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Evaluation of Nail Psoriasis: Delving into Some Useful Scores

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Abstract

Introduction: Several scoring systems have been established for the severity assessment of nail psoriasis. However, there is a lack of consensus on these tools.

Objectives: To evaluate the nail changes in psoriasis patient sand to correlate the severity of nail findings by Nail Psoriasis Severity Index (NAPSI) and modified NAPSI (m-NAPSI) scores.

Material and Methods: Three hundred and seventy consecutive adult psoriatic patients were studied to describe the frequency and pattern of nail changes. The findings were compared with data collected on age-and gender-matched 150 control subjects to determine which of the observed features are psoriasis disease-specific nail changes. The nail severity was assessed by NAPSI and m-NAPSI scores.

Results: Nail signs included in NAPSI were more commonly seen in psoriatic patients as compared to healthy controls and it was statistically significant. Beau's line was also found more in patients as compared to controls. None of the cases and controls had red spots in the lunula, and leukonychia was comparatively common in the controls. There was a strong and significant correlation found between NAPSI and m-NAPSI (r=0.916). Fingernails had a stronger correlation as compared to toenails between NAPSI and m-NAPSI (r=0.920 vs. r=0.877; p<0.001).

Conclusions: m-NAPSI should be considered to measure the degree of nail changes. Beau's line could be added as further modification of m-NAPSI. However, leukonychia and a red spot in the lunula may be removed.

Key words: Nail Disease; Psoriasis; Severity of Illness Index

Introduction

Nail abnormalities are considered a significant problem and can influence a person's self-esteem.[1] Involvement of nails is an extremely common feature of psoriasis and affects 10-92% of psoriasis patients.[2-6] However, about 5-10% of patients with psoriasis manifest with nail changes alone without skin involvement.[7] There is an appreciable negative impact on the quality of life in psoriasis patients with nail involvement.[8]

The severity assessment of nail involvement is important not only for research purposes but also useful in routine clinical use to evaluate the response of the treatment. Psoriasis Area and Severity Index, a widely accepted psoriasis severity assessment score, does not include the assessment of nail involvement. Therefore, various scoring systems have been developed based on the absence or presence of clinical manifestations of nail involvement. However, there is a lack of consensus on these tools as they differ in the selection and type of scoring features included and none of the existing scoring systems has been completely validated.[5,9-14]

The present study evaluated nail involvement in psoriasis patients and compared the nail findings in healthy age-sex-matched individuals. Furthermore, the nail severity was assessed using the total Nail Psoriasis Severity Index (NAPSI) and modified NAPSI (m-NAPSI) scores. We also tried to identify a better scoring tool for the proper recognition of nail changes in psoriasis. The knowledge of the complete spectrum of clinical changes in nail psoriasis may help clinicians to better recognize the disease and further improve patient care.

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Materials and Methods

Three hundred and seventy consecutive patients of age 18 years and above with the clinical diagnosis of psoriasis based on the established clinical criteria[15] with/without nail change sattending the department of Dermatology and Venerology at a tertiary care hospital were recruited over a period of one year in this case-control study. A total of hundred fifty healthy age and sex-matched individuals (attendants without skin disease of dermatological patients other than psoriasis) who visited the same outpatient department were enrolled as controls.

Psoriatic patients and healthy controls aged less than 18 years, concomitant onychomycosis or other skin diseases affecting the nails like alopecia areata, lichen planus, etc, a history of trauma-related nail changes, usage of artificial nails in the past 6 months, under systemic therapy within one month or, those who refused to give consent were excluded.

A detailed history and thorough cutaneous and systemic examination were performed on each subject. To allow consistency in clinical assessment, each subject underwent a dermatological examination by the same dermatologist. The study was performed after ethical approval from the Institute.

