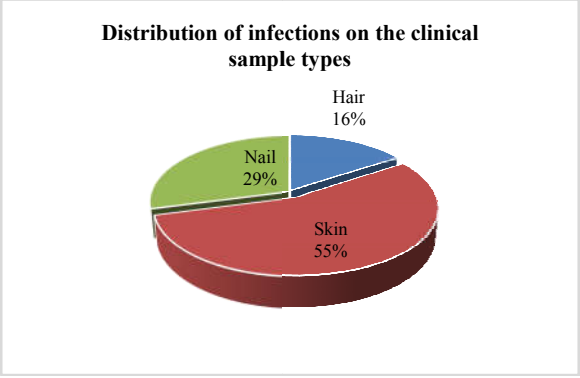

Fig 1 Distribution of infections on the clinical sample types

Table 3 Results showing growth and no growth after culture specimen examination

Culture on SDA	Total number of samples
Culture shows growth	72 (31.30%)
Culture shows no growth	158 (68.69%)

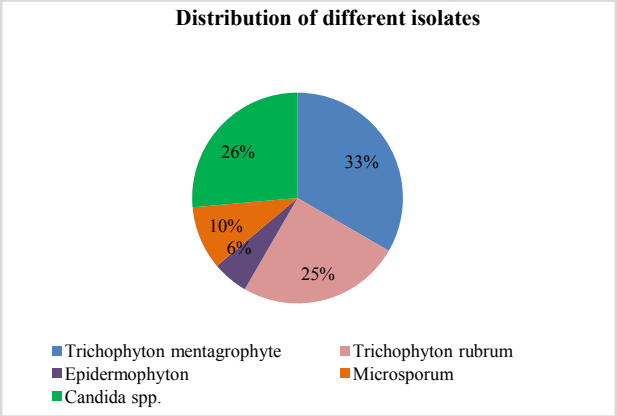

Fig 2 Distribution of different isolates

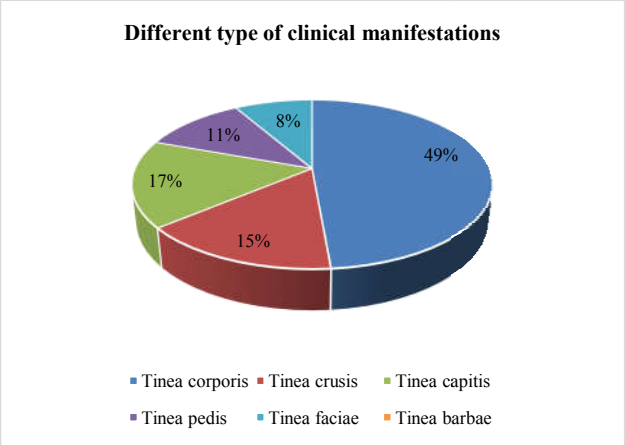

Fig 3 Different type of clinical manifestations

DISCUSSION

In our study, the highest number of cases were seen in the age group of 26-45 years (36.65%), followed by 46 years (32.17%), which was similar to the studies done by C.L. Vasudha et al[3] (33.34%) and Ravinder Kaur *et al*[2]. Most samples were obtained from male patients that were 70.44% as compared to females 29.56%. Similar cases were seen in the study of Ravinder Kaur *et al* [2], Abida Malik *et al* [4]and S. Bhagra, S.A.Ganju[9] in which male predominance was higher as compared to females. However, a study done by Kumaran Ganesan *et al* [6] there was more of female preponderance. Due to the prolonged outdoor activity, frequent interaction with overcrowded people, poor personal hygiene and most of them working as exhaustive physical worker like farmer, can justify the results that males were more prone as compared to females. In our study, we discovered that skin was the most common site of superficial fungal infection (55.21 percent), followed by nails (29.14 percent) and hair (15.65 percent), which was similar to the findings of Lakshmanan *et al*[10] in 2015 and C.L.Vasudha *et al*[3].

Out of the total 230 samples for KOH mount test, 141(61.30%) were negative and rest of 89(38.69%) were positive. In our study, the total number of positive KOH mounts for fungal infection was found to be 38.69 percent. The majority of clinically diagnosed cases were found to be KOH mount positive, which was consistent with the findings of Hiral K Patel *et al*[8].

Out of total 230 samples 72 (31.30%) samples showed growth on SDA culture medium whereas 158 (68.69%) samples showed no growth. It also showed that out of 89 positive KOH mount isolates, 72 were culture positive, while those with negative KOH mounts were not culture positive. There were no cases in which the KOH mount was positive but the culture was negative. Out of all the species, *T. mentagrophyte* **(**33%**)** was the commonest isolate, followed by *Candida (*26%*), T.rubrum* (25%), *Microsporum (*10%*), Epidermophyton* (6%). Similar results were shown in a study done by KumaranGanesan[6] and Debeeka Hazarika [7] whereas, study conducted by Abida Malik *et al*[4] and Meenakshi Sharma[1] showed *T. rubrum* to be the commonest species followed by *T. mentagrophyte*.

Tinea corporis (49 percent) was found to be the most common type of clinical presentation in the current study, followed by Tinea cruris (17 percent) and Tinea capitis (15 percent). Surendran *et al* [11] and Bhatia *et al* [12] reported similar data, revealing that Tinea corporis (44.3 percent) was the most common, followed by Tinea cruris (38.2 percent).We also reported the incidence of Tinea pedis in our study was 3.47% , this may be because of the regular wearing socks-shoes, predisposing to maceration and perspiration. *Tinea barbae* was the least (0%) to be reported as followed by Tinea faciae (2.60%).

CONCLUSION

The current study concludes that, in addition to dermatophytes, dermatomycotic fungi are emerging as an important cause of superficial mycoses. Culture was found to be more sensitive than KOH mount, but both methods are useful for diagnosing superficial fungal infections. The percent of distribution of disease at different age group cases were significantly higher in young age group (26-45). Males were found highly susceptible as compare to females. The infection of skin samples was positively higher than others. However, the KOH mount and SDA estimated were negative. *Trichophytonmentagrophyte* was the predominant causative agent of dermatophytic infections. Although the findings of this study are consistent with those of many other studies conducted in India, they differ significantly from those of other studies that suggest the role of geographical variation in clinical and mycological patterns. Good hygiene, sanitation, and proper hand washing are all effective ways to prevent such infections.

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