Onychomycosis: A clinico-epidemiological study

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ABSTRACT

Onychomycosis is a common nail disorder. Far more than being a simple cosmetic problem, infected nail serves as a chronic reservoir, which can give rise to repeated mycotic infections. The study was undertaken to determine the various clinical patterns of onychomycosis. This prospective cross sectional study was conducted in clinically suspected patients of onychomycosis attending out patients department of dermatology, T.U. Teaching hospital between August 2006 and July 2007. Various data were obtained and clinical patterns were noted. Out of 182 clinically suspected patients of onychomycosis, 52.7% were males with male: female ratio of 1.1:1. Onychomycosis was predominant among the younger patients with slight male preponderance. Fingernails were more frequently involved in females whereas toenails in males. The most common clinical type was distal and lateral subungual onychomycosis. 58.2% had other concomitant fungal infections apart from onychomycosis. Onychomycosis could serve as a good reservoir for recurrent cutaneous superficial fungal infections. Hence, adequate treatment of onychomycosis can prevent from these recurrent cutaneous superficial fungal infections.

Keywords: DLSO, Nepal, onychomycosis, PSO, WSO.

INTRODUCTION

Onychomycosis (OM) is a common superficial fungal infection in both developed and developing countries. It may involve any component of the nail unit, including the nail matrix, the nail bed, or the nail plate. It represents up to 20.0% of all nail disorders.[1] Its prevalence is estimated at 2 to 18 percentage worldwide and up to 48-percentage incidence by age 70.[2] Onychomycosis can be caused by dermatophyte mold, yeasts and non-dermatophyte mold.

Onychomycosis can be divided into four major clinical types:[3]

1. Distal and lateral subungual onychomycosis (DLSO), 2. Proximal subungual onychomycosis (PSO), 3. White superficial onychomycosis WSO), 4. Candidial onychomycosis (CO).

DLSO, the most common form, begins as a whitish to brownish-yellow opacification at the distal edge of the nail or near the lateral nail fold. As the infection progresses, subungual hyperkeratosis leads to onycholysis. Increasing invasion of the ventral nail plate makes it thick, discolored, and friable.

Early PSO is evident as a white to beige opacity on the proximal nail plate that may gradually enlarge to affect the entire nail. It is particularly common in AIDS patients.

WSO is recognized as white to dull yellow sharply bordered patches anywhere on the surface of the toenail. The affected areas are rough and friable, and may coalesce with time.

CO is rare, affecting either the fingernails or toenails of those with chronic mucocutaneous candidiasis. Nailbed thickening also occurs and may be severe enough to create "Pseudoclubbing". It resembles DLSO. In contrast to DLSO, a paronychial inflammatory response is often present, and subungual debris does not accumulate.

The etiology of this condition is multifactorial. The factors that increase the prevalence of onychomycosis include increasing age, male sex, underlying conditions such as diabetes, immunodeficiency, peripheral arterial disease and psoriasis, environmental and behavioral factors such as sporting and religious practices and certain professions. Genetics has also been identified as a factor governing the epidemiology of onychomycosis. In view of this, our study was carried out to study the clinico-epidemiological aspect of onychomycosis.

MATERIALS AND METHODS

It was a prospective cross-sectional study and was carried out from August 2006 to July 2007 at the department of Dermatology, TU Teaching Hospital, Kathmandu. All the patients with clinical suspicion of onychomycosis were included in the study. Prior consent was taken and

Table-1: Occupationwise distribution of the patients

Occupation	Frequency	%
Students	57	31.3
Farmer	15	8.2
Housewives	52	28.5
Office workers	40	22.0
Miscellaneous	18	10.0

Table-2: Nail involvement according to gender

Gender	SITE			Total
	Both	Finger nail	Toe nail	
Male	16	32	48	96
Female	10	54	22	86
Total	26	86	70	182

patient's data were recorded in a preset proforma that included a demographic data, patient's detailed history, specific data related to risk factors for onychomycosis (physical activities; use of occlusive footwear; involvement in wet work; occupation), predisposing diseases such as diabetes, cardiovascular disease, and previous onychomycosis; family history; findings of clinical examination and investigations. The morphological types of onychomycosis were documented as DLSO, PSO, WSO and CO. It was classified as DLSO if there was discoloration, onycholysis, subungual hyperkeratosis, and nail thickening affecting the distal and/or lateral nail plate, as PSO if discoloration and onycholysis affected the proximal part of the nail, as WSO if white opaque spots were present on the nail surface and as CO if it was associated with paronychia and distal and lateral onycholysis. All of them were examined for the evidence of other fun-gal infections or coexistent cutaneous diseases. Analyses of these data were done by SPSS software, version 10.0 for Windows. P value was calculated using chi-square test and p value of < 0.05 was taken as statistically significant.

