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An Observational Study Of Clinical And Cultural Pattern Of Onychomycosis Along With Its Risk Factors And Associated Conditions.

Priya Singh*.

Senior Resident, Department Of Pharmacology, Government Medical College, Kannauj -209732, Uttar Pradesh, India.

ABSTRACT

Onychomycosis is a fungal infection of nail unit. To determine the clinical pattern of the disease, risk factors and identification of fungus by direct microscopy and culture methods. The study was done on 70 patients of onychomycosis in Department of Dermatology, Venereology & Leprosy of Sarojini Naidu Medical College Agra UP from august 2019 to march 2021. The sample from the involved nail was subjected to potassium hydroxide (KOH) examination and fungal culture was done on sabouraud's dextrose agar (SDA) medium. Distal and lateral subungual onychomycosis was the most common clinical type to be observed in 60% of patients followed by candidal onychomycosis in 21.43% , superficial white onychomycosis in 8.57%, total dystrophic onychomycosis in 7.14% and proximal subungual onychomycosis in 2.86% of patients. 55 (78.57%) out of 70 patients, were positive by KOH and culture examination. *Trichophyton rubrum* was the most common organism isolated in 50.91% cases followed by *trichophyton mentagrophytes* in 21.82%, *candida albicans* in 18.18% cases and non-dermatophyte moulds in 9.09% cases. The commonest risk factor observed were involvement in sports activities (54.29%) and use of occlusive modern footwear (21.43%).

Keywords: Onychomycosis, Distal and lateral subungual onychomycosis (DLSO), Candidal onychomycosis (CO), Superficial white onychomycosis (SWO), Proximal subungual onychomycosis (PSO), Total dystrophic onychomycosis (TDO), Potassium hydroxide (KOH) mount, Sabouraud's dextrose agar (SDA) culture.

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**Corresponding author*

INTRODUCTION

Onychomycosis, a fungal nail infection, is the most common nail disease with a prevalence of approximately 5.5% in the world. It clinically presents as nail discoloration, nail separation from the nail bed, brittleness, nail thickening and subungual debris [1].

Risk factors such as diabetes, increased age, psoriasis, immunosuppression, or poor peripheral circulation can increase incident rates to up to 30% [2, 3]. It reduces the quality of life of patients or cause local pain and paraesthesia, which in turn result in difficulty in walking or wearing shoes and can be a source of social embarrassment [1, 4].

It is a pattern of superficial mycoses caused by three main class of fungi: dermatophytes, yeast and non-dermatophyte moulds (NDMs) [5]. The type of nail invasion depends on the fungus responsible and the host susceptibility determining its clinical type [6]. They are classified as distal and lateral subungual onychomycosis (DLSO), superficial white onychomycosis (SWO), proximal subungual onychomycosis (PSO), endonyx onychomycosis (EO) and candidal onychomycosis. Total dystrophic onychomycosis (TDO) refers to the most advanced form of any subtype of them. Patients may also have a combination of these subtypes [7].

Diagnosis of onychomycosis is commonly confirmed by clinical examination along with regular diagnostic techniques such as direct microscopy and fungal culture, which are the golden standards for diagnosis.^[8] The present study was done to evaluate the clinical pattern of the disease, risk factors and identification of fungus by direct microscopy and by culture methods.

MATERIAL AND METHODS

This observational study was conducted in the Department of Clinical Pharmacology and Therapeutics in collaboration with Department of Dermatology, Venereology & Leprosy of Sarojini Naidu Medical College Agra UP from august 2019 to march 2021. The study was approved by Institutional Ethics Committee and informed consent was taken from all patients before recruiting.

Inclusion Criteria

All clinically diagnosed cases of onychomycosis (e.g. nail discoloration, nail thickening, crumbling of nail plate or subungual debris) in the age group 18-70 years attending dermatology OPD, SNMC, Agra, confirmed by direct microscopic examination of nail material under potassium hydroxide(KOH) and culture in sabouraud's dextrose agar(SDA), were included in the study.