Nail assessment and Severity Scores

All twenty nails were examined thoroughly in proper light for the presence of nail changes mentioned in NAPSI as well as not included in NAPSI but reported by others 14 and were recorded in the proforma. The severity of nail changes was assessed by NAPSI and m-NAPSIin each subject. To start with the first method (NAPSI or m-NAPSI), a computer-generated 2 groups list was prepared prior to the commencement of the study and was done accordingly. The nail findings and score along with the time taken for the assessment were recorded. After an hour, the nail findings were assessed by the next method (m-NAPSI or NAPSI))and were recorded on a separate sheet. The dermatologist did not have a record of the previous methods of assessment.

Calculation of NAPSI and m-NAPSI

NAPSI scoring for nails was calculated by nail bed features (oil spots, splinter haemorrhage, onycholysis, and subungual hyperkeratosis) and nail matrix features (pitting, crumbling, leukonychia, and red spots in lunula).[10] The nail was dividedin to 4 quadrants and 1 point was given if there was any finding of the nail matrix and 1 point for nail bed change that was seen, per quadrant. Thus, the score per nail ranged from 0–8 per nail, with maximum 80 scores for fingernails only and 160 for all fingers and toenail involvement.

m-NAPSI was calculated by the presence of 7 features.[13] Onycholysis and oil-drop dyschromia were clubbed together and 1 point each was given for the presence and 0 for the absence of red spots in the lunula, splinter haemorrhage, subungual hyperkeratosis, and leukonychia in each nail, whereas pitting, onycholysis and crumbling were ranged from 0-3 with the presence of the number of pits (0: no pit; 1: 1-10 pits; 2:11-49: 3: ≥50) and percentage ofnail involvement by onycholysis &oil- drop dyschromia (0: no dyschromia; 1: ≤10%; 2: 11-30%; 3: >30 & crumbling: (0: no;1:1-25%; 2: 26-50; 3: >50). Thus, the m-NAPSI score ranged from 0-13 for each nail and 0-130 for all fingernails. We also calculated the toenails' m-NAPSI (range 0-130) and the total m-NAPSI score ranged from 0-260. Nail involvement in the psoriatic patient was considered when there was at least NAPSI score of 1 present.