RESULTS

A total of 182 patients with clinical suspicion of onychomycosis were included in the study. The age of the patients studied varied from 4 years to 73 years. Mean age of the patient was 32.9 ±15.1 years. Maximum number of our patients (70.0%) was between 10 and 40 years of age (Fig. 1). Most of the patients (77.5%) were from hilly region followed by 21.4% from terai and least was from the mountain region. Males were more than females. Male to female ratio was1.1:1. Most of the patients were students (31.3%) followed by housewives (Table-1). 56.2% of patients with toe nail involvement agreed with wearing occlusive footwear. Occupational involvement in wet work was seen in 41.8% of the patients. Duration of the disease at the time of pre-sentation varied from 1 month to 15.8 years. Majority of them had the disease of less than 6 months duration. Only 20 % of the patients had the disease of more than 2 years duration (Fig. 2). 16 (8.8%) patients were diabetic. Previously diagnosed diabetes mellitus irrespective of the duration and blood glucose level were included in this group. 14.3% of patients gave family history of onychomycosis. Finger nails were more commonly involved than toe nails. In female patients finger nail infection was more common than toenail infection. It was reverse in male patients (Table-2).

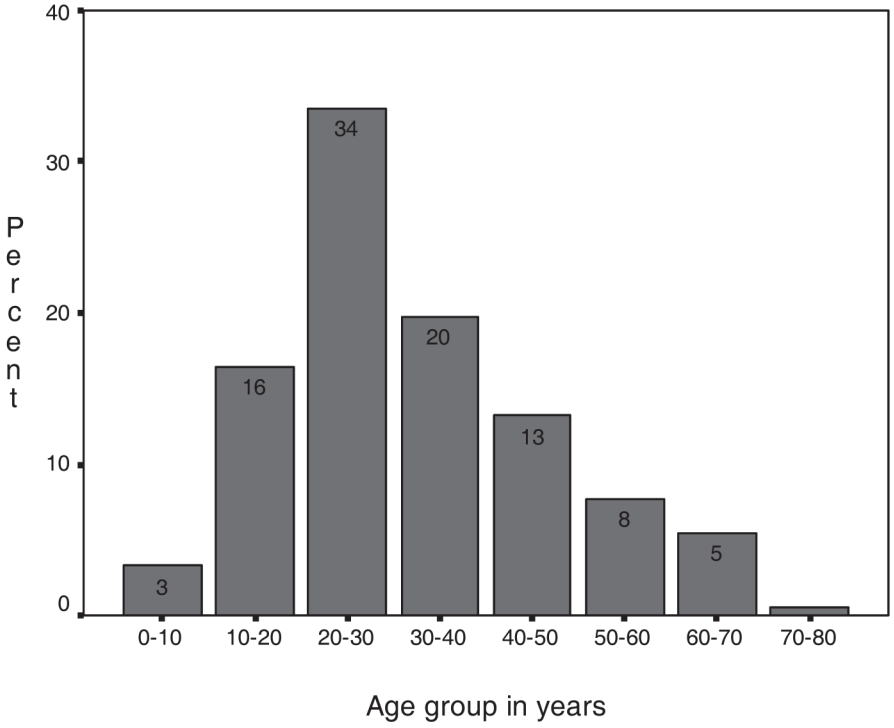

Fig. 1. Age distribution of the patients.

DLSO was the most common clinical type to be observed followed by CO, WSO and PSO. DLSO was most commonly observed among male patients whereas CO among female patients, which was statistically significant (Table-3).

58.2% had other concomitant fungal infections apart from onychomycosis. Tinea pedis was the most commonly associated fungal infection with onychomycosis (Table-4).

Table-3: Frequency of various clinical types according to gender.

Gender	Clinical types				Total
	DLSO	CO	WSO	PSO	
Male	86	1	8	1	96
Female	61	25	0	0	86
Total	147	26	8	1	182
P value	0.001	<0.001	0.007	1.0	<0.001

DISCUSSION

Onychomycosis is a chronic mycotic infection of fingernails and toenails that affects the quality of life in a significant proportion. There has been a recent increase in the incidence as well as the spectrum of causative pathogens associated with onychomycosis.

