

Frequency of Organisms Causing Onychomycosis in a Tertiary Care Hospital

KHAWAJA MUHAMMAD SALIK¹, NAJIA AHMED², ANAS AHMED QAZI³, MANSOOR PANHWAR⁴, YOUSRA ABDUL KHALIQ⁵, IQRA MUSHTAQ⁶

¹Resident Dermatology, PNS Shifa Hospital, Karachi

²Associate Professor in Dermatology, PNS Shifa Hospital Karachi

³Consultant Dermatologist, Abbasi Shaheed Hospital, Karachi

⁴Trainee Dermatology PNS Shifa Hospital, Karachi

⁵Post Graduate Trainee Dermatology, Sandeman Provincial Hospital, Quetta

⁶FCPS Trainee Dermatology department CMH, Multan

Corresponding Author: Dr. Khawaja Muhammad Salik, Email: kh.m.salik@gmail.com, Cell No: +92332441960

ABSTRACT

Objective: To determine the frequency of organisms causing onychomycosis in a tertiary care hospital.

Study Design: Cross-sectional study

Setting and Duration: The Department of Dermatology, PNS Shifa Hospital, Karachi for duration of six months from 1st September 2019 to 28th February 2020

Material and Methods: Total 395 patients were included. Affected nail was cleaned with 70% alcohol and nail clipping was done. Scrapings were collected from distal portion of nail plate, the nail bed and undersurface of the nail. In case of multiple nail involvement, the nail that was most severely affected was selected. The culture plates were put to incubation and observed for 4 weeks period for the presence of growth. Descriptive statistics were calculated. Stratification was done. Poststratification chi-square test was applied. P-value ≤ 0.05 was considered as significant.

Results: There were 63.8% male and 36.2% female patients. Color change of nail was observed in 94.9% cases, subungual hyperkeratosis in 28.6% cases, distal onycholysis in 24.6% cases, total nail plate dystrophy in 22% cases, partial nail plate dystrophy in 11.6% cases, and transverse ridges in 21.8% cases. Total 82.8% cases were classified as dermatophyte, 5.3% as yeast and 11.9% as non-dermatophytic mould.

Conclusion: In conclusion, our study results showed that most prevalent mycological type of isolate was dermatophyte, followed by non-dermatophytic mould, and yeast.

Keywords: Frequency, Organisms, Onychomycosis

INTRODUCTION

Tinea unguium, the medical term for onychomycosis, is a fungus that infects the nail. The influence on patients' quality of life has made it a major public health issue in the past. Nearly half of all nail illnesses are caused by onychomycosis, which is a typical presentation in primary care [1-4]. It's not just an aesthetic issue; it's a medically significant disease as well. The prevalence of OM is increasing over the world, with estimates ranging from 2% to 50% [2].

Infectious agents can induce Onychomycosis, which has a variety of clinical manifestations [5]. *Aspergillus* (*Candida albicans*), non-dermatophyte mould (*Onychocolacanthadensis*), *Scopulariopsis brevicaulis*, and *Scytalidium dimidiatum*) and fungi (*Candida* spp.) are all examples of dermatophytes [6-7]. When it comes to onychomycosis, the four most prevalent types are distal lateral subungual (DLSO), superficial white (SWO), proximal subungual (PSO), and total dystrophy (TDO) onychomycosis [6].

Many factors contribute to the occurrence of this disease, such as the occupation, chronic health problem, immunity of the patient, type of footwear used, bathing in communal swimming pools, nail trimming procedure, climatic conditions, frequency of travel, diabetes and pre-existing dysmorphic nails due to diseases such as psoriasis or trauma [8-10].

Onychomycosis affects around 32% of the senior population and becomes more common as people get older

[11]. However, it is uncommon in children, affecting only 0.5% to 2.6% of all children [12]. Toenail fungus is more common than fingernail fungus, notably tinea manuum and tinea pedis, with about 30% of cases occurring simultaneously [13].

In comparison to other body sites, dermatophytoses of the fingernails and toenails are particularly difficult to remove with pharmacological treatment. To effectively treat onychomycosis, a correct diagnosis is required. An accurate clinical diagnosis must be backed up by microscopy and culture results. The presence of enlarged nails, discoloration, onycholysis, and subungual hyperkeratosis are all signs of onychomycosis based on nail morphology [1].

Previous research found that men were infected at a higher rate than women (1.61:1). In 70.59 percent of individuals, OM was found in the distal and lateral subungual regions. Subungual hyperkeratosis affected 75% of those with discoloration, followed by 98.53 percent in the change. Dermatophytes accounted for 80.88 percent of the cases, with *Trichophyton rubrum* constituting the majority of them (51.47%). *Candida albicans*, a yeast, was detected in 13.23% of patients, and non-dermatophytic moulds, such as *Aspergillus niger*, were found in 8.82% of patients. In 1.47 percent of patients, *Acremonium* sp. was the only pathogen found. 29% of patients have dermatophyte and *Aspergillus* infections, while only 14% have both dermatophyte and *Candida* [2].