Statistical analysis

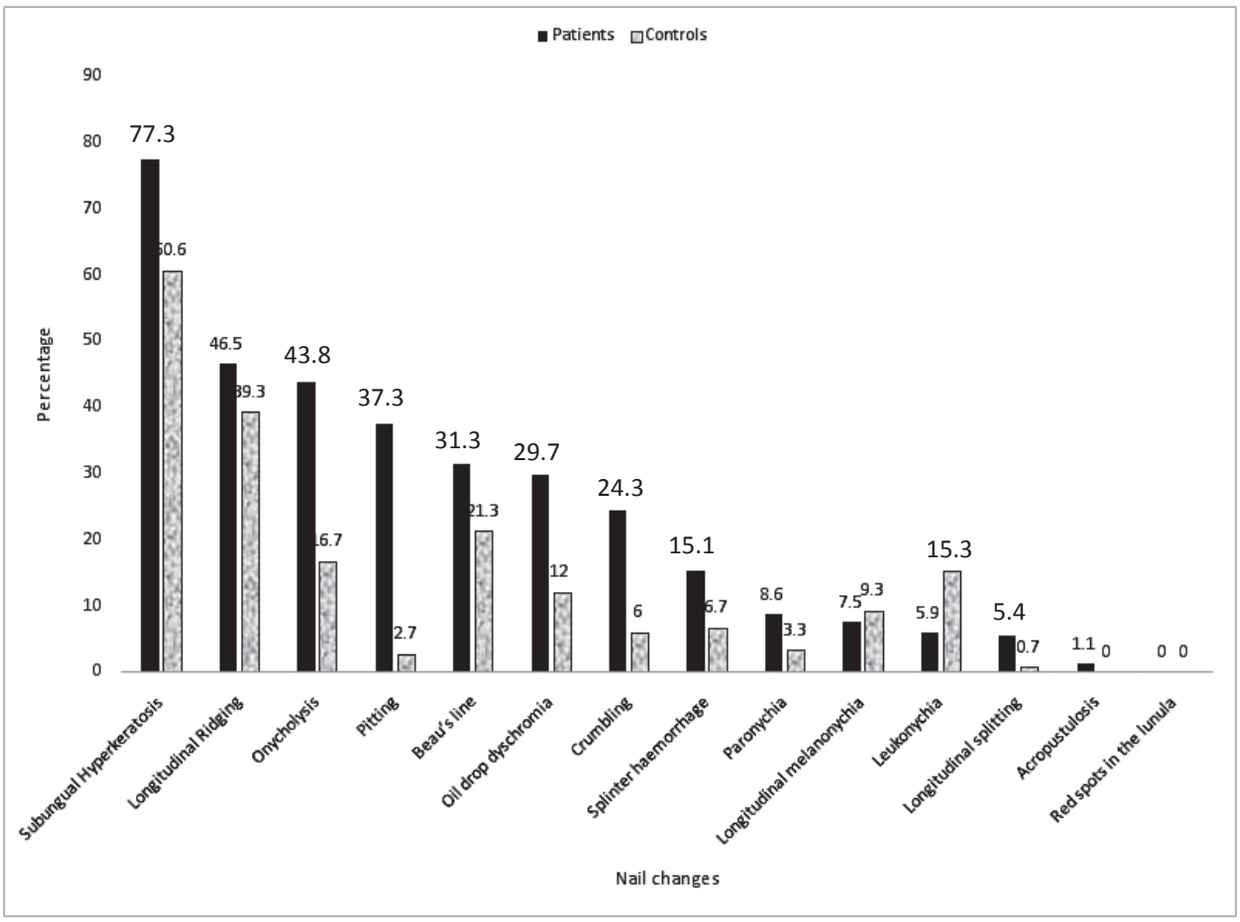
Descriptive statistics for the quantitative variables were done by mean and standard deviation whereas frequencies and percentages were used for categorical variables. The comparison between cases and controls was done using the Chi-square test with Yate's correction for qualitative variables and Student's t-test or Mann-Whitney test for quantitative variables. Pearson correlation coefficient was done to correlate NAPSI and m-NAPSI. All tests were two-sided. $P<0.05$ was taken as statistical significance.

Results

Socio-demographic characteristics and nail changes of psoriasis patients and controls

The mean age was 44.32 ± 13.94 years in psoriatic patients and 41.4 ±15.1 years in controls and the difference was not statistically significant (P = 0.136). Amongst 370 patients with psoriasis, 214 (57.8%) were males and 156 (42.2%) were females with a male: female ratio of 1.37:1. Similarly, amongst 150 controls, 84 (56%) were males and 66 (44%) were females with a male: female ratio of 1.27:1 (P=0.701). Outdoor workers were affected more i.e., 226 in patients (61%) and 91 in controls (60.8%) as compared to indoor workers (students, housewives, etc) (P=0.224). Of these study populations, 328 psoriatic patients (88.6%) and 117 (78%) controls had nail changes present at the time of nail examination and the difference was statistically significant (x^2= 9.8054; P<0.002). Both fingernails (F) and toenails (T) were more involved in psoriatic patients (F: 82.1%; T: 85%) than in controls (F: 52.6%; T: 70.7%) and it was statistically significant.

Figure 1 depicts the percentage of nail changes in psoriasis patients and controls. The maximum number of psoriasis patients had subungual hyperkeratosis (77.3%) followed by longitudinal ridging (46.5%), onycholysis (43.8%), pitting (37.3%), Beau's line (31.3%), oil drop dyschromia (29.7%), crumbling (24.3%), and splinter haemorrhage (15.1%). None of the psoriatic patients and controls had red spots found in the lunula of the nail.



