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Fungal infection in nail psoriasis: An existence to consider

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Abstract--Introduction: Onychomycosis is a common superficial fungal infection of nail 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. Its prevalence is estimated at 2 to 18 percentage worldwide and up to 48-percentage incidence by age 70. Onychomycosis can be caused by dermatophyte mold, yeasts and non dermatophyte mold. We planned this study to determine the frequency of onychomycosis in psoriatic nails to establish the local perspective as the international studies shows wide variation. Objective: To find the presence of fungal elements in nails of patients affected by psoriasis. Setting: Dermatology (OPD), Baqai Medical University. Duration: 06 months from 15th July 2022 - 15th Dec 2022. Design: Descriptive Cross-sectional study. Results: In this study, out of 96 cases, 32.29% (n=31) of patients were between 18-40 years and 67.71% (n=65) were between 41-70 years of age, mean+SD: 47.32+11.94 years. In gender 60.42%(n=58) were male and 39.58%(n=38) were female, duration of psoriatic nail changes were recorded as 38.54% (n=37) between 1-3 years, 45.83% (n=44) between 3-5 years and 15.63%(n=15) had >5

years, mean+SD was calculated as 3.58+1.97 years, frequency of onychomycosis in psoriatic nails was recorded in 54.17% (n=52) while 45.83%(n=44) had no findings of the morbidity. Conclusion: We concluded that frequency of onychomycosis is high among patients with psoriatic nails and comparable with other studies. So, it is recommended that every patient who presents with psoriatic nails, should be evaluated for onychomycosis. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

Keywords---Psoriatic nails, Onychomycosis, Frequency.

Introduction

Psoriasis is a chronic, inflammatory, relapsing, remitting, autoimmune disorder with genetic and environmental influence, characterized by erythematous, silvery, scaly plaques on the skin.^{1,2,3} Joints and nails can also be involved in addition to the skin. Nail involvement varies considerably and is seen in 15-86 % of all patients with psoriasis and around 75-86% in patients with psoriatic arthropathy.^{1,4} Nail changes in psoriasis include pitting, onycholysis, subungual hyperkeratosis, nail plate discoloration, uneven nail surface, splinter hemorrhages.^{2,5,10} The variable combination of these dystrophic changes in psoriatic nails disrupts the natural preventive barrier allowing colonization by fungi.^{1,5,6}

The most common nail disease, Onychomycosis, an infection of the nail unit by fungi, constitutes half of all onychopathies.⁷ Factors such as increasing age, male gender, repeated nail trauma, genetic predisposition, diabetes mellitus, peripheral vascular disease, immunosuppression, psoriasis and sports (swimming) have been associated with increased incidence of onychomycosis.^{7,8}

Morphological changes associated with onychomycosis closely resemble that of dystrophic psoriatic nail changes.^{9,10} Occurrence of fungal infection in psoriatic nails have negative synergistic effect on nail morphology.⁶ It is possible to have both at the same time. This can complicate the process of getting an accurate diagnosis. Because their treatments are fundamentally different, anti-inflammatory-immunosuppressive for psoriasis and anti-infective for onychomycoses, an exact diagnosis is crucial for their management.⁸

The distressing appearance of psoriatic nails have negative impact on patients social and working life and a cause of significant discomfort.⁹ Moreover, the co-existent onychomycosis aggravates the situation with a reported frequency of 4%-60%.^{2,11}

The relationship between fungal infection of nails and psoriasis of nails is controversial in the literature and varies widely according to the geographic region of the study. However there is limited local data available to emphasize this fact. So the rationale of my study is to highlight the local perspective of this coexistence.

Objective: To find the presence of fungal elements in nails of patients affected by psoriasis.

