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## Original Article

# Prevalence of Onychomycosis in Patients with Psoriasis: Mycological, Pathological and Dermoscopic Study

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## ABSTRACT

### Article information

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**Background:** Onychomycosis, a common nail infection caused by dermatophytes, yeast, and molds, makes up roughly half of all nail conditions worldwide and is the most prevalent nail disorder globally. Clinically, nail psoriasis and onychomycosis can frequently be difficult to differentiate from one another and may exacerbate each other's progression.

**The aim of the work:** The purpose of this study was to use mycological, histological, and dermoscopic techniques to evaluate the prevalence of onychomycosis in individuals with nail psoriasis.

**Patients and Methods:** A cross-sectional investigation was conducted on 30 patients. Patients with psoriasis and nail lesions who were not taking antifungal medication or affected by other dermatological conditions were recruited from the dermatology outpatient clinic between February 2021 and March 2023. A thorough clinical examination and history were conducted for each patient included. Additionally, nail samples were collected for dermoscopic examination, culture, direct microscopy with 20% KOH solution, and nail clipping with PAS stain.

**Results:** The 30 recruited patients ranged in age from 6 to 68 years old [mean  $\pm$ SD 24.06 $\pm$ 19.2], including 23 men and 7 women. Twenty percent of patients [six] had onychomycosis. Dermatophytes were isolated from 3.3% of patients, yeast from 16.6% of patients, and non-dermatophytic mold from 80% of patients. Histopathological results revealed fungal hyphae and spores in 16.6% of patients. The most prevalent dermoscopic sign in psoriatic patients with onychomycosis was spikes [83.3%] with statistical significance [P-value < 0.005] followed by subungual hyperkeratosis, while nail pitting was the most prevalent dermoscopic feature in nail psoriasis [89.7%].

**Conclusion:** This work paves the way for an accurate diagnosis of nail lesions by highlighting the importance of cooperation between mycology, histology, and dermoscopy in diagnosing onychomycosis in patients with nail psoriasis.

**Keywords:** Mycology; Dermoscopy; Histopathology; Dermatophytes.



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## INTRODUCTION

Psoriasis is characterized clinically by skin lesions and extracutaneous comorbidities side by side to systemic inflammation <sup>[1]</sup>. Erythematous, indurated, and scaling plaques with discomfort, itching, and a burning feeling are typical cutaneous signs of psoriasis <sup>[2]</sup>.

A fungal infection of the nail unit, specifically the nail bed, known as onychomycosis results in gradual changes to the nail's color, texture, and structure. Regardless of the cause, it is an invasive nail fungal infection. <sup>[3]</sup> It has an insidious onset and if left untreated, progresses until it involves the entire nail plate. onychomycosis rarely resolves spontaneously, nor does it respond to placebo therapy taken orally or applied topically <sup>[3]</sup>.

Onychomycosis is more common in people with nail psoriasis. According to studies, immunosuppressive medications or structural changes in nail psoriasis may be the main causes. Onychomycosis was not considerably more common in psoriatic patients, according to some experts. The rapid growth of the affected nails in psoriasis may inhibit the development of onychomycosis due to the quick turnover and elimination of the distal nail plate, possibly decreasing the opportunity for fungi to invade the nail keratin. This is one explanation for why psoriasis may increase nail protection against fungal invasion <sup>[4]</sup>. Additionally, the serum like glycoprotein substance that was discovered in psoriatic oil drop patches may possibly have an inhibitory effect on dermatophytes <sup>[5]</sup>.

## THE AIM OF THE WORK

This study included mycological, pathological, and dermoscopic examinations to assess the prevalence of onychomycosis in psoriasis patients.

## PATIENTS AND METHODS

For this study, 30 well-known psoriatic patients with nail condition were enlisted [diagnosed clinically and/or pathologically]. From February 2021 to March 2023, dermatology outpatient clinics were used to recruit the patients. Before they were enrolled in the study, all individuals provided written informed consent.

**Methods:** Each patient in the study had a thorough history taken, including information about

themselves, their current disease, their past, and any history of psoriasis in their families.

**Mycological Analysis:** Three sections of the collected specimens were separated. A 20% potassium hydroxide [KOH] solution was used to conduct a microscopic examination of the first batch of specimens. On Sabouraud dextrose agar, the second and third sections were grown, one with and one without cycloheximide.

**Histopathological examination:** the extracted nail specimen was placed in a formaldehyde solution. PAS stain for the demonstration of fungal hyphae was used in our study.

