# CLINICAL AND MYCOLOGICAL PROFILING OF SUPERFICIAL MYCOSES FROM TERTIARY CARE HOSPITAL IN NEPAL

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## ABSTRACT

Superficial mycoses are among the most common fungal infections worldwide, affecting the skin, hair and nails. Their prevalence and clinical profile can vary based on geographic, environmental, and host factors. This study aimed to determine the clinical and mycological profile of superficial mycoses among patients attending a tertiary care hospital. A cross-sectional study was conducted among 140 clinically diagnosed cases of superficial mycoses at Nepal Medical College Teaching Hospital. Detailed demographic and clinical data were recorded. Samples including skin scrapings, nail clippings, and plucked hairs were collected and subjected to direct KOH microscopy and fungal culture on Sabouraud dextrose agar and dermatophyte testing agar (DTM). Fungal isolates were identified based on colony morphology, lactophenol cotton blue mount and standard biochemical tests. Among 140 patients, 72 (51.42%) were male and 68 (48.58%) were female (male-to-female ratio 1.06:1). The most affected age group was 31–40 years (27.86%). The most common clinical diagnoses were onychomycosis and *Tinea corporis* (24.28% each), followed by *Tinea manuuam* (14.29%). KOH microscopy was positive in 25.71% and culture in 15.71% of cases. *Trichophyton* spp. was the most frequently isolated fungus (54.54%), followed by *Epidermophyton* spp. (13.64%). Non-dermatophyte fungi such as *Candida* spp., *Rhizopus* spp., and *Penicillium* spp. were also identified. Superficial mycoses are common and often chronic, with varied clinical presentations. *Trichophyton* remains the predominant etiological agent, but non-dermatophyte fungi are emerging. Early diagnosis, accurate species identification, and appropriate treatment are essential to reduce disease burden and prevent recurrence.

## KEYWORDS

Dermatophytes, superficial mycoses, *Tinea*, *Trichophyton*

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## INTRODUCTION

Superficial fungal infections affect the outermost layers of the skin and its appendages, such as hair and nails. These fungi colonize the cornified layers of the epidermis or the superficial portions of hair shafts and typically do not invade deeper tissues.[1] These infections generally cause minimal tissue damage and provoke only a mild immune response, leading many patients to neglect seeking medical care.[1,2]

Superficial mycoses are classified into four main categories: pityriasis versicolor, dermatophytosis, cutaneous candidiasis and non-dermatophyte fungal infections.[3] The most common cause of superficial mycoses is a group of closely related fungi known as dermatophytes, which infect skin, hair and nails. Dermatophyte infections, also known as dermatophytosis, ringworm or Tinea, are clinically classified according to the site of involvement.[4]

Infections of the skin caused by non-dermatophyte fungi are termed dermatomycoses, while infections of the hair and nails are referred to as piedra and onychomycosis, respectively.[5,6] When dermatophytes infect the nails, the condition is termed Tinea unguium; however, the term onychomycosis is now broadly used to describe any fungal infection of the nails.[7]In addition to dermatophytes, *Candida albicans* and other non-*albicans Candida* spp. can also cause superficial mycoses. Another significant pathogen is *Malassezia furfur*, the causative agent of pityriasis versicolor.[8,9]

Globally, superficial fungal infections affect an estimated 10 to 20% of the population. Prevalence rates vary widely across regions, ranging from 14 to 26.8% in North America, Europe, and East Asia, to 5 to 31.6% in African countries such as Ethiopia, Kenya, Nigeria, and Tanzania.[10,11] *Trichophyton rubrum* is recognized as the most common and widely distributed causative agent worldwide. Onychomycosis and Tinea pedis are more prevalent in developed countries, whereas Tinea cruris and Tinea capitis are more common in developing countries.[10,12]

In Nepal, superficial fungal infections are highly prevalent in clinical settings, with culture-positive rates around 55.0%, predominantly involving dermatophytes.[13,14] However, consistent with global trends, there is an increasing burden of non-dermatophyte and yeast-associated superficial mycoses.[4] in this paper we report the prevalence of superficial mycoses among patients attending dermatology outpatient department in Nepal Medical College Teaching Hospital (NMCTH) and mycological analysis of the identified cases.