Exclusion Criteria

Patients who had applied topical antifungal medication in the previous 1 month or had used oral antifungal medication in previous 3 months, patients with nail abnormalities due to associated skin disease or any systemic disease like psoriasis, contact dermatitis, congenital nail dystrophy, lichen planus, malnutrition etc. were excluded from the study.

70 patients who met the above inclusion criteria agreed to participate in the study. The patients were clearly explained about the nature of the study and a written consent was taken for their participation in the study. For sample collection, nail polish, creams and ointments were removed from the nail to be sampled. Nail was wiped with 70% alcohol and scrapings were collected from the deeper diseased area of the nail. The screening of samples was done by direct microscopy with 10% KOH to identify presence or absence of fungi in the nail specimen. The details regarding spores, hyphae, pseudohyphae and budding cells were noted. The samples were inoculated on the surface of Sabouraud's Dextrose Agar (SDA) at 37°C for 2-4 days for isolation of yeast and 26°C for 14-30 days for moulds/dermatophytes. SDA with chloramphenicol and cycloheximide was used for isolation of dermatophytes. The fungal species that grew in SDA were identified based on rate of growth, colony size, shape, margins, colony colour, type of growth and pigment production.

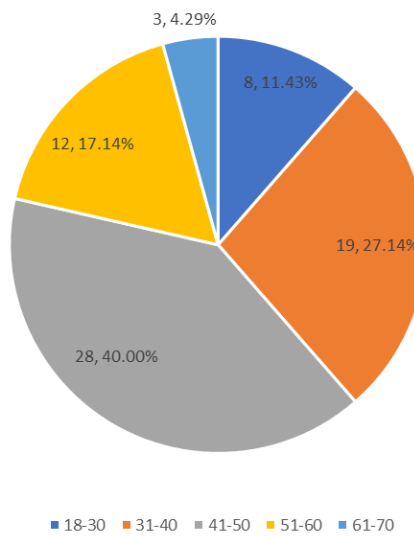
RESULTS

Age group wise distribution of patients is depicted in Table-1, Figure-1 with maximum no. of 40% cases in age group 41-50 years followed by 27.14% cases in age group 31-40 years.

Table 1: Age Wise Distribution Of Patients

AGE GROUP (YEARS)	NO. OF PATIENTS	PERCENTAGE(%)
18-30	8	11.43
31-40	19	27.14
41-50	28	40
51-60	12	17.14
61-70	3	4.29
TOTAL	70	100

Figure 1: Age Wise Distribution Of Patients

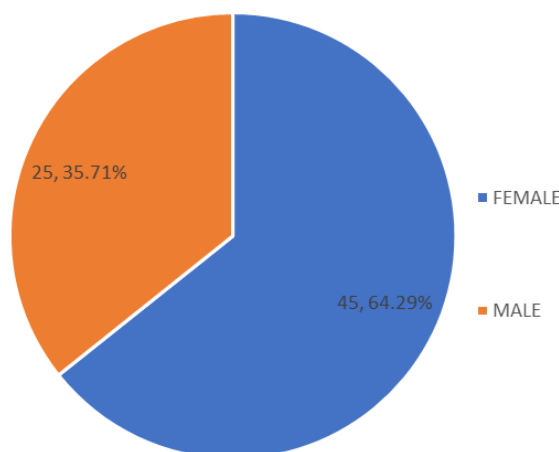


In this study, disease was more common in females (64.29%) as compared to males (35.71%)[Table-2, Figure-2].