*P<0.05

Figure 1: Nail changes in psoriasis patients (n=370) and controls (n=150)

Subungual hyperkeratosis, onycholysis, and oil drop dyschromia were found more in the fingers and toes nails of psoriasis patients than in controls. Splinter haemorrhage and pitting were more observed in the fingernail sand crumbling in the toenails of the psoriasis patients than in controls. However, leukonychia was more commonly seen in controls than in psoriasis patients and these findings were statistically significant. The parameters not included in NAPSI i.e.Beau's line and paronychia were more frequently observed in the fingernails of the psoriasis patients than in controls and were found to be statistically significant (Table 1).

Nail changes	Total Fingernails and toenails			Fingernails			Toenails		
	Patients N (%)	Control N (%)	P-value	Patients N (%)	Control N (%)	P-value	Patients N (%)	Control N (%)	P-value
Nail bed signs included in NAPSI									
Subungual hyperkeratosis	286 (77.3)	91(60.6)	**<0.001**	82(22.1)	10 (6.7)	**<0.01**	280 (75.6)	89 (59.3)	**<0.01**
Onycholysis	162(43.8)	25(16.7)	**<0.001**	118 (31.9)	11 (7.3)	**<0.01**	90 (24.3)	14 (9.3)	**<0.01**
Oil drop dyschromia	110 (29.7)	18 (12.0)	**<0.001**	52 (14.0)	7 (4.7)	**0.004**	66 (17.8)	13 (8.6)	**0.01**
Splinter haemorrhage	56 (15.1)	10 (6.7)	**<0.001**	36(9.7)	4(27.6)	**=0.01**	20 (5.4)	6 (4.0)	**0.65**
Nail matrix signs included in NAPSI									
Pitting	138 (37.3)	4 (2.7)	**<0.001**	128 (34.6)	4 (2.6)	<0.01	44 (11.8)	0 (0.0)	-
Crumbling	90 (24.3)	9 (6.0)	**<0.001**	12 (3.2)	1 (0.6)	0.16	88 (23.7)	8 (5.3)	<0.001
Leukonychia	22 (5.9)	23 (15.3)	**<0.001**	22 (5.9)	20 (13.3)	0.00	0 (0.0)	4 (2.6)	-
Red spots in the lunula	0 (0.0)	0 (0.0)	-	0 (0.0)	0 (0.0)	-	0 (0.0)	0 (0.0)	-

Nail signs not included in NAPSI									
Longitudinal Ridging	172 (46.5)	59 (39.3)	**0.165**	164 (44.3)	57 (38.0)	0.221	54 (14.6)	17 (11.3)	0.401
Beau's line	116 (31.3)	32 (21.3)	**0.029**	82 (22.2)	13 (8.6)	<0.01	48 (12.9)	20 (13.3)	0.912
Paronychia	32 (8.6)	5 (3.3)	**0.051**	28 (7.56)	3(2.0)	0.026	4 (1.0)	2 (1.3)	0.807
Longitudinal melanonychia	28 (7.5)	14 (9.3)	**0.623**	20 (5.40)	11 (7.3)	0.524	10 (2.7)	3 (2.0)	0.877
Longitudinal splitting	20 (5.4)	1 (0.7)	**0.025**	8 (2.16)	0 (0.0)	-	12(3.2)	1 (0.6)	0.807
Acropustulosis	4 (1.1)	0 (0.0)	-	4 (1.08)	0 (0.0)	-	2 (0.5)	0 (0.0)	-

Table 1: Nail changes in psoriasis patients (n=370) and controls (n=150) according to parameters included and not included in NAPSI

Severity of Nail involvement in cases and controls

The severity of nail involvement by NAPSI and m-NAPSI is shown in **Table 2**. The total NAPSI scores were 26.88±24.38 (20) and 14.19±15.90 (8) in psoriasis patients and controls respectively. The total NAPSI score >20 was more frequently found in psoriasis patients(45.4%) than in controls (17.3%).These findings were statistically significant. While comparing the NAPSI scores for fingernails and toes nails separately, it was significantly higher for fingernails in patients 10.19±14.51 (4)than in controls 1.83±4.79 (0) but the difference was not significant for toenails NAPSI [16.99±16.22 (12) in patients vs 12.35±14.63 (8) in controls].

