Prevalence of nail changes in patients with psoriasis and correlation of NAPSI (Nail area psoriasis severity index) with BSA (Body surface area)

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Abstract

Introduction: Nail involvement is an often-overlooked clinical symptom of Psoriasis. It causes psychologic stress, pain, impairment of manual dexterity and a significant negative impact on a patient's quality of life.

Objective: The present study was conducted to study the prevalence of nail changes in psoriasis patients, assessment of the severity of nail involvement using NAPSI score and to correlate the relationship between NAPSI and BSA in those patients.

Materials and Methods: This was a cross sectional study, conducted in Dermatology department in a tertiary care hospital between January 2016-August 2017. A total of 100 psoriasis patients were included in the study. The severity of nail involvement was assessed with NAPSI. Cutaneous disease severity was assessed with BSA. Data were coded and analyzed.

Results: Most common nail change in our study was Nail pitting (83.1%), followed by onycholysis (73.8%), subungual hyperkeratosis (23.1%), Longitudinal ridges (23.1%) and Beau's lines (21.5%). We observed that BSA showed a positive and statistically significant correlation with NAPSI, demonstrating worsening of nail involvement with increased severity of skin disease.

Conclusion: Nail psoriasis seems to be an ignored feature of the disease and further research must focus on the effect of psoriasis treatment on the nails. This study is the first to compare NAPSI in correlation with body surface area (BSA), leading to lesser inter observer variability in assessing the severity of skin and nail involvement when compared with PASI.

Keywords: Body surface area, Nail area psoriasis severity index, Nail psoriasis, Psoriasis vulgaris, Pitting.

Introduction

Psoriasis is a chronic inflammatory papulosqamous disorder with remissions and exacerbations, that affects millions of people throughout the world. It is not only a disease that affects the skin, but also can affect the physical, emotional, social & psychological aspects of life.[1] While skin manifestations are the most characteristic findings of psoriasis, nail involvement is an often-overlooked clinical symptom of the disease.[1] Approximately 10-78% of patients with psoriasis have concurrent nail psoriasis,[2,3] while isolated nail involvement is seen in 5-10% of patients.[1,4]

The clinical nail manifestations seen in psoriasis depends on the localization of the inflammation in the nail unit. Two patterns of nail disorders are commonly seen in psoriasis. A) Nail matrix involvement- result in features such as pitting, leukonychia, onycholysis, Beau's lines and crumbling of the nail plate. B) Nail bed involvement- leads to oil-drop discoloration, onycholysis, subungual hyperkeratosis and splinter haemorrhages. It is an indicator of more severe form of psoriasis and it leads to significant negative repercussions in the quality of life.

Nail psoriasis severity index (NAPSI) is the first nail specific scores created for assessing the severity of nail involvement in psoriasis. Even though many other scoring systems have been developed, NAPSI is the most widely used scoring system in clinical trials. Although it can be time consuming and impractical for the clinician in an outpatient clinic, NAPSI demonstrates excellent inter-rater reliability and validity in the assessment of psoriatic nail disease.

In spite of its aesthetic and functional implications, only few studies have investigated the epidemiology and clinical characteristics of nail psoriasis. In this back drop this study is in the direction to throw light on the prevalence of the nail changes in psoriatic patients along with assessment of severity of nail involvement with NAPSI scoring system.

Objectives

1. To study the prevalence of nail changes in psoriasis patients attending our Outpatient department and to assess the severity of nail involvement using NAPSI score.
2. To assess the relationship between the severity of nail involvement using Nail Psoriasis Severity Index (NAPSI) and the extent of skin involvement by using body surface area (BSA) involvement in such patients.

Materials and Methods

This was a cross sectional study conducted in our Skin & STD outpatient department after getting approval from ethical committee of our institution. The study population included 100 psoriatic patients of any age group who attended our outpatient department during the study period of January 2016-August 2017.

After getting informed consent, demographic variables (age, sex), age of onset, type of psoriasis,

duration of the disease and other relevant things were recorded. All 20 nails of each patient were evaluated for any nail changes and photographically documented. The severity of nail involvement was assessed with NAPSI. Cutaneous disease severity was assessed with BSA. The findings were recorded in the pre-designed proforma for analysis and interpretation of data.