Nail alterations aren't always a good predictor of the organism causing them, and depending solely on clinical manifestations for diagnosing onychomycosis might be dangerous. Our study's goal is to find out how common onychomycosis-causing microbes are in the community we're studying. The findings of this study show that onychomycosis patients need to have their microbiology checked.

MATERIALS AND METHODS

This cross-sectional study was conducted at department of Dermatology, PNS Shifa Hospital, Karachi for six months duration from 1st September 2019 to 28th February 2020. Total 395 patients of either gender with ages 15 to 60 years having Onychomycosis for one month were enrolled in this study. Informed consent was obtained from all the patients before assigning them to the study and using their data in research. Brief history from the patients was taken. Patients showing positive results with both KOH and fungal culture were included in our study. Patients with psoriasis and other skin diseases over hand/feet (confirmed with history), pregnant and lactation women, history of a zole hypersensitivity, patients with use of topical anti-fungal treatment within the previous 2 weeks, and patients with use of systemic anti-fungal treatment within the previous 2 months were excluded.

Clinical examinations were recorded regarding the site of nail involvement, the number of involved nails, the type of involvement, and morphological changes. For sample collection procedure the affected nail was first cleaned with 70% alcohol to remove contamination and then nail clipping was done and scrapings was collected from the distal portion of the nail plate, the nail bed and undersurface of the nail with the help of sterile scalpel blade or nail cutter. In case of multiple nail involvement, the nail that was most severely affected was selected for sample collection. A portion of each sample was subjected to direct microscopic examination using 20% KOH and the remaining portion was put to culture in SDA with chloramphenicol. The culture plates were put to incubation at 25°C in biological oxygen demand and were observed for 4 weeks period for the presence of growth before being discarded as negative. The findings of variables were entered in a predesigned proforma. The confounding variables and biasness were controlled by strictly following inclusion and exclusion criteria.

Data were compiled and analyzed using statistical package for social sciences (SPSS) version 21. Mean and standard deviations were calculated for the quantitative variables like age and duration of Onychomycosis. Frequencies and percentages were calculated for the qualitative variables like gender, involved site, types of onychomycosis, clinical features of onychomycosis, and mycological types of types of isolates.

RESULTS

Among total patients, 249 (63.04%) were male and 146 (36.96%) were females. The overall mean age was 43.68±7.15 years. The overall mean onychomycosis duration was 2.30±1.48 months. 60 (15.2%) patients were found with left hand involvement, 171 (43.3%) with right

hand involvement, 50 (12.7%) with left foot involvement, and 114 (28.9%) with right foot involvement. (Table 1)

Table No 1: Baseline details of all the patients

Variables	Frequency No.	%age
Mean age (yrs)	43.68±7.15	-
Disease Duration	2.30±1.48	-
Gender		
Male	60	63%
Female	35	37%
Site		
Left Hand	60	15%
Right Hand	171	43%
Left Foot	50	13%
Right Foot	114	29%

Among all study patients, 64.1% were found with DLSO, 22% with TDO, and 13.9% with SWO as presented in Table-2.

Table No 2: Frequency distribution of Onychomycosis types

Variables	Frequency No.	%age
DLSO	253	64.1
TDO	87	22
SWO	55	13.9
TOTAL	395	

Color change of nail was observed in 94.9% cases, subungual hyperkeratosis was observed in 28.6% cases, distal onycholysis was observed in 24.6% cases, total nail plate dystrophy in 22% cases, partial nail plate dystrophy in 11.6% cases, and transverse ridges in 21.8% cases, as presented in Table-3.

Table No 3: Frequency distribution of Clinical features

	Frequency (%)	
	Yes	No
Color change	375 (94.9)	20 (5.1)
Subungual hyperkeratosis	113 (28.6)	282 (71.4)
Distal onycholysis	97 (24.6)	298 (75.4)
Total nail plate dystrophy	87 (22)	308 (78)
Partial nail plate dystrophy	46 (11.6)	349 (88.4)
Transverse ridges	86 (21.8)	309 (78.2)

In our study, 82.8% patients were observed dermatophyte, 5.3% patients observed yeast and 11.9% patients observed non-dermatophytic mould as presented in Table-4.