Similarly, the m-NAPSI score was higher in patients [14.31±14.77(9)]than in controls [6.03±7.81 (3)] and >20 m-NAPSI score was more found in psoriatic patients [142 (38.3%)]than in controls [8 (5.33%)]. The m-NAPSI score for fingernails was 6.29±9.11 (3) and 1.17±2.90 (0) in patients and controls respectively whereas it was 8.11±8.72 (6) and 4.8±7.00 (2) for toes nails of patients and controls.

Scoring Method	Patients N (%)	Control N (%)	P-value
Nail Area Severity (NAPSI) score			
0 NAPSI			
1-20 NAPSI			
>20 NAPSI	42 (11.4)	33 (22)	<0.001
Total NAPSI (0-160)	160 (43.2)	91(60.7)	
Mean ±SD (median; range)	168 (45.4)	26 (17.3)	
Fingernail-NAPSI (0-80)	26.88±24.38 (20; 0-134)	14.19±15.90 (8;0-32)	<0.001
Mean ±SD (median; range)			
	10.19±14.51 (4;0-72)	1.83±4.79 (0;0-8)	
Toenail-NAPSI (0-80)			
Mean ±SD (median; range)	16.99±16.22 (12; 0-80)	12.35±14.63 (8; 0-40)	
Modified NAPSI (m-NAPSI)			
0 m-NAPSI	42 (11.3)	33 (22.0)	<0.001
1 -20 m-NAPSI	246 (66.5)	109 (72.6)	
>20m-NAPSI	82 (22.2)	8 (5.3)	
Total m-NAPSI (0-260)			
Mean ±SD (median; range)	14.33±14.8 (9; 0-75)	6.03±7.81 (3; 0-50)	<0.001
Fingernail-m-NAPSI (0-130)			
Mean ±SD (median; range)	6.29±9.11 (3; 0-50)	1.17±2.9 (0; 0-17)	
Toenail-m-NAPSI (0-130)			
Mean ±SD (median; range)	8.11±8.72 (6; 0-40)	4.8±7.00 (2;0-40)	

Table 2: Clinical severity of nail changes using NAPSI and m-NAPSI in Psoriasis patients (370) and controls (150)

Calculation of NAPSI and m-NAPSI in the involved nail

Figures 2 and 3 show the calculation of NAPSI and m-NAPSI in the involved.

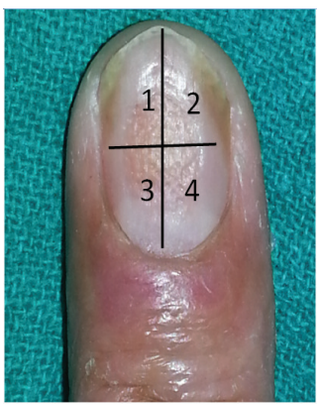


Figure 2: Nail Psoriasis Severity Index (NAPSI)score calculation of a fingernail- Quadrant 1: Nail bed sign=1 (Oil drop dyschromia) & Nail matrix sign= 1 (Pitting); Quadrant 2: Nailbed sign= 1 (Oil drop dyschromia) & Nail matrix sign=1 (Pitting); Quadrant 3: Nail bed sign= 0 & Nail matrix sign=1 (Pitting); Quadrant 4: Nail bed sign= 0 & Nail matrix sign= 1 (Pitting). NAPSI Score for 1 nail=6 (Range = 0-8 for each nail)