Table 2: Sex Wise Distribution Of Patients

SEX	NO. OF PATIENTS	PERCENTAGE (%)
FEMALE	45	64.29
MALE	25	35.71
TOTAL	70	100

Figure 2: Sex Wise Distribution Of Patients

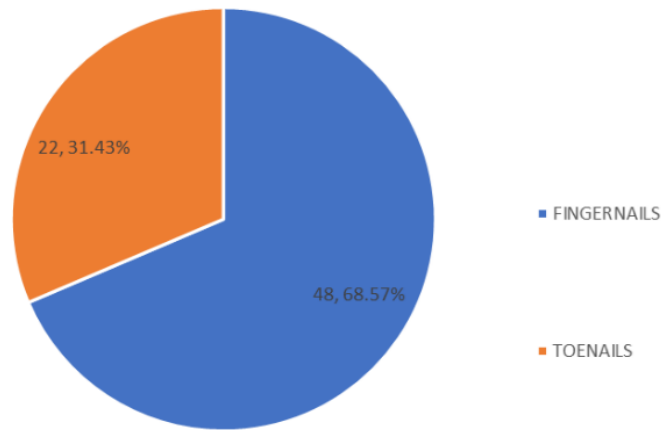


In this study, fingernails were more common being involved in 68.57% of patients while toenails were involved in 31.43% of patients [Table-3, Figure-3].

Table 3: Nails Affected Of The Patients

NAILS AFFECTED	NO. OF PATIENTS	PERCENTAGE(%)
FINGERNAILS	48	68.57
TOENAILS	22	31.43
TOTAL	70	100

Figure 3: Nails Affected Of The Patients

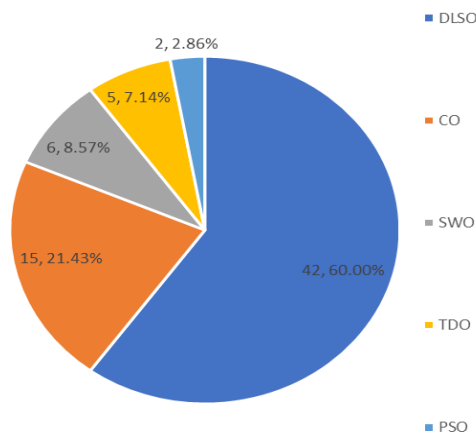


DLSO was the most common clinical type to be observed in 60% of patients followed by CO in 21.43%, SWO in 8.57%, TDO in 7.14% and PSO in 2.86% of patients [Table-4, Figure-4].

Table 4: Clinical Pattern Of Disease

CLINICAL PATTERN	NO. OF PATIENTS	PERCENTAGE(%)
DLSO	42	60
CO	15	21.43
SWO	6	8.57
TDO	5	7.14
PSO	2	2.86
TOTAL	70	100

Figure 4: Clinical Pattern Of Disease

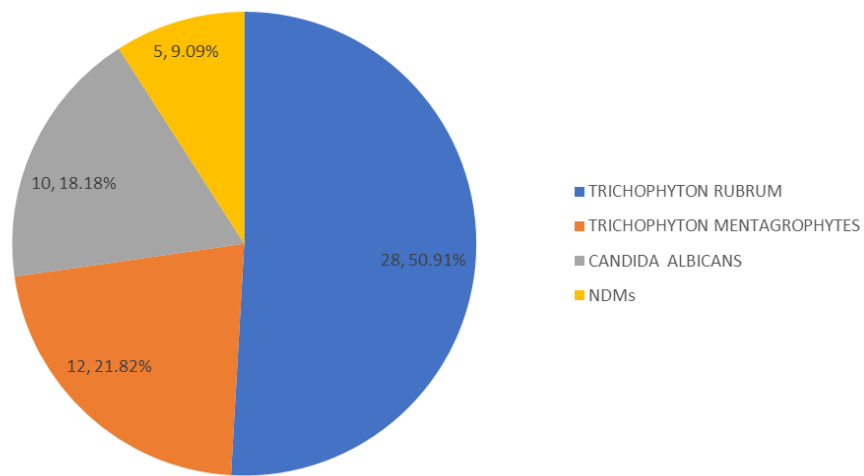


Out of 70 patients, 55 (78.57%) were positive by culture and KOH mount. The most common organism isolated is *Trichophyton rubrum* in 50.91% cases followed by *Trichophyton mentagrophytes* in 21.82%, *Candida albicans* in 18.18% cases and NDM in 9.09% cases [Table-5, Figure-5].