Table No 4: Frequency distribution of Isolates Mycological types (n=395)

Variables	Frequency No.	%age
Dermatophyte	327	82.8
Yeast	21	5.3
Non-Dermatophytic Mould	47	11.9
TOTAL	395	

DISCUSSION

A fungus called dermatophyte or non-dermatophyte mould or yeast invades the nail plate, causing onychomycosis

[15]. It's a prevalent condition that affects about 5% of the world's population [16] and accounts for up to 50% of all nail illnesses. There is a rising number of cases around the world, and it is no longer just a cosmetic issue [7]. Onychomycosis is mostly caused by the dermatophyte *Trichophyton rubrum* (*T. rubrum*) [17]. *Candida* species are the most prevalent non-dermatophytes, along with saprophytic moulds including *Acremonium* species, *Scopulariopsis* species, *Scytalidium* species, *Aspergillus* species, and *Fusarium* species, for example. This is common in soil and plant matter [18]. Onychomycosis is most commonly caused by the mould *Scopulariopsis brevicaulis*, and by *Candida albicans*, a yeast. Fungus species may work in concert to cause an infection [19].

Onychomycosis was reclassified in 1998, based on a study that identified five distinct clinical types of the infection, including distal lateral subungual onychomycosis (DLSO), white superficial onychomycosis (WSO), proximal subungual onychomycosis (PSO), and endonyxonychomycosis (EO), as well as candidal onychomycosis. These subtypes may coexist in patients. Total dystrophic onychomycosis is the most severe form of the condition. As a result, *Candida* onychomycosis no longer has its own categorization [20].

The fungus *Candida albicans* causes *Candida* nail infections in people with chronic mucocutaneous candidiasis [21]. In addition to onycholysis and paronychia, *Candida* species (spp) can produce various symptoms [21]. *Candida* infections in the middle finger are more common in women than in males and may be caused by interaction with *Candida* organisms in the gut or vagina [22].

There are three types of *Candida* onychomycosis: Paronychia is the most prevalent kind of *Candida* onychomycosis [23]; patients with chronic mucocutaneous candidiasis are at risk for *Candida* granuloma, which accounts for less than 1% of onychomycosis cases [24]. Invasion of the nail bed is required [25]. *Candida* onycholysis affects the hands and feet equally [26].

An rising number of risk factors for all types of onychomycosis include male gender, age and certain immunodeficiencies, as well as diabetes, nail damage and persistent exposure to water in the case of candidal onychomycosis (hyperhidrosis). Onychomycosis is a fungal infection of the nail plate caused by dermatophytes, non-dermatophytes moulds, or yeast. All ages are susceptible, however children are less likely than adults to become infected [27].

Additionally, Cohen et al [24] found that men were more likely to develop onychomycosis than women. At King Edward Medical College/Mayo Hospital in Lahore, Pakistan, Bokhari et al [28] found that 72 percent of their patients were female. According to Cohen et al [24], persistent exposure of the nails to water is a substantial risk factor for any type of onychomycosis.

Candida was shown to be the most prevalent pathogen in a Lahore investigation by Bokhari et al (46 percent). The percentage of patients with dermatophytes was found to be 43 percent, with *Trichophyton rubrum* (a dermatophyte) accounting for 31 percent of those cases. Shenoy et al. [29] found fungi in 35 percent of those patients, with dermatophytes accounting for 11 percent of

those patients, *Candida* making up 2 percent of those patients, and non-dermatophyte moulds accounting for 22 percent of those patients. Other researchers have found the same thing [30,] thus far.

Venugopal [32] reported abnormally high frequency of *Candida* onychomycosis of the toe nails and proposed that this occurrence may be linked to the Muslim religious practise of washing the feet five times a day. Elewski [14] found onychomycosis by *Candida* in 8.7 percent. Faergemann [33] found that *Candida albicans* was the most common species causing onychomycosis, which is in line with a research in which *Candida albicans* was identified in 14 patients from a total of 16 *Candida* spp. Being cut off from others [34].

An Iranian study by Khosravi and Mansouri [35] looked at 187 people who had symptoms of probable onychomycosis. Onychomycosis was found in 115 of the patients tested in the lab, and 97 of those had positive microscopic and cultural exams. Of these, 43.3% had *Candida* spp. infection.

CONCLUSION

In conclusion, our study results showed that most prevalent mycological type of isolate was dermatophyte, followed by non-dermatophytic mould, and yeast. Further, the most observed clinical presentation was color change of nail, followed by subungual hyperkeratosis, distal onycholysis, total nail plate dystrophy, transverse ridges, and partial nail plate dystrophy. The most of the cases were presented with distal lateral subungual onychomycosis (DLSO) type of Onychomycosis followed by total dystrophy onychomycosis (TDO), and superficial white onychomycosis (SWO).

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