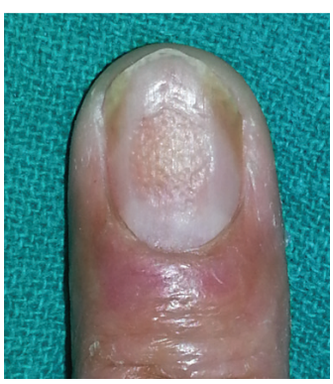


Figure 3 : Modified Nail Psoriasis Severity Index (m-NAPSI) score calculation of a fingernail-
Nail Bed changes: A. Onycholysis and Oil Drop Dyschromia =1; B. Splinter Haemorrhages = 0; C. Subungual Hyperkeratosis = 0; Nail Matrix changes: D. Pitting = 3; E. Crumbling = 0; F. Leukonychia = 0; G. Red spots in lunula = 0. m- NAPSI Score for 1 nail =4 (Range = 0-13 for each nail)

Correlation between NAPSI and m-NAPSI

A strong correlation was found between total NAPSI and m-NAPSI (r=0.916, P<0.001). Fingernails had a stronger correlation as compared to toenails between NAPSI and m-NAPSI (r=0.920 vs. r=0.877; P<0.001) **(Figure 4a, b and c)**.

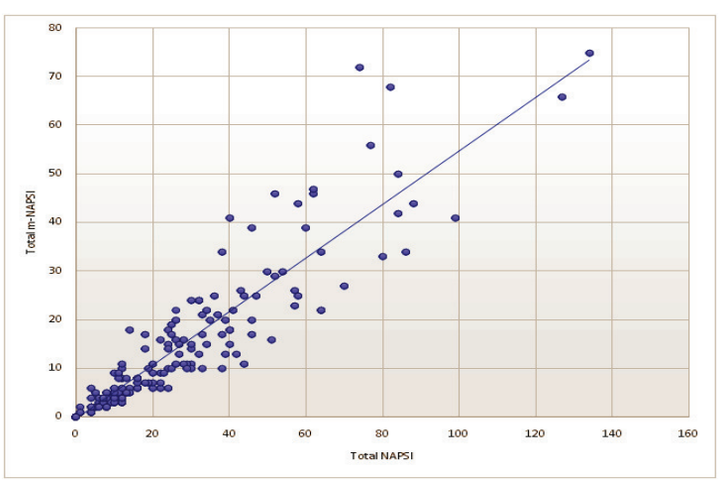


Figure 4a: Correlation between Total NAPSI and Total m-NAPSI

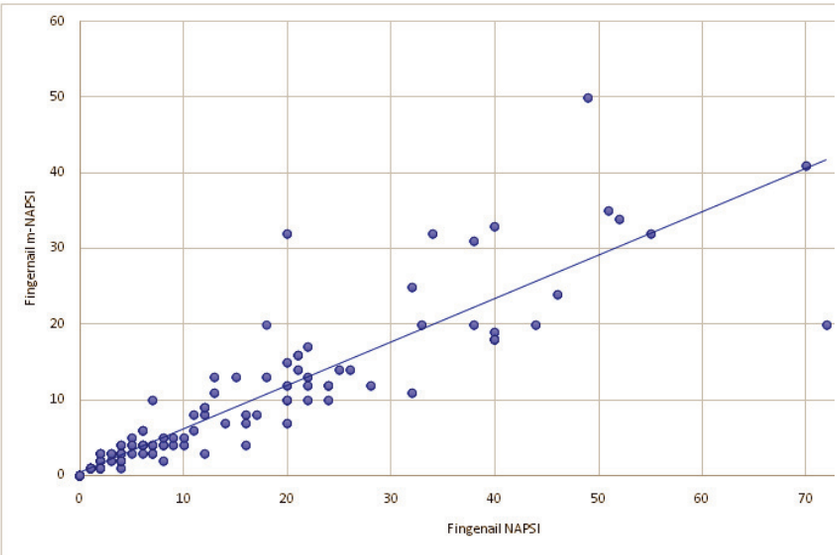


Figure 4b: Correlation between fingernails NAPSI and m-NAPSI

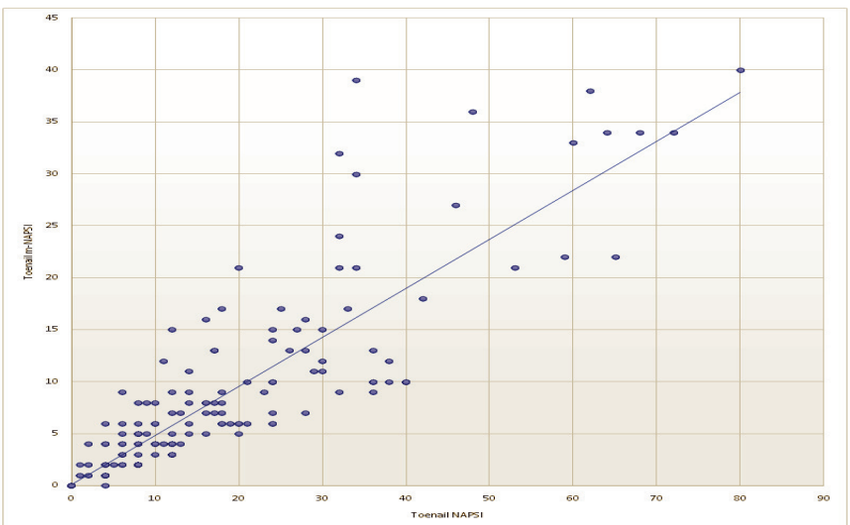


Figure 4c: Correlation between toenails NAPSI and m-NAPSI

Nail involvement as per the number of pits

Nail pits were present in 138 (37.3%) psoriasis patients and 4 (3.4%) in controls and the difference was statistically significant. Among psoriatic patients, 86 (62.3%) had ≥20 pits while in controls none had ≥20 pits. The mean number of pits was maximum in the index finger and middle finger i.e., 21.8 and 21.7 respectively. The mean number of pits in the great toe was 16.4. However, in other toes, it was < 2 pits.

Discussion

Nail changes in psoriasis have divergent clinical manifestations correlating with the anatomical subunit of the nail that is affected. The reported prevalence of each specific clinical pattern of nail psoriasis varied considerably.In our study, overall subungual hyperkeratosis was the most common nail finding in psoriatic patients. It was the most common finding in toenails but was the third most common finding in fingernails in psoriasis patients. Two previous studies found subungual hyperkeratosis to be the most common manifestation of fingernail psoriasis.[7,11] However, others reported it to be less common.[6,16-17]

