Nail Changes in Psoriatic Patients and their Association with Disease Severity

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ABSTRACT:

BACKGROUND:

Nail psoriasis occurs in both adults and children. Nail involvement is associated with significant physical and psychological consequences for a substantial number of patients. The prevalence of nail changes among patients with psoriasis varies between 10 and 55 percent. In most patients, nail involvement follows or is concurrent with onset of cutaneous psoriasis.

OBJECTIVE:

To evaluate nail changes in a sample of Iraqi patients with psoriasis and study their association with the disease severity.

PATIENTS AND METHODS:

The study is a clinico-epidemiological observational cross-sectional study. It was conducted at the outpatient clinic at the Center of Dermatology and Venerology/ Medical City Teaching Hospital between May 2018 and August 2019. A total of 94 patients were enrolled in this study. The severity of psoriasis was assessed using Psoriasis Activity Score Index (PASI), Body Surface Area (BSA), and Dermatology Life Quality Index (DLQI) scores whereas the severity of nail involvement was assessed by Nijmegen Nail Psoriasis Activity Index Tool (N-NAIL) and then compared against psoriasis scores. The patients were divided into two groups; patients with (group A) and without (group B) nail involvement.

RESULTS:

The study sample included 41 males (43.62%) and 53 females (56.38%). The mean age at presentation was 32.59±16.32 years. The number of patients in group A was 69 patients (73.4%). The mean ±SD for PASI score was 6.6±7.71 and the mean ±SD for DLQI score was 11.36 ±7.93.While the number of patients in group B was 25 patients (26.6%). The mean ±SD for PASI score was 4.38±3.02 and the mean ± SD for DLQI score was 8.48±4.77. There were no statistical differences between group A and group B regarding age, duration of the disease, PASI score and DLQI score. The patients in group A were subdivided into two groups: the first group included patients with mild psoriasis; 37 patients (PASI score ≤ 10) and the second group included patients with moderate to severe psoriasis; 10 patients (PASI score > 10). The patients with severe cutaneous psoriasis had more severe nail changes. In patients with mild psoriasis, the N-NAIL score was 25.62±23.96 while in patients with moderate to severe psoriasis, the N-NAIL score was 48.8±27.95 (p value =0.011). Crumbling, onycholysis and subungual hyperkeratosis were more frequent in this group. In general, pitting was the most frequently observed finding (52.13%) followed by onycholysis and crumbling.

CONCLUSION:

This is the first study of nail changes in psoriasis patients in Iraq. Nail changes were observed in 73.4% of patients with pitting as the most frequent nail finding. The patients with severe psoriasis had more severe nail changes with higher N-NAIL scores than patients with mild psoriasis.

KEYWORDS: Psoriasis, Nail psoriasis, Nijmegen nail psoriasis activity score (N-NAIL).

INTRODUCTION:

Psoriasis is a common inflammatory skin disease affecting 2% of the world's population. [(1)] Nail changes in psoriasis have long been observed, however, the prevalence varies from 10% to 55% of patients.[(2)] Different nail changes were reported such as pitting, onycholysis and subungual hyperkeratosis. A relation between nail changes and the severity of psoriasis has been reported in some studies. [(3- 5)] Also the effect of other factors

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such as age and gender has also been reported to be important. [3], [6]

PATIENTS AND METHODS:

The study is an epidemiological observational cross-sectional study. It was conducted at the outpatient clinic at the Center of Dermatology and Venerology/ Medical City Teaching Hospital between May 2018 and August 2019. A total number of (94) outpatients with clinical diagnosis of psoriasis were enrolled in this study. The diagnosis of psoriasis was established on clinical basis. A verbal consent was obtained from all patients or their parents before they enrolled in this study. Ethical approval was given by the Scientific Council of Dermatology and Venereology/ The Iraqi Board for Medical Specializations. Patients who received systemic treatment for the last six months or topical treatment for the last one month were excluded. Patients with any concomitant dermatological or systemic disease were also excluded from this study. Enrolled patients were subjected to a detailed history including: age, occupation, residence, marital status, duration of psoriasis, family history of psoriasis, and previous treatment by using standardized questionnaires.

Physical examination was carefully performed on each patient which includes measuring the size, site, erythema, and scales of psoriatic lesions.