**Onychoscopy:** A handheld dermatoscope [DermliteDL4N; 4 Gen, Inc., San Juan Capistrano, CA] with a 10x magnification was used to examine all of the afflicted nails. Wherever considered required, higher magnification up to 30x was applied. A Samsung Note 10 Plus coupled to the dermoscopy took pictures straight.

Patients who received any topical or systemic antifungals during the previous 3 months or were suffering from any disease-causing nail dystrophy such as eczema and lichen planus were excluded.

## RESULTS

Out of the 30 patients complaining of psoriasis with nail lesions, 7 patients were females and the other 23 were males. Their ages ranged from 6 to 71 years. Manual workers 11 patients, and 19 patients were not manual workers. 12 patients were smokers, and 15 patients had a history of prolonged sun exposure. Six patients [20%] were diagnosed as having onychomycosis. Dermatophytes were 3.3% [1 patient out of 30] and identified as trichophyton violaceum, yeasts were 16.6% [5 out of 30] identified as candida species and non-dermatophytic molds were 80% [contaminants]. Histopathological examination revealed fungal hyphae and spores in 16.6% of cases [five patients]. The most prevalent dermoscopic signs in psoriatic patients with onychomycosis were spikes 83.3% followed by subungual hyperkeratosis 50% and in patients with psoriasis without onychomycosis pitting was the most common sign in dermoscopy [83.3%]. The results of the study are presented in Tables [1] through [3].

**Table [1]:** Demographic data among study group

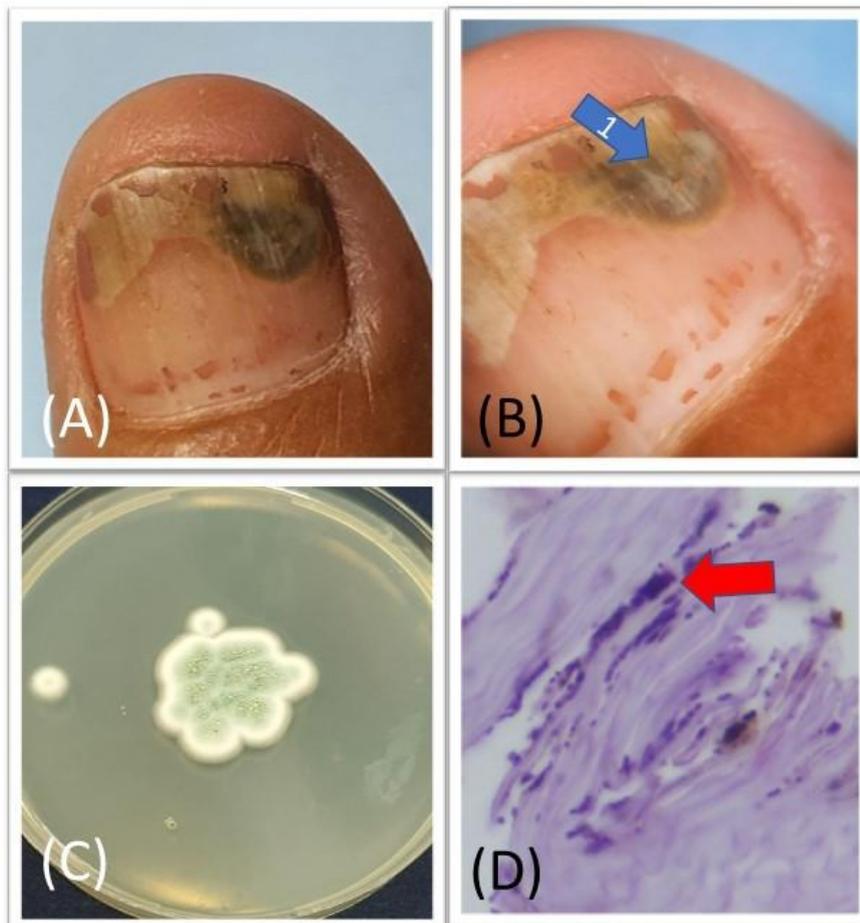
Data		Studied patients [N = 30]	
Age [years]	Mean ±SD	24.06 ± 19.2	
	Min - Max	6 – 68	
Sex	Male	23	76.6%
	Female	7	23.3%
Occupation	Manual worker	11	36.6%
	Non-manual worker	19	63.3%
Risk factors	Smoking	12	40%
	Sun exposure	15	50%
Family history of psoriasis	Negative	24	80%
	Positive	6	20%
Co-morbidities	Psoriatic arthritis	4	13.3%
	HTN	6	20%
	DM	3	10%
Residence	Rural	12	40%
	Urban	18	60%