Operational Definitions

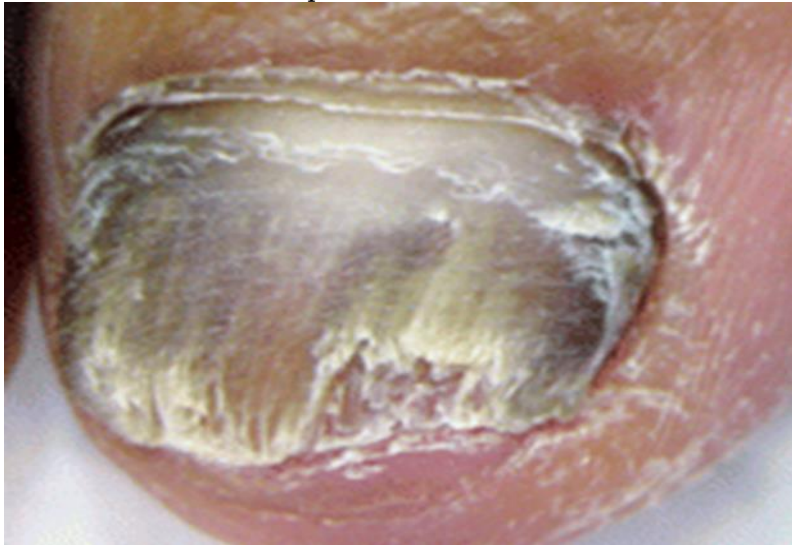
1. Psoriatic nails: (Fig:1)

Presence of either or combination of following nail changes in psoriasis patients.

a. Onycholysis: white area of nail plate due to functional separation of nail plate from its underlying attachment.

b. Subungual hyperkeratosis: abnormal scaling of nail bed and hyponychium causing lifting of nail plate.

c. Discoloration: diffuse or patchy, yellow-brown, pink or green discoloration of nail plate



(Fig. 1) Onycholysis, subungual hyperkeratosis, as well as nail thickening and discoloration

2. Onychomycosis:

Presence of any one or more of following – branching hyphae, pseudohyphae and blastospores on direct microscopy and culture of nail showing fungal colonies was labeled as onychomycosis.

Methodology

Design: Descriptive Cross-sectional study

Setting: Study will be conducted at department of dermatology, Fatima Hospital, BMU.

Sampling technique: Nonprobability consecutive.

Sample Size: Sample size of 96 adult subjects (patients of psoriatic nail changes) will be required for above study on the basis of previous study which shows that onychomycosis was diagnosed in 55% of patients with psoriasis¹ at 95% CI with 10% precision. Using Computer program “Open Epi Version 2 for calculation of the sample size.

Ref: <http://www.openepi.com/SampleSize/SSPropor.htm>

Sample Selection

Inclusion criteria:

- Patients with either gender.
- Age 18 - 70yrs.
- Clinically diagnosed cases of psoriasis with nail changes including subungual hyperkeratosis, onycholysis, discolouration, either alone or in combination of more than 6 months duration involving one or more nails.

Exclusion Criteria:

- Patients with known diabetes, peripheral vascular disease, nail trauma, and on immunosuppressive therapy.
- Patients on topical/ systemic antifungal treatment for any indication in the last 4 weeks.

Data collection procedures

After approval from ethical committee of hospital the study was conducted by researcher in OPD of dermatology unit, Fatima Hospital BMU. Patients meeting the inclusion criteria were included after taking an informed consent and detailed history at their first visit and are then referred to laboratory.

In laboratory, nail clippings and subungual keratinous debris from clinically affected nails either finger or toe was taken using sterile instrument after thorough cleaning with 70% ethyl alcohol and subjected to direct microscopy using 30% KOH to determine the presence of the septate branching hyphae, the pseudohyphae and blastospores. The samples showing fungal elements on direct microscopy was called KOH +ve and those not showing were called KOH -ve. Part of each sample was placed on culture medium - Sabaraud's Dextrose Agar (SDA). The presence of fungal colonies on culture medium irrespective of species was considered culture positive.

Diagnosis of onychomycosis is made if direct microscopic examination and fungal culture of nail clippings shows evidence of fungal infection. All data was entered in precise proforma.

Statistical Analysis

Data feeding and analysis will be on computer package SPSS v. 21 (Statistical Package for Social Sciences). A descriptive statistical analysis of continuous and categorical variables will be performed. Data on continuous variables include age and duration of psoriatic nails changes, will be presented as Mean \pm SD and data on categorical variables include gender, onychomycosis, and number of nails involved, will be presented in terms of frequencies and percentages. Stratification will be done with regards to age, gender, duration of psoriatic nail changes and number of nails involved and post stratification chi-square test will be applied. In all statistical analysis only p-value <0.05 will be considered as significant.