Psoriatic nail changes were first evaluated by performing detailed examination of the affected fingernails and toenails and followed by case documentation and photographed by using iPhone 6s smartphone. The severity of psoriasis was assessed using Psoriasis Activity Score Index (PASI). [7] The percentage of body surface area involved was calculated using the patient's palm (or 10 thumbs) which roughly equals 1% of the body surface area. Dermatology life quality index (DLQI) was assessed according to Finlay and Khan. [8] Nail involvement was assessed by Nijmegen Nail Psoriasis Activity Index Tool (N-NAIL).[9] The collected data were organized, tabulated, and statistically analyzed using Statistical Package for Social Science (SPSS) version 26. Values were expressed as mean ± SD. A comparison of continuous variables was performed by an independent sample t-test, whilst chi-square tests were used for categorical variables. Significant levels were set as P values ≤ 0.05 in all cases.

RESULTS:

A total of 94 patients were enrolled in this study. They were 41 males (43.62%) and 53 females (56.38%) with a male-to-female ratio of 1: 1.3. Minimum age at presentation was 7 years and maximum age was 75 years. The mean ±SD for age at presentation was 32.59±16.32 years.

Of the enrolled patients, 65 patients (69.15%) had plaque psoriasis, 9 patients (9.57%) had guttate psoriasis, 6 patients (6.38%) had scalp psoriasis, 5 patients (5.32%) had nail psoriasis, 4 patients (4.26%) had palmoplantar psoriasis, 3 patients (3.19%) had pustular psoriasis, 1 patient (1.06%) had erythrodermic and 1 patient (1.06%) had inverse psoriasis.

The patients were divided into two groups, **group A** (patients with cutaneous and nail psoriasis) and **group B** (patients with cutaneous psoriasis only). Table 1 shows the age, gender, family history, duration of psoriasis, PASI score and DLQI for patients in group A and B. There were no statistical differences between the two groups regarding age, gender, family history, duration of the disease, mean PASI score and mean DLQI score.

The nail changes observed in this study (figure 1) were pitting (52.13%) (figure 2), onycholysis (42.55%) (figure 2), crumbling (38.3%) (figure 3), oil spots (35.11%) (figure 5), subungual hyperkeratosis (25.53%) (figure 4), leukonychia (17.02%), splinter hemorrhage (17.02%) (figure 5), Beau's lines (12.77%) and onychomadesis (1.06%) (figure 2).

Patients in group A were subdivided into two groups: the first group included patients with mild psoriasis (PASI score ≤ 10) and the second group included patients with moderate to severe psoriasis (PASI score >10). This categorization was based on their cutaneous severity which was assessed by PASI score and evaluated for nail changes. (Table 2&3)

Five patients with guttate, three patients with pustular and one patient with erythrodermic psoriasis were not included in either group, as their cutaneous severity was evaluated by calculating BSA not PASI score.

Patients with nail psoriasis without cutaneous involvement were 5 and were also not included as their PASI scores were zero.

Patients with leukonychia as their only nail changes were 6 and patients with only splinter hemorrhages were 2 patients. They were also not

included here because these nail findings were not included in N-NAIL score for assessment of nail severity. So, the total number of patients that were included in this comparison was 47 patients.

The number of patients in mild psoriasis group was 37 patients while the number of patients in moderate to severe psoriasis group was 10 patients. (Table 2 shows age, gender, duration of psoriasis, N-NAIL for fingers, toes and total N-NAIL of the two groups).

There were no statistical differences between the two groups regarding age and duration of the disease. However, the male to female ratio in mild psoriasis group was 1:1.3 while in moderate to severe psoriasis group was 9:1 which was statistically significant (P =0.00856).

Comparing the mean of N-NAIL score for fingers, N-NAIL score for toes and total N-NAIL score between the two groups, they were statistically significant. (P value was 0.0302, 0.0295, and 0.011 respectively). Comparison of the different nail findings between both groups is demonstrated in (Table 3).

Pitting was most common nail finding in both groups. Crumbling, subungual hyperkeratosis and onycholysis were significantly more prevalent in patients with moderate to severe psoriasis than in patients with mild psoriasis. While pitting, leukonychia, oil spots, splinter hemorrhages and Beau's lines were observed in both groups.

Table 1:Characteristics of patients with (Group A) and without (Group B) nail involvement regarding age, gender, family history, duration of the disease, PASI score and DLQI score.