**Table [2]:** Identification of isolated fungi among study group

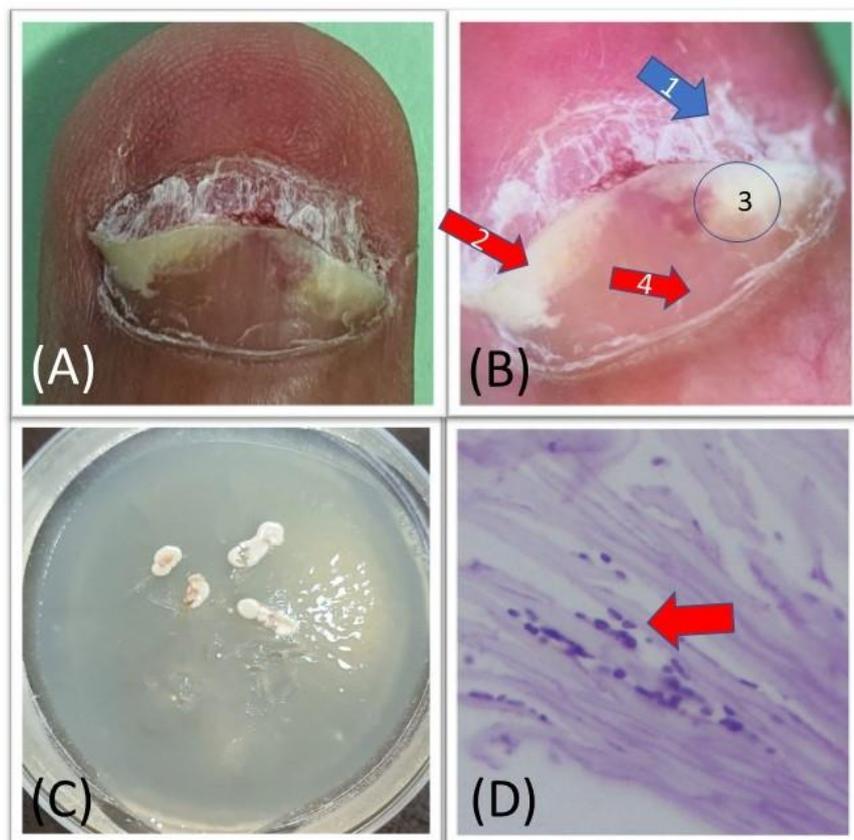
Isolated Fungi		Studied group N=30	
<b>Dermatophytes; No. = 1 [3.3%]</b>			
Trichophyton species	1	3.3%	
<b>Yeasts; No. = 5 [16.6%]</b>			
Candida species	5	16.6%	
<b>Non– dermatophytic molds; No. = 24 [80%]</b>			
Aspergillus species	12	40%	
Penicillium species	10	33.3%	
Unknown molds	2	6.6%	
<b>Single growth No. = 27 [90%]</b>			
<b>Mixed growth; No. = 3 [10%]</b>			
<b>Histopathology results [of hyphae and spores with PAS stain]</b>			
Positive	5	16.6%	
Negative	25	83.3%	

**Table [3]:** Correlation between diagnosis of onychomycosis and dermoscopic results

		Diagnosis				X <sup>2</sup>	P-value
		Psoriasis with onychomycosis [n = 6]		Psoriasis without onychomycosis [n = 24]			
Dermoscopy	Spikes	5	83.3%	-	-	15.7	<b>0.009</b>
	Subungual hyperkeratosis	3	50%	5	20.8%	3.9	<b>0.047</b>
	Onycholysis	2	33.3%	6	25%	4.9	<b>0.026</b>
	Pitting	1	16.6%	20	83.3%	6.3	<b>0.013</b>
	Oil drop	-	-	1	4.1%	2.4	> 0.05



**Figure [1]:** [A] clinical photo shows: DLSO. [B] dermoscopy photo shows: 1= greenish discoloration. [C] mycology culture shows *Aspergillus* species, [D] histopathology photo shows: fungal spores



**Figure [2]:** [A] clinical photo shows: DLSO. [B] dermoscopy photo shows: 1= subungual hyperkeratosis 2= spikes, 3= onycholysis, 4= scales. [C] mycology culture shows *Candida* species. [D] Histopathology photo shows: fungal spore

## DISCUSSION

A nail infection known as onychomycosis is caused by dermatophytes, yeast, and molds. The majority of onychopathies, especially onychomycosis is considered big concern to a lot of people around the world. Onychomycosis and psoriasis are both frequent illnesses in the general population [6]. Onychomycosis is more common in people with nail psoriasis. According to studies, the main cause is structural alterations in nail psoriasis [7].