Table 5: Culture Findings

FUNGUS ISOLATED	NO. OF CASES	PERCENTAGE (%)
TRICHOPHYTON RUBRUM	28	50.91
TRICHOPHYTON MENTAGROPHYTES	12	21.82
CANDIDA ALBICANS	10	18.18
NDMs	5	9.09
TOTAL	55	100

Figure 5: Culture Findings



In this study, the common risk factors observed were involvement in sports activities like swimming and running (54.29%), history of nail trauma (11.43%), use of occlusive modern footwear (21.43%), history of fungal infections (8.57%) and immunosuppression (4.28%) (due to HIV, pulmonary tuberculosis) [Table-6, Figure-6].

Figure 6: Risk Factors And Associated Conditions

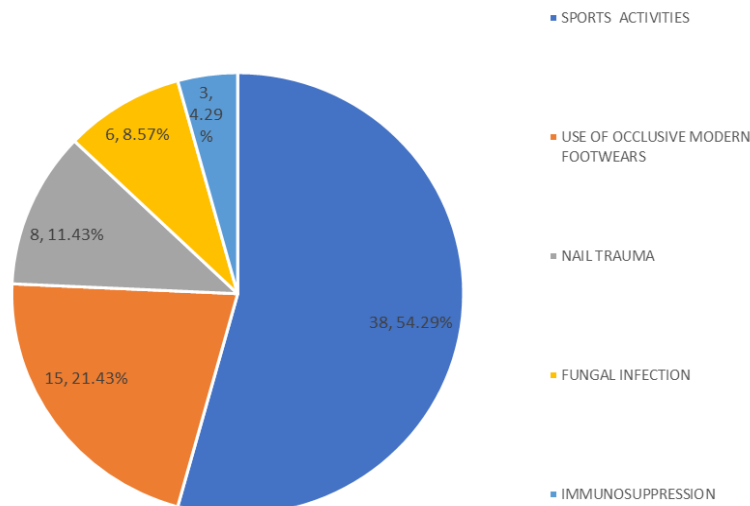


Table 6: Risk Factors And Associated Conditions

RISK FACTORS	NO. OF CASES	PERCENTAGE (%)
SPORTS ACTIVITIES	38	54.29
USE OF OCCLUSIVE MODERN FOOTWEARS	15	21.43
NAIL TRAUMA	8	11.43
FUNGAL INFECTION	6	8.57
IMMUNOSUPPRESSION	3	4.28
TOTAL	70	100

DISCUSSION

Onychomycosis is a chronic fungal infection of fingernails and/or toenails leading to gradual destruction of the nail plate. It is confirmed by clinical examination along with direct microscopy and fungal culture [8].

In this study, we evaluated the clinical and cultural pattern of onychomycosis along with its risk factors and associated conditions. DLSO was the most common clinical type to be observed which is in accordance with the report by Grover et al [9]. The most common organism isolated is *Trichophyton rubrum* followed by *trichophyton mentagrophytes* which concurs with the study done by Adhikari et al [10]. Fingernail involvement was common in females and toenail involvement was common in males, also confirmed by other authors [11]. Such pattern is due to the fact that females do household wet work as laundry and house cleaning that required them to put their hands in water for long time and are more concerned about cosmetic appearance of their nails. Toenail involvement is higher in males due to their participation in sports activities like running and wearing of occlusive modern footwear. In this study, the common risk factors observed are the presence of nail trauma, sports activities like swimming and running, history of fungal infections, use of occlusive footwear and immunosuppression (due to HIV, pulmonary tuberculosis).

Limitation Of The Study

Limitations of our study include its small sample size and short duration of follow ups.

CONCLUSION

Onychomycosis was predominant among patients of middle age with female preponderance. DLSO was the most common clinical type and *trichophyton rubrum* was the most common fungal isolate. It could serve as a chronic reservoir of infection, which give rise to mycotic infections of the skin. Hence it is wise to search for and treat onychomycosis in those with recurrent cutaneous superficial fungal infections.

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