## MATERIALS AND METHODS

A descriptive cross-sectional study was conducted in the Department of Dermatology and Department of Microbiology of NMCTH from December 2024 to May 2025. The ethical approval was obtained from Institutional Review Committee of NMCTH (Ref. No.: 29-081/082). The sample size for this study was calculated using the standard formula for estimating a population proportion: $N=Z^2 X p X (1-p)/ d^2$

Where N is the required sample size, Z is the Z-score corresponding to the desired confidence interval level, p is the estimated prevalence and d is the acceptable margin of error. Based on a previously reported culture positive superficial mycoses of 28.69% of the hospital in Kathmandu, Nepal[13]), with a 95.0% confidence level (Z=1.96) and a margin of error of 7.5% (d=0.075), the minimum required sample size was calculated to be approximately 140.

Patients included in this study were randomly selected from clinically diagnosed cases of with superficial mycoses attending the Dermatology Department of NMCTH. A detailed clinical history was recorded for each participant. Patients who were unwilling to participate were excluded from the study. Prior to sample collection, the procedure was explained to each patient, and informed consent was obtained.

Samples, including skin scrapings, plucked infected hairs and nail clippings, were collected by dermatologists and sent to the Microbiology Laboratory for microscopy and culture. In the laboratory, skin scrapings and hair samples were examined using a 10.0% KOH mount, while nail clippings were soaked in 40.0% KOH solution overnight and examined the following day.[1,8]

All specimens were cultured on Sabouraud's Dextrose Agar (SDA) and dermatophyte testing agar (DTM). The culture media were incubated at both 37 °C and 25 °C for up to four weeks before reporting negative results. Any fungal growth was identified based on macroscopic and microscopic characteristics using lactophenol cotton blue (LPCB) teased mount, slide culture, urease test, and germ tube test.[1,8,13] Data was entered into Microsoft Excel, and descriptive statistical analysis was performed using SPSS-16.

## RESULTS

**Table 1: Age and gender distribution of patients clinically diagnosed with superficial mycoses**

| Age (in years) | Male | Female | Total (%) |
|---|---|---|---|
| ≤10 | 4 | 4 | 8 (5.71) |
| 11-20 | 7 | 6 | 13 (9.28) |
| 21-30 | 12 | 17 | 29 (20.72) |
| 31-40 | 23 | 16 | 39 (27.86) |
| 41-50 | 11 | 15 | 26 (18.58) |
| 51-60 | 11 | 4 | 15 (10.71) |
| ≥61 | 4 | 6 | 10 (7.14) |

**Table 2: Distribution of clinical presentations of superficial mycoses**

| Clinical Diagnosis | Total n (%) |
|---|---|
| Onycomycoses | 34 (24.28) |
| Tinea corporis | 34 (24.28) |
| Tinea manuum | 19 (13.58) |
| Tinea pedis | 18 (12.86) |
| Tinea capitis | 16 (11.42) |
| Tinea faciei | 8 (5.72) |
| Tinea cruris | 3 (2.14) |
| Pityriasis versicolor | 3 (2.14) |
| Tinea incognita | 2 (1.43) |
| Seborrheic dermatitis | 2 (1.43) |
| Tinea barbae | 1 (0.72) |

A total of 140 patients clinically diagnosed with superficial mycoses were included in the study. Among the 140 patients, 72 (51.42%) were male and 68 (48.58%) were female, with a male-to-female ratio of 1.06:1. The majority of cases (27.86%) were in the age group of 31–40 years, followed by 20.72% in 21–30 years. Details of age and sex distribution of superficial mycoses are presented in Table 1.

Most patients presented with two or more symptoms. The most common symptom was itching, observed in 69.28% of cases, followed by scaling in 54.28%. Nail discoloration was reported in 22.14% of patients. Detailed symptom distribution is shown in Fig. 1.

The duration of symptoms among patients ranged from as early as 1 week to as long as 4 years. The majority of patients (49.28%) reported symptoms lasting between 1 to 6 months. A notable proportion(25.71%) also reported experiencing symptoms for more than one year. Among 140 clinically diagnosed superficial mycoses 25.71% had history of prior antifungal use.