Results

A total of 96 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of onychomycosis in psoriatic nails. Age distribution of the patients was done which shows that 32.29% (n=31) were between 18-40 years and 67.71% (n=65) were between 41-70 years of age, mean+SD: 47.32+11.94 years. (Table No. 1)

Table no. 1 age distribution
(n=96)

Age(in years)	No. of patients	%
18-40	31	32.29
41-70	65	67.71
Total	96	100

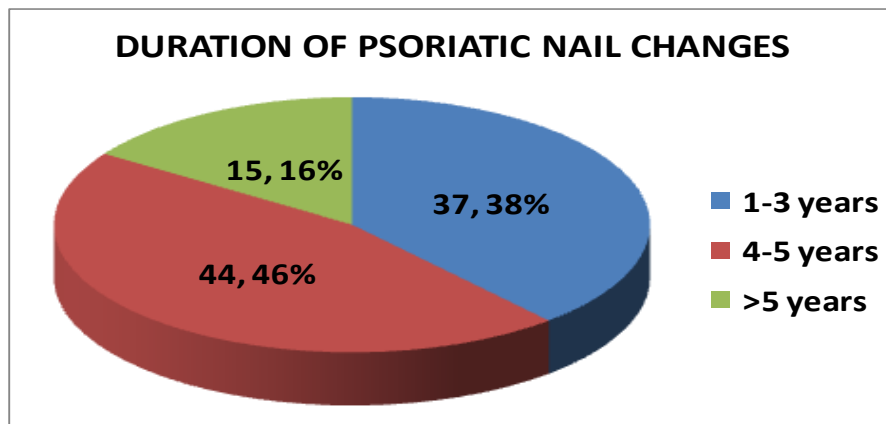
Mean±SD: 47.32±11.94

Gender distribution of the patients was done which shows that 60.42% (n=58) male and 39.58% (n=38) were female. (Table No. 2)

Table no. 2 Gender distribution
(n=96)

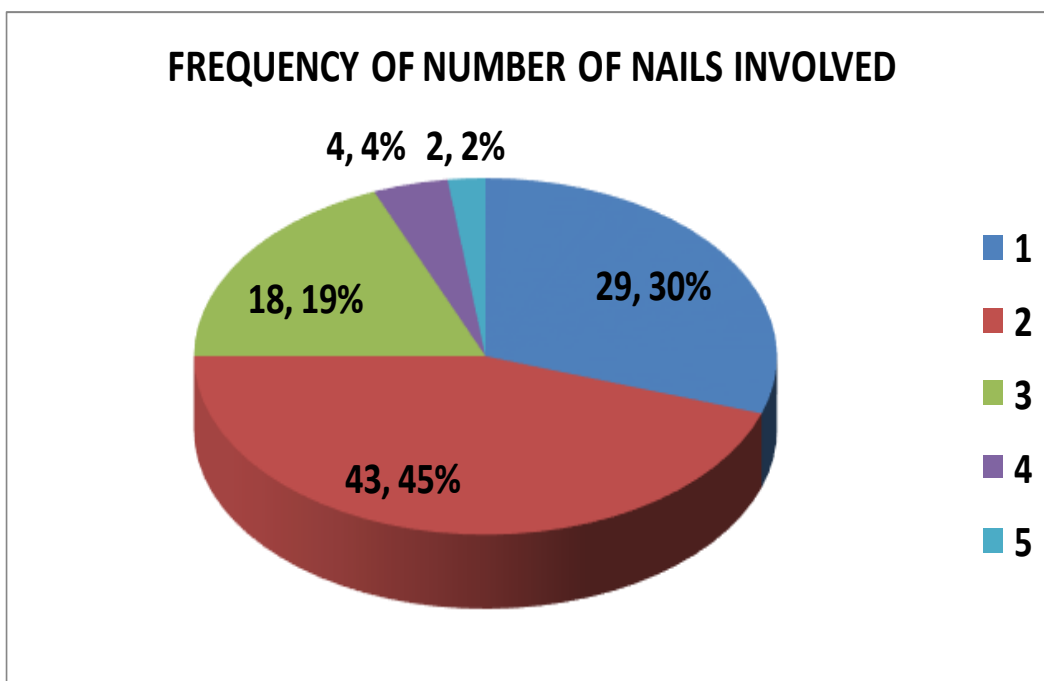
Gender	No. of patients	%
Male	58	60.42
Female	38	39.58
Total	96	100