The other nail signs such as onycholysis, oil drop dyschromia, splinter haemorrhage, pitting, and crumbling were more commonly found in psoriasis patients than in the control group and were significant. These findings could be the common nail findings in psoriasis and thus considered in NAPSI.[6,10] However, none of the psoriatic patients showed red spots in the lunula in our study and the red-spotted lunula has also been reported as an infrequent nail change by other investigators in 0.4% to 10.2% of patients.[11,14,18,19]

In fingernail psoriasis, we observed onycholysis in 31.8% of patients whereas, in the previousstudy done by van der Velden (2013),93.9% of patients had finger

nailonycholysis as the most prevalent nail change.[18] In concordance with previous studies,[2, 7,10,20] pitting was observed in 34.5% patients of our patients.

Likevan der Velden's study(2013), we also found leukonychia more common in controls than in psoriasis patients (15.3% vs 5.98%). Leukonychia is not a nail psoriasis-specific symptom but may be the consequence of the inflammatory process or just occur in nail psoriasis because it has a very high prevalence in the general population.[18]

Additional nail symptoms such as Beau's lines and longitudinal ridging were not considered and scored in nail psoriasis in the earlier published literature because these features are not included in the NAPSI score and may be less specific than the eight above-mentioned features in NAPSI.[2,7,10,18] Baran (2004) documented the significance of Beau's lines for estimating disease activity in nail psoriasis and he included the number of Beau's lines in his nail psoriasis severity scoring system.[21] In the present study, Beau's line wasalso noted in one-third of patients, which was statistically significantly present in comparison to healthy controls. Longitudinal ridging was the second most common feature observed in our study, however, the difference was not statistically significant in comparison to the findings in controls. Both longitudinal ridging and Beau's lines may be the result of the inflammatory process in the proximal nail matrix.