The most common clinical diagnosis were Tinea corporis and onycomycoses, 24.28% each of them followed by *Tinea manuum* 13.58%. Details of other clinical diagnosis are presented in Table 2.

Out of 140 samples, 36 (25.71%) were positive on direct KOH microscopy and 22 (15.71%) were positive on culture. Among the 22 culture-positive cases, 14 had a corresponding positive KOH result, while 8 were negative on microscopy but positive on culture as shown in Table 3.

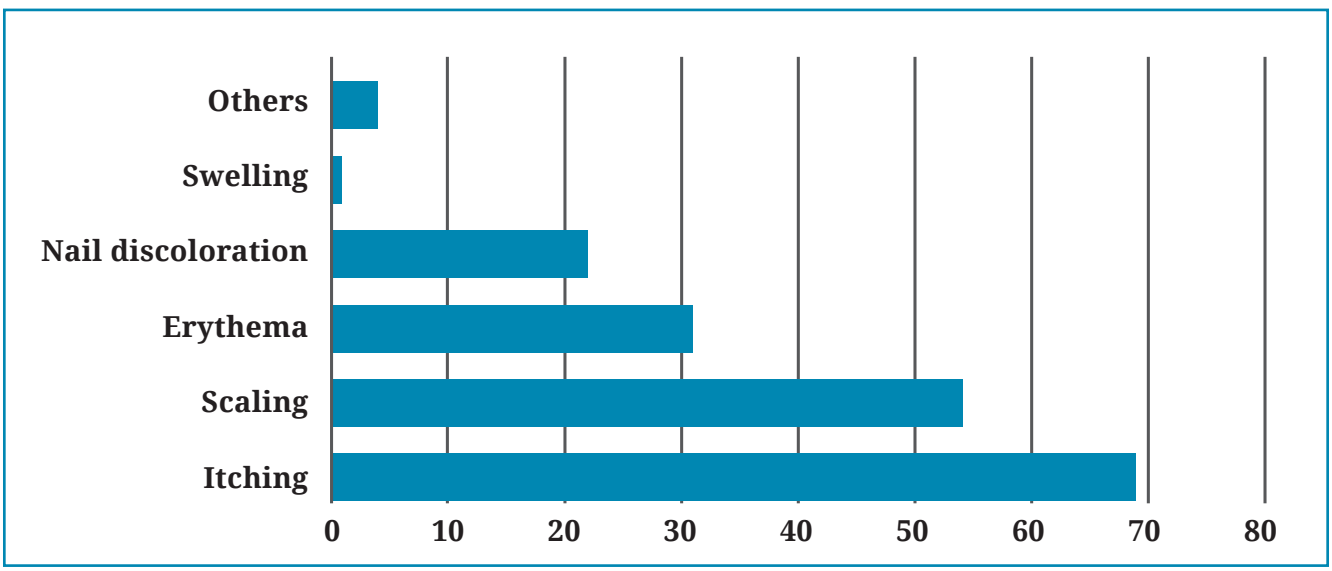


**Fig. 1:** Clinical presentations of patients with superficial mycoses (%)

| Table 3: Correlation of KOH and culture report | | | |
|---|---|---|---|
| | **KOH positive** | **KOH negative** | **Total n (%)** |
| Culture positive | 14 | 8 | 22 (15.72) |
| Culture negative | 22 | 96 | 118 (84.28) |
| **Total (%)** | **36 (25.71)** | **104 (74.29)** | **140 (100)** |