Characteristic /study Groups		Group A (Patients with nail psoriasis) (n =69)	Group B (patients without nail psoriasis) (n = 25)	P - value
Age Mean± SD (years)		31.97±15.85	34.28±17.8	0.5473
Gender N (%)	Male	33 (47.83%)	8 (32%)	0.1715
	Female	36 (52.17%)	17 (68%)	
Family History	Positive	16 (23.19%)	8 (32%)	0.3866
	Negative	53 (76.81%)	17 (68%)	
Duration of psoriasis Mean± SD (years)		6.54± 8.37	5.76± 7.34	0.6814
*PASI Mean ±SD		6.6±7.71	4.38±3.02	0.1267
DLQI Mean± SD		11.36±7.93	8.48± 4.77	0.0917

*PASI was not calculated for patients with guttate, pustular, erythrodermic, and nail psoriasis (18 patients).

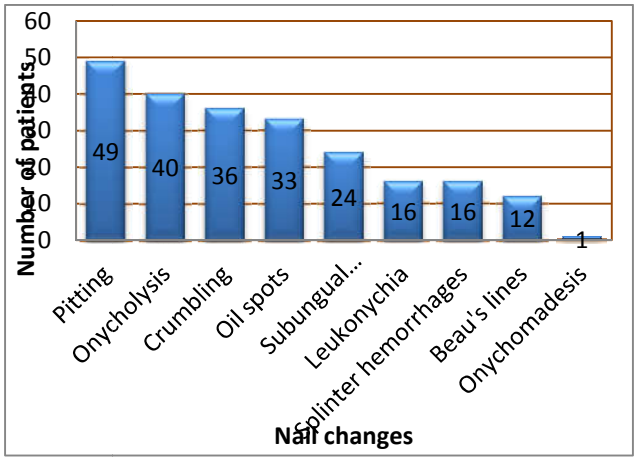

Figure 1: Frequency of nail findings observed in this study.

Table 2: Comparison between patients with mild and patients with moderate to severe psoriasis.

Characteristic/study Group		Mild psoriasis (PASI ≤10) (n = 37)	Moderate – severe psoriasis (PASI > 10) (n = 10)	P - value
Age Mean± SD (years)		31.19±16.17	39.4± 15.34	0.1571
Duration of psoriasis Mean ±SD (years)		6.26± 8.68	10.2± 10.66	0.23
Gender	Male	16 (43.24%)	9 (90%)	0.00856
	Female	21 (56.76%)	1(10%)	
N-NAIL of fingers Mean± SD		10.68± 11.68	20.3± 13.47	0.0302
N-NAIL of toes Mean± SD		14.84± 17.15	28.5± 16.63	0.0295
Total N-NAIL Mean± SD		25.62± 23.96	48.8± 27.95	0.011

Table 3: Comparison of nail findings observed in patients with mild and patients with moderate to severe psoriasis.

Nail finding/ study Group	Mild psoriasis (PASI ≤10)	Moderate – severe psoriasis (PASI > 10)	P - value
Pitting	29 (78.38%)	9 (90%)	0.355
Leukonychia	6 (16.22%)	0 (0%)	
Crumbing	18 (48.65%)	9 (90%)	0.001
Red lunula	0 (0%)	0 (0%)	
Subungual hyperkeratosis	12 (32.43%)	6 (60%)	0.004
Onycholysis	23 (62.16%)	10 (100%)	0.003
Oil spot	20 (54.05)	7 (70%)	0.151
Splinter hemorrhage	10 (27.03%)	2 (20%)	0.307
Beau's lines	6 (16.22%)	2 (20%)	0.505

Figure 2: Nail changes in fingernail psoriasis. Pitting (black arrow), onycholysis (red arrow), and onychomadesis (star).

Figure 3: Crumbling with subungual hyperkeratosis of thumb nails.

Figure 4: Subungual hyperkeratosis of both big toe nails.

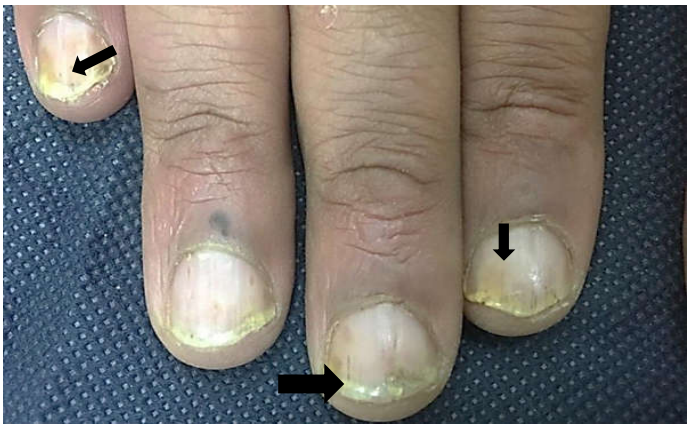

Figure 5: Oil spots (black arrow), splinter hemorrhages (red arrow).