Some patients have both disorders concurrently. Nail alterations in many psoriasis patients share morphological similarities with onychomycosis. To rule out the occurrence of a concurrent fungal infection in certain situations, additional diagnostic investigations are necessary [8].

In the present study, duration of psoriasis ranged between 1 – 40 years with mean  $\pm$  SD 11.2  $\pm$  7.9. This matches with the results of **Natarajan et al.** [9] where the mean duration was 9.63 years [range: 1 month–49 years].

We found out that 11 individuals [22%] had psoriasis in their families. **Solmaz et al.** [10] reported a greater incidence, finding that 31.9% of the individuals under study had a family history of psoriasis or psoriatic arthritis.

In the current work, 11% of individuals with nail psoriasis had family histories, according to **Augustin et al.** [11] Onychomycosis and psoriasis are both diseases whose development is significantly influenced by genetic background. Onychomycosis susceptibility is autosomal dominant characteristic, as shown by the frequent vertical spread within afflicted families [12].

The current study found that 6 out of 30 psoriatic patients [20%] had onychomycosis, which was detected in psoriatic patients. Five cases' histopathological diagnoses were conclusive, and one patient's mycological cultures showed dermatophytes. The prevalence of onychomycosis in the current study among patients with psoriasis was 20% [6 out of 30]. This result is higher than the result of **Gupta et al.** [13] and **Al-Mutairi et al.** [14] who reported a result of 10.2% and 20.3% respectively. These results are the opposite of **Jendoubi et al.** [15] **Alves et al.** [16] found a prevalence of 53%, and 57.89% respectively. This difference in the studies outcome is because of using different methods in the diagnosis of onychomycosis. It is clear that the correlation between mycological, histopathological, and dermoscopic tools as practiced in this study

will largely exclude false-positive and false-negative results.

Regarding the isolated fungi, we isolated dermatophytes from 1 patient out of 30 [3.3%] and identified as *trichophyton violaceum*, which is less than the results of **Romaszkiewicz et al.** [17] who isolated dermatophytes in 7%. In another study by **Alves et al.** [16] isolated dermatophytes in 23.6% mostly from toenails in Brazil. Our study on the other hand was performed on fingernails. Onychomycosis - Generally- is more common in toenails. Yeasts were 16.6% and identified as *candida species*. Yeasts results were much more than dermatophytes because in the middle east, the high humid atmosphere favor the growth of yeasts more than dermatophytes.

Non-dermatophytic molds were 80% considered as contaminants because it was growing away from the inoculum and it wasn't supported by histopathological findings. In addition, cases with molds growth didn't have clinical signs of onychomycosis. Taking into consideration that most of them are housewives and manual workers with high incidence of contamination with molds. Anyway, suspicious mycological cultures were repeated for more confirmation about the growth.

Non-dermatophytic molds and yeasts tend to be considered as secondary pathogens rather than main invaders, in contrast to dermatophytes, which cannot penetrate healthy, normal nails but can typically reside and thrive on damaged or diseased nails, as is the case with nail psoriasis.

Regarding histopathological results, fungal hyphae and spores were found in 5 patients out of 30 [16.6%] which matches with the results of **Abu El-Hamd et al.** [18]. In the current study, the positive histopathological result of the fungal element is considered to be diagnostic of onychomycosis. Yet, still, much research depends on mycological cultures and dermoscopic signs because it is easier and less aggressive.

As regard dermoscopic signs in psoriatic patients with onychomycosis, the current study found that spikes were the most common finding in 5 out of 6 [83.3%] with statistical significance [P-value < 0.001] when compared to cases with psoriasis without onychomycosis. This was in accordance with **Ankad et al.** [19] who found that in cases of psoriasis with onychomycosis, spikes were the commonest finding with dermoscopy [90%].

With a specificity of 99.38%, 83.78%, and 85.64%, respectively, **Litaïem et al.** [20] studied

databases of 33 papers about dermoscopic finding in onychomycosis and found that the most common dermoscopic signs are "ruin appearance," "longitudinal striae," and "spikes" on the proximal margin of onycholysis areas respectively. Regarding dermoscopic signs in psoriatic nail without onychomycosis, we found that pitting was the most prevalent feature [89.7%]. Similar results were reported by other studies [21, 22].

**Conclusion:** The present study establishes the way for an accurate diagnosis of nail lesions by highlighting the significance of cooperation between mycology, histology, and dermoscopy in the diagnosis of onychomycosis in patients with nail psoriasis.

**Disclosure:** None to be disclosed

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