Duration of psoriatic nail changes were recorded as 38.54% (n=37) between 1-3 years, 45.83% (n=44) between 4-5 years and 15.63% (n=15) had >5 years, mean+SD was calculated as 3.58+1.97 years. (Graph No. 1)



Graph 1: Duration of Psoriatic Nail Changes (n = 96)

Frequency of number of nails involved are recorded, where 30.21%(n=29) had 1 nail involved, 44.79%(n=43) had 2 nails involved, 18.75%(n=18) had 3 nails involved, 4.17%(n=4) had 4 while 2.08%(n=2) had 5 involved nails. (Graph No. 2)

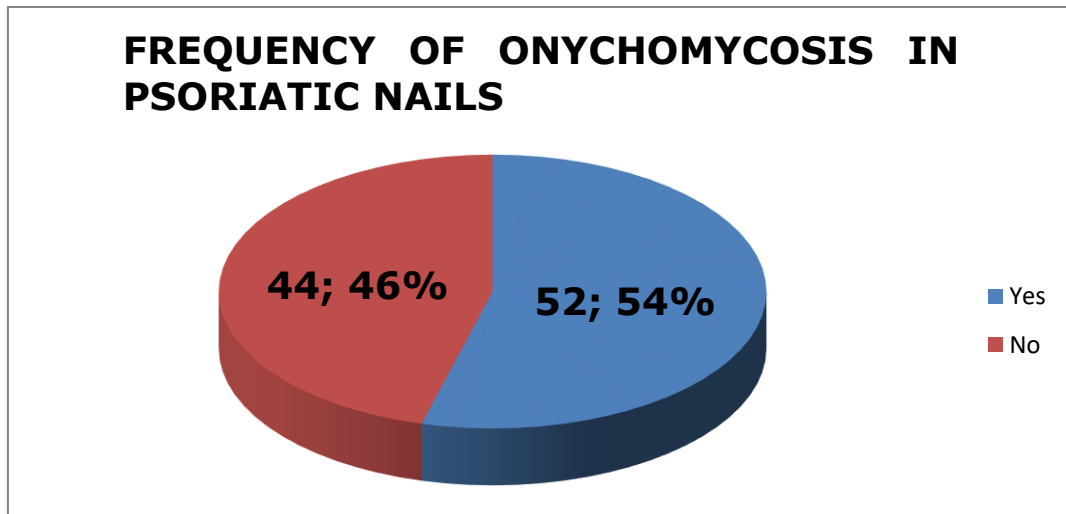


Graph No. 2: Frequency of Number of Nails Involved (n = 96)

Frequency of onychomycosis in psoriatic nails was recorded in 54.17% (n=52) while 45.83% (n=44) had no findings of the morbidity. (Table No. 3/ Graph No. 3)

Table no. 3 Frequency of onychomycosis in psoriatic nails (n=96)

Onychomycosis	No. of patients	%
Yes	52	54.17
No	44	45.83
Total	96	100



Graph No.3 Frequency of Onychomycosis in Psoriatic Nails (n=96)

Stratification for frequency of Onychomycosis in psoriatic nails with regards to age was recorded which shows that out of 52 cases, 25%(n=13) were between 18-40 years and 75% (n=39) were between 41-70 years, p value was calculated as 0.00 which shows that elderly age is at significantly higher risk of the morbidity. (Table No. 4)

Table no. 4 Stratification for frequency of onychomycosis in psoriatic nails with regards to age (n=52)

Age(in years)	No. of patients	%
18-40	13	25
41-70	39	75
Total	52	100

P value= 0.000

Stratification for frequency of Onychomycosis in psoriatic nails with regards to gender was recorded which shows that out of 52 cases, 63.46%(n=33) were between male and 36.54%(n=19) were females, p value was calculated as 0.006 which shows that male gender is at significantly higher risk of the morbidity. (Table No. 5)