DISCUSSION:

Nail involvement in psoriasis patients is common and the nails can be involved in up to 50% of patients with psoriasis. However, the involvement remains an important yet overlooked aspect of the disease. [6]

In the present study, nail changes were observed in 73.4% of patients with psoriasis attending the Dermatology Center at the Medical City Teaching Hospital. Choi et al studied 200 patients with psoriasis and found that psoriatic nail involvement was present in 85% of the patients, while Ahmed et al studied a total of 102 patients with psoriasis vulgaris and found that nails were involved in 58% of patients.[4], [6] The variation from one study to another might be attributed to the population studied and the study design.

Sharada et al and Ahmed et al found that nail changes are more common in males. [3] , [6] In the present study, there was no difference among psoriatic patients with and without nail changes regarding the gender. However, on comparing patients with mild psoriasis and patients with moderate to severe psoriasis, it was found that males outnumber females in the second group with male to female ratio of 9:1 and these patients had more severe nail disease.

There were no significant differences between patients with and without nail involvement regarding age, duration of the disease and family history. Also, there was no significant difference between both groups regarding the severity of the disease measured by PASI score.

This seems to be in agreement with study by Choi et al who reported no significant difference in mean PASI score between psoriatic patients with and without nail involvement. [4]

Klaasen et al found that psoriasis patients with nail involvement scored significantly higher mean scores of DLQI. [10] However in the present study, there was no significant difference in the DLQI between patients with and without nail changes. Most studies on DLQI in patients with psoriasis do not differentiate between changes in DLQI due to skin disease or due to nail disease, and unless there are specific questions concerning the nails, the effect of nail abnormality on DLQI remains not adequately estimated.

In this study, N-NAIL score was chosen as a scoring system for assessment of nail psoriasis severity. Klaassen et al performed an evaluation for various nail psoriasis severity scoring systems and found that the N-NAIL score better reflected clinical severity than all other tested nail psoriasis scoring systems. [9]

It was observed that with increasing the severity of cutaneous psoriasis, the severity of nail psoriasis also increases (P=0.011). This is compatible with studies by Marina et al , Augustin et al and Ahmed et al.[5,6,11]

In present study the most common nail manifestation was pitting which was observed in 52.13% of psoriasis patients. This result is in line with previous studies by Choi et al and Kaur et al. [4,12]

Onycholysis was found in the present study as the second most common nail finding and was observed in 42.55% while Sharada et al and Grover

et al reported onycholysis as the most prevalent nail change in their studies. [3,13]

In the present study certain nail changes were observed more frequently in patients with severe psoriasis. These are crumbling, onycholysis and subungual hyperkeratosis. Choi et al also reported subungual hyperkeratosis to be associated with severe psoriasis. [4] On the other hand, pitting, oil spots, Beau's lines and splinter hemorrhages were observed comparably in patients with mild and moderate to severe psoriasis.

Nail involvement in psoriasis could be explained as following candida could act as a trigger for the exacerbation of skin and nail psoriasis through the cathelicidin (LL-37) pathway; in particular, in the psoriatic nail, candida could activate the antimicrobial peptide, LL-37, produced by epithelial nail bed cells that induce interleukin (IL-23) production by dendritic cells and macrophages, which consequentially activate Th17, determining the cytokine overflow theory and acting as a trigger for the exacerbation of nail psoriasis. [14-18]

Previous findings demonstrated an increased expression of tumor necrosis factor (TNF)-α, nuclear factor-kappa B, IL-6, and IL-8 in psoriasis-affected nails, which is consistent with the findings of a study on lesional psoriatic skin. [19]

Rashmi et al described an imbalanced cytokine milieu in psoriatic lesions, with the presence of increased levels of TNF-α, interferon-α, IL-2, IL-6, IL-8, IL-12, and leukemic inhibitory factor-1 and reduced levels of IL-1, IL-4, IL-5, and IL-10. [20]

IL-10 is an anti-inflammatory and immunosuppressive cytokine that plays an important role in the regulation of the immune response. Several studies demonstrated a downregulation of IL-10 in psoriatic skin lesions. [21] In contrast, Saulite et al found an increased expression of IL-10 in the affected nail bed suggesting unique pathways of psoriatic nail disease and the nail as an immune-privileged site. [22-24]

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