Majority of our patients (70.0%) were between the ages of 10 and 40 years. This is in accordance with reports by Garg *et al*[4] and Bokhari *et al*,[5] but contrasts with the findings of other reports.[6,7] A sizeable number (52.7%) of our patients were between 21 and 40 years of age that is in accordance with reports by Sujatha *et al*,[8] Agarwalla *et al*[9] and Grover *et al*.[10] This could be attributed to the fact that onychomycosis may be considered a cosmetic problem by the younger patients who are more conscious of their appearance, who come forward for therapy. This increased incidence in younger population could also be because of their exposure to occupation related trauma, predispos-ing them to onychomycosis.

Various studies have shown no sex differences in the prevalence of onychomycosis.[11] A slightly higher incidence was observed in our study with male to female ration of 1.1:1, which is similar to the study by Ching *et al*.[12] and Wang *et al*.[13]

The higher incidence among the students may be due to the wearing of occlusive shoes throughout daytime. In a study conducted in Eastern Nepal, the study population mainly constituted of farmers.[9] This difference observed could be due to the difference in sampling population as our study was based in Kathmandu, which is the capital city where young populations may have been concentrated for higher education. Housewives had predominated in the study conducted by Jesudanam TM.[14]

Table-4: Frequency of concomitant fungal infections.

Concomitant fungal infections	Frequency	(%)
Tinea pedis	46	25.3
Chronic paronychia	26	14.3
Interdigital intertrigo	14	7.7
Tinea corporis	8	4.4
Tinea mannum	6	3.3
Tinea capitis	6	3.3
None	76	41.8
Total	182	100.0

In the present study, 17.6% of patients were smokers that were irrespective of the frequency and duration of smoking. Heavy smokers had constituted 8.0% of study population according to the report of Veer P.[15]

41.8% of the patients were involved in wet work related either to their occupation or hobbies which is nearly similar to the report by Jesudanam *et al*.[14]

High proportion of our patients with toe nail involvement agreed with wearing of occlusive footwear. Occlusive footwear was also the commonest predisposing factor in other study.[15]

Maximum patients (66.0%) had the disease for less than 1 year duration which was similar to the findings of other studies.[8,14] This may be due to the fact that if the nail changes remain for a longer time they are used to living with it and may consider it as a part of normal physiology.

A high incidence of onychomycosis of the toe nails have been reported by various authors.[13] The increased incidence of finger nail involvement in our study is in agreement with reports of other authors.[9,10,16] This may be because the finger nail infection is more likely than the toe nail infection to arouse the patients concern, driving them to seek medical attention as most of our patients were young. And higher risk of exposure to trauma to the finger nails must be considered. Finger nail involvement was commoner in females whereas toe nail involvement was commoner in males, also confirmed by other authors.[17] Such pattern of involvement may be due to greater involvement of women in household works and men wearing occlusive footwear.

DLSO was the predominant type observed in the present study which is comparable to the findings of other authors.[9,10,13] CO was recorded in 14.3% of patients, which is higher than that observed by Sujatha *et al*[8] and Veer *et al*[15] but lower than that recorded by Jesudanam *et al*.[14]

Ching *et al*[12] and Wang and colleague[13] had recorded 62.4% and 62.6% of concomitant fungal infections respectively. In the present study, 58.2% of onychomycosis was accompanied by superficial fungal infection at other sites. Tinea pedis was the most common concomitant fungal infection followed by chronic paronychia.