Table no. 5: Stratification for frequency of onychomycosis in psoriatic nails with regards to gender distribution (n=52)

Gender	No. of patients	%
Male	33	63.46
Female	19	36.54
Total	52	100

P value=0.006

Stratification for frequency of Onychomycosis in psoriatic nails with regards to duration of psoriatic nail changes was recorded which shows that out of 52 cases, 78.85%(n=41) were between 1-5 years of duration while 21.15%(n=11) had >5 years of duration, p value was calculated as 0.000. (Table No. 6)

Table no. 6: Stratification for frequency of onychomycosis in psoriatic nails with regards to duration of psoriatic nail changes (n=52)

Duration (in years)	No. of patients	%
1-5	41	78.85
>5	11	21.15
Total	52	100

P value=0.000

Stratification for frequency of Onychomycosis in psoriatic nails with regards to number of nails involved was recorded which shows that out of 52 cases, 65.38%(n=34) had 1-2 nails involved while 34.62%(n=18) had 3-5 nails involved, p value was calculated as 0.001. (Table No. 7)

Table no. 7: Stratification for frequency of onychomycosis in psoriatic nails with regards to number of nails involved (n=52)

No. of nails involved	No. of patients	%
1-2	34	65.38
3-5	18	34.62
Total	52	100

P value=0.00

Discussion

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.^{12, 13} Its prevalence is estimated at 2 to 18 percentage worldwide and up to 48-percentage incidence by age 70.^{12, 14} Onychomycosis can be caused by dermatophyte mold, yeasts and nondermatophyte mold.

Psoriatic nail disease may be a predisposing condition for secondary invasion by the fungi. Many psoriatic patients have nail changes which morphologically resemble onychomycosis, and in such patients further differential diagnostic procedures are essential to exclude the presence of coexisting fungal infection. Onychomycosis playing a role in the initiation or the worsening of nail changes in psoriasis patients is also possible but it is more difficult to substantiate.

The current study was planned to determine the frequency of onychomycosis in psoriatic nails to establish the local perspective as the international studies shows wide variation. In future, strategies may be developed for early detection and treatment of concomitant fungal infection, which may help in improving the dystrophic nail changes of psoriasis.

In our study, 32.29%(n=31) were between 18-40 years and 67.71%(n=65) were between 41-70 years of age, mean+SD: 47.32+11.94 years, 60.42%(n=58) male and 39.58%(n=38) were female, duration of psoriatic nail changes were recorded as 38.54%(n=37) between 1-3 years, 45.83%(n=44) between 3-5 years and 15.63%(n=15) had >5 years, mean+SD was calculated as 3.58+1.97 years, frequency of onychomycosis in psoriatic nails was recorded in 54.17%(n=52) while 45.83%(n=44) had no findings of the morbidity.

Various studies have shown sex differences in the prevalence of onychomycosis. A slightly higher incidence was observed in our study with male to female, which is similar to the study Gupta et al.¹⁵ and by Babayani et al.¹⁶ The findings of the study are in agreement with a study by Leibovici *et al.* who shows that onychomycosis was diagnosed in 47.6% of patients with psoriasis.¹⁷ In other studies 80% of psoriasis patients had nail abnormalities. This is in accordance with some more studies.^{18,19, 20}

Kyriakou A et al²³ and Chularojanamontri L²⁵ concluded that nail psoriasis constituted a risk factor for onychomycosis specifically by dermatophytes. Other studies by Gallo L et al²² Chaowattanapanit S et al²⁴ and Wang S et al²⁶ reported a higher probability of yeast infection, while Tsentemeidou A., et al²⁷ reported a higher probability of non-dermatophytic infection in psoriatic nails, but they all also concluded that the frequency of onychomycosis in psoriatic patients did not differ much from the occurrence of onychomycosis in non psoriatics. In some studies nail changes vary according to the anatomical sites. The most common fingernail change observed was pitting followed by onycholysis,^{20, 21} in our study being the limitation of the study we did not recorded the site of the nail involved in the morbidity.

Conclusion

We concluded that frequency of onychomycosis is high among patients with psoriatic nails and comparable with other studies. So, it is recommended that every patient who presents with psoriatic nails, should be screened for onychomycosis. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

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