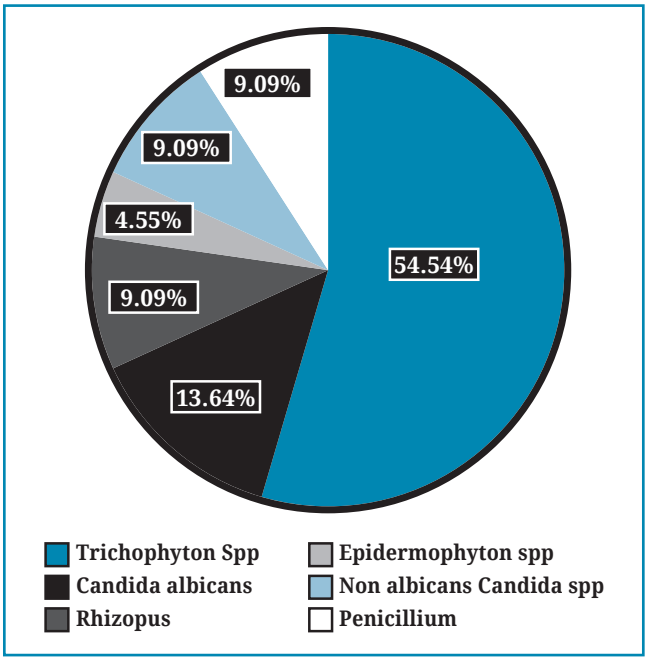


**Fig. 2:** Fungal species isolated from culture-positive cases

The sensitivity and specificity of KOH when compared with culture were 63.6% and 81.4%, respectively. The positive predictive value (PPV) was 38.9%, while negative predictive value (NPV) was 92.3%. A statistically significant association was observed between KOH and culture results ($\chi^2 = 17.37$, $p = 0.00003$), indicating that KOH positivity correlates significantly with culture positivity.

The most frequently isolated species was *Trichophyton* spp. (54.54%), followed by *Epidermophyton* spp. (13.64%). Other isolates included *Candida albicans*, non-*albicans Candida* spp., *Rhizopus* spp., and *Penicillium* spp., as detailed in Fig. 2.

## DISCUSSION

This study assessed the demographic, clinical, and mycological profile of patients clinically diagnosed with superficial mycoses at a tertiary care hospital. Among the 140 patients included, males slightly outnumbered females, with a male-to-female ratio of 1.06:1. This is in line with studies by Pathave *et al*,[14] Sharma *et al*,[15] and Basak *et al*[16] reporting either a male predominance or near equal distribution, possibly due to differences in occupational exposure, hygiene practices, or health-seeking behavior.

The highest number of cases (27.86%) in the present study occurred in the 31–40 years age group, followed by 21–30 years (20.72%). This trend is consistent with findings from both Indian and Nepali cohorts. Joshi *et al*,[17] in a study conducted in South India, reported the 31–40 years age group as the most commonly affected. Similarly, Aishiya *et al*,[18] from Northern India observed that 46.2% of dermatophytosis cases fell within the 31–45 years range. In contrast, a study by Khadka *et al*,[19] from Kathmandu, Nepal, reported the highest prevalence among individuals aged 21–30 years. Adults in their third and fourth decades appear to be at higher risk, likely due to greater physical and occupational activity, which increases exposure to dermatophytes.

Clinically, most patients in our study presented with more than one symptom, with itching being the most common (69.28%), followed by scaling (54.28%) and nail discoloration (22.14%). This symptom pattern is consistent with several previous studies. For instance, similar studies from Kathmandu, Nepal by Khadka *et al*,[19] and Shrestha *et al*,[20] reported pruritus (itching) as the most frequently encountered symptom among patients with superficial fungal infections, attributing it to inflammatory reactions from fungal invasion of the keratinized epithelium. The chronic nature of the condition was evident, as nearly half of the patients (49.28%) had symptoms lasting between 1 to 6 months, and 25.71% reported symptom duration exceeding one year. This suggests a potential delay in seeking care or incomplete treatment courses, which is further supported by the fact that 25.71% had a history of prior antifungal use. Similar patterns have been documented in dermatology clinics globally.[6,10,24] A study from Birgunj, Nepal by Pradhan *et al*,[21] found nearly one-third of dermatophytosis cases were chronic, and prior antifungal use (topical and systemic) was significantly associated with chronicity. Nonadherence to antifungal therapy is also a recognized issue globally; a review article on treatment approach for superficial dermatophytosis infection

reportedapproximately 48.0% of patients interrupted treatment prematurely, often upon symptom relief.[22]