The NAPSI is a standard validated tool for the evaluation of the severity of nail psoriasis with good reproducibility and reliability.[10] Each nail must be assessed for the presence of 8 clinical signs included in the tool.[10] Higher scores represent worse nail disease. However, it takes time to perform depending on the amount and severity of nail disease. Thus, modifications of the NAPSI score or alternatives of NAPSI have been studied. Cannavò*et al*. (2003) and Baran (2004) measured subungual hyperkeratosis with the calliper, which does not seem to be feasible in the clinical practice.[14,21, 22]

In the modification of NAPSI, targeted NAPSIand modified NAPSI have been studied.[13,15] In targeted NAPSI, only 1 nail is selected for the presence or absence of 8 parameters included in NAPSI. Because of its complexity and probably not sensitive enough to reflect significant clinical improvement, the single nail is not sufficient to reflect the severity of the disease.[13] The modified NAPSI (m-NAPSI) is a more feasible scoring system than NAPSI and has demonstrated excellent interrater reliability.[15] The m-NAPSI is simple rthan NAPSI and has demonstrated excellent reliability and scoring takes<5 minutes to perform.

We included both NAPSI and m-NAPSI for the severity assessment of nail involvement in our case-control study and assessed the toenails with the same parameters as m-NAPSI and scored for toenail involvement. There was a strong correlation found between NAPSI and m-NAPSI (r=0.916, P<0.001) in the present study similar to the previous study.[13] Fingernails had a stronger correlation as compared to toenails between NAPSI and m-NAPSI (r=0.920 vs. r=0.877; P<0.001). Thus, we recommend that m-NAPSI may be considered for the assessment of nail psoriasis in clinical practice. However, further modification in m-NAPSI can be done by removing leukonychia and red spot lunula and addition of Beau's line to make a simpler and valid tool. Similar results of leukonychia and a red spot in the lunula were found by other investigators[19] and questioned in their study whether leukonychia and a red spot in the lunula should remain in nail psoriasis disease severity scores and whether additional symptoms, such as Beau's lines, should be added.

Klaassen*et al*. (2014) in Nijmegen Nail psoriasis Activity Index tool (N-NAIL) considered pitting, crumbling, Beau lines, onycholysis &"oil drop" (salmon patch dyschromia) and subungual hyperkeratosis.[14] They excluded red spots in the lunula and leukonychia.[14] This study correlated better with clinical severity when compared with the existing nail psoriasis scoring systems.

Limitation

The present study did not compare other different nail psoriasis severity scores with physician global assessment and patient-specific factors such as the impact on quality of life.

Conclusion

Nail changes in psoriasis were very frequently observed with the most common nail changes as subungual hyperkeratosis, onycholysis, pitting, and Beau's line. Pitting and onycholysis were more frequently observed in fingernails whereas subungual hyperkeratosis was more in toenails. The NAPSI can distinguish patients with nail psoriasis from healthy controls and there was a strong and significant correlation between NAPSI and m-NAPSI. The m-NAPSI may be considered to measure the degree of nail changes and Beau's line can be added as further modification of m-NAPSI. However, leukonychia and a red spot in the lunula canbe removed.

A new simplified scoring system with 2 nail bed signs (onycholysis/oil drop dyschromia and subungual hyperkeratosis) and 2 nail matrix signs (pitting and Beau's line) should be devised, and further studies will be required for further validation of these methods.

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