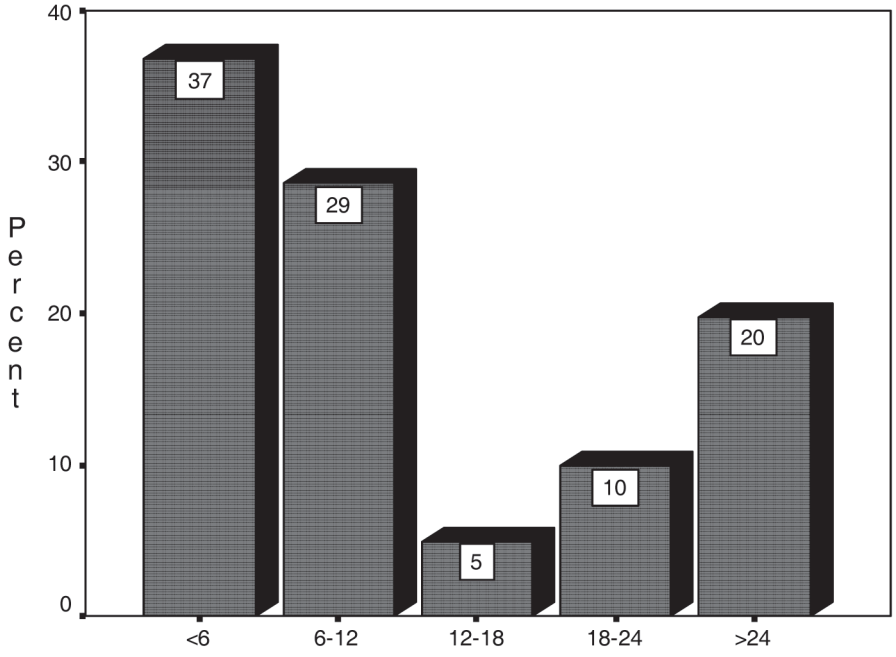

Fig. 2. Duration of the disease

It is recommended that a longer study from a more representable population covering wider geographical areas, preferably by including non-dermatology out patients, could reinforce or remodulate the true picture of this fairly common condition.

In conclusion, onychomycosis was predominant among the younger patients with slight male preponderance. DLSO was the most common clinical type. Fingernail involvement was more common than toe nail involvement. Onychomycosis could serve as a good reservoir for recurrent cutaneous superficial fungal infections. Hence, it is wise to search for and treat onychomycosis in those with recurrent superficial fungal infections of the skin.

REFERENCES

1) Weitzman I, Summerbell RC. The dermatophytes. *Clin Microbiol Rev* 1995; 8:240-59.
2) Nelson MM, Martin AG, Heffernan MP. Superficial Fungal Infections: Dermatophytosis, Onychomycosis, Tinea nigra, Piedra. In: Freedberg IM, Eisen AZ, Wolff K, Austen KF, Goldsmith LA, Stephen IK, editors. Fitzpatrick's Dermatology in General Medicine. 6th ed. New York: Mc Graw- Hill Medical Publishing Division, 2003: 1989-2005.
3) Evans EGV. Onychomycosis: Challenges for diagnosis: In: Proceedings of the 2nd International Symposium on Onychomycosis. Florence, Italy 1995 Gardiner Caldwell Communications Ltd. 1996: 710.
4) Garg A, Venkatesh V, Singh M, Pathak KP, Kaushal GP, Agrawal SK. Onychomycosis in central India: a clinicoetiologic correlation. *Int'l J Dermatol* 2004; 43: 498–502.
5) Bokhari MA, Hussain I, Jahangir M, Haroon TS, Aman S, Khurshid K. Onychomycosis in Lahore, Pakistan. *Int'l J Dermatol* 1999; 38: 591-5.
6) Heikkila H, Stubb S. The prevalence of onychomycosis in Finland. *Brit J Dermatol* 1995; 133: 699-703.
7) Pierard GE, Arrese JE, Pierard-Franchimont C. Heterogeneity in fungal nail infections and life threatening onychomycosis. *Brit J Dermatol* 1994; 131: 805.
8) Sujatha V, Grover S, Dash K, Singh G. A clinico - mycological evaluation of onychomycosis. *Indian J Dermatol Venereol Leprol* 2000; 66: 238-40.
9) Agarwalla A, Agrawal S, Khanal B. Onychomycosis in Eastern Nepal. *Nepal Med Coll J* 2006; 8: 215-9.
10) Grover S. Clinico-mycological evaluation of onychomycosis at Bangalore and Jorhat. *Indian J Dermatol Venereol Leprol* 2003; 69: 284-6.
11) Roberts DT. Prevalence of dermatophyte onychomycosis in the United Kingdom. *Brit J Dermatol* 1992; 126: 23-7.
12) Ching CC, Wang SH, Chou MC. The causative pathogens of onychomycosis in southern Taiwan. *Mycoses* 2005; 48: 413-20.
13) Wang SH, Ching CC. Onychomycosis in Taiwan. *Int'l J Clin Prac* 2005; 59: 906-11.
14) Jesudanam TM, Rao GR, Lakshmi DJ, Kumari GR. Onychomycosis: A significant medical problem. *Indian J Dermatol Venereol Leprol* 2002; 68: 326-9.
15) Veer P, Patwardhan NS, Damle AS. Study of onychomycosis: Prevailing fungi and pattern of infection. *Indian J Med Microbiol* 2007; 25: 53-6.
16) Rigopoulos D, Katsiboulas V, Koumantaki E, Emmanouil P, Papanicolaou A, Katsambas A. Epidemiology of onychomycosis in southern Greece. *Int'l J Dermatol* 1998; 37: 925-8.
17) Vijaya D, Anandkumar BH, Geetha SH. Study of onychomycosis. *Indian J Dermatol Venereol Leprol* 2004; 70: 185-6.