In this study, *Tinea corporis* and onychomycosis were the most frequently observed clinical diagnoses, each constituting 24.28% of cases, followed by *Tinea manuum* (13.58%) and *Tinea pedis* (12.86%). The prominence of nail infections is consistent with multiple reports emphasizing onychomycosis as a common superficial fungal infection worldwide. Studies from Nepal[14] and India[19] similarly report onychomycosis as a leading clinical presentation, reflecting increased fungal colonization in nails possibly due to occupational exposures and poor nail hygiene. Moreover, *Tinea manuum*, fungal infection of the hands is often reported alongside onychomycosis, underscoring the link between hand and nail fungal infections.[7] Similarly, some studies report higher frequencies of skin-only infections such as *Tinea corporis* and *Tinea cruris*, particularly in tropical climates where occlusive clothing and humid conditions favor skin infections over nail involvement.[10] Additionally, the lower proportion of *Tinea pedis* in our study contrasts with global data where *Tinea pedis* frequently the most common dermatophytosis, particularly in developed countries.[23] These variations may reflect regional differences in environmental factors, occupational activities, and healthcare-seeking behavior.

In terms of laboratory findings 25.71% of the samples were positive on direct KOH microscopy, and 15.71% yielded positive culture results. While KOH mount is a rapid screening tool, it may not always detect a low fungal burden or deeper infections. Culture remains the gold standard for confirming diagnosis and identifying the specific fungal species. In this study, 63.64% (14 out of 22) of culture-positive samples were also KOH-positive. These findings are consistent with previous reports emphasizing that KOH microscopy, despite being a rapid and cost-effective screening method, has limitations in sensitivity, particularly in cases with low fungal burden or deep-seated infections.[8,24] For instance, a study from Nepal reported KOH positivity rates ranging from 30.0% to 40.0%, with culture positivity often lower.[19,20] Similarly, research from India documented KOH sensitivity around 50.0–70.0%, which increased when combined with culture.[14-16] Overall, the combined use of KOH microscopy and culture remains crucial for accurate diagnosis of superficial mycoses. While KOH offers rapid preliminary screening, culture confirms the diagnosis.

In this study, KOH preparation demonstrated a sensitivity of 63.6% and specificity of 81.4% when compared with fungal culture, the reference standard. While the negative predictive value was high (92.3%), indicating its utility in ruling out fungal infections, the positive predictive value was relatively low (38.9%), suggesting that KOH positivity alone should not be solely relied upon for diagnosis. The association between KOH and culture results was statistically significant ($p$=0.00003), reinforcing the diagnostic relevance of KOH, albeit with limitations. These findings are consistent with previous studies, where KOH preparation showed moderate sensitivity and specificity for detecting fungal elements, highlighting the importance of combining it with culture or molecular methods for accurate diagnosis.[28,29]

The most common isolate in this study was *Trichophyton* species, accounting for 54.54% of isolates in this study, which is similar with global epidemiological trends where *Trichophyton rubrum* and related species are the leading causative agents of dermatophytosis.[6,10] Similarly, *Epidermophyton* species represented 13.64% of isolates, consistent with reports from South Asia and other tropical regions where *Epidermophyton floccosum* is frequently implicated.[19] Isolation of non-dermatophyte fungi such as *Candida albicans*, non-*albicans Candida* spp., *Rhizopus*, and *Penicillium* spp. are similar to findings from recent studies indicating a growing spectrum of fungal pathogens in superficial infections, particularly in onychomycosis and immunocompromised patients.[14,24] Similarly, a study by Pathave *et al*[14] in eastern India reported increasing isolation of non-dermatophyte molds and yeasts, suggesting a shifting epidemiology possibly influenced by environmental changes and widespread antifungal use.

These findings emphasize the critical role of culture-based diagnosis, as clinical differentiation between dermatophyte and non-dermatophyte infections is challenging, yet therapeutic approaches vary considerably. While dermatophyte infections generally respond well to standard antifungals, non-dermatophyte infections may require alternative or prolonged therapy.[25]

The moderate culture positivity rate reflects limitations of culture-based method such as the slow growth of fungi, nutritional requirements, or prior antifungal exposure reducing viable fungal loads.[26] This highlights the importance of molecular diagnostic methods, which offer increased sensitivity and rapid species

identification with antifungal susceptibility and could improve clinical outcomes and treatment.[27]

This study has a few limitations. Being a single-center hospital-based study, the findings may not be generalizable to the community level. In addition, antifungal susceptibility testing was not performed, which could have provided valuable insights into emerging resistance patterns.

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