Calculation of NAPSI[5]: According to NAPSI, each nail was divided into four quadrants and any nail plate or bed changes found were accounted for generating a score that varies from 1-80 for finger nails and from 1-160 for fingernails and toe nails. The nail was divided with imaginary horizontal and longitudinal lines into quadrants. Each nail was given a score for nail bed psoriasis (0-4) and nail matrix psoriasis (0-4) depending on the presence of any of the features of nail psoriasis in that quadrant. 0 for none, 1 if present in 1 quadrant of the nail, 2 if present in 2 quadrants of the nail, 3 if present in 3 quadrants of the nail, and 4 if present in 4 quadrants of the nail. Each nail was evaluated, and the sum of all the nails was the total NAPSI score

Nail Matrix: In each quadrant of the nail, nail matrix psoriasis is evaluated by presence of *any* of the nail matrix features (pitting, leukonychia, red spots in the lunula, crumbling);

Nail Bed: Nail bed psoriasis is evaluated by the presence of any of the nail bed features (onycholysis, splinter hemorrhages, subungual hyperkeratosis, "oil drop" sign)

At any time the matrix or nail bed score can be assessed independently if desired. If a target nail scale is desired, the same technique can be used to evaluate all 8 parameters in each quadrant of the nail, giving that 1 nail a score of 0-32. As per the above calculation NAPSI scoring was done for all the patients.

Calculation of BSA: As per "The national psoriasis foundation definitions of disease severity" we calculated BSA for all the patients.[6]

Mild: BSA 1-2%

Moderate: BSA 3-10%

Severe: BSA >10%

1 palm of the hand =1% BSA

Statistical Analysis: Data was entered in Statistical package for social sciences (SPSS 18.0, SPSS Inc, Chicago, IL) database. Descriptive statistics were provided using mean (SD) and median (range) for normal and nonparametric distributed numeric values, respectively. Frequencies and percentages were used for categorical variables. Spearman rank test was used to explore the relationship between continuous variables. *P* values less than 0.05 were considered to be statistically significant. Level of significance was estimated with 95% confidence intervals and p value <0.05.

Results

A total of 100 psoriasis patients were included in the study. Among the 100 patients 65 patients had nail involvement making the prevalence of nail psoriasis as 65% in our study. Among this 65 patients, 63 people had concomitant cutaneous involvement and two patients had isolated nail involvement. Of the 65 patients, majority of the study subjects were in age group of 41-50 years (24.0%). The mean age of the study population was 40.78 +/- 15.40. In our study 42 (64.6%) patients were males while 23 (35.4 %) patients were females and the male: female ratio was 1.8:1.

Majority of the patients of our study had their skin lesions in the range of 6-10 years. The Mean duration of skin changes in our study population was 7.321 +/- 6.371. In our study population 56.9% had the changes for more than 1 year and 28 patients (43.1%) had nail involvement for less than 1 year duration. Mean duration of nail involvement in our study population was 6.51 +/- 5.52.

In our study 42 patients (64.6%) had chronic plaque type psoriasis, 12 patients (18.5%) Palmo plantar psoriasis, three patients (4.6%) had scalp psoriasis, three patients (4.6%) had pustular psoriasis, one patient (1.5%) had guttate psoriasis, one patient had flexural psoriasis (1.5%), one patient had erythrodermic psoriasis(1.5%) and two patients (3.1%) exclusively presented with only nail psoriasis. Joint involvement was seen in 67.7% of our study population.

Most common nail change in our study was nail pitting (83.1%) (Fig. 1), followed by onycholysis (73.8%) (Fig. 2), subungual hyperkeratosis (23.1%) (Fig. 3) longitudinal ridges (23.1%) and Beau's lines (21.5%). Other changes include cutaneous psoriasis of nail folds (10.8%), onychorrhexis (10.8%), nail crumbling (7.7%), onychomadesis (7.7%), leukonychia (6.2%),melanonychia(4.8%),Splinter hemorrhage (4.6%) (Fig. 4), Trachyonychia (4.61%) and oil drop sign (3.1%) (Fig. 5). Among the nail matrix changes, the most common was pitting followed by Beau's lines. Among the nail bed changes, the most common was onycholysis followed by subungual hyperkeratosis. The presence of nail fold lesion was seen in 7 (10.8%) patients. Table 1 shows the distribution of nail changes among the patients.

Table 1: Distribution of nail changes among the study population

Type of Nail change	Nail changes	Number of Patients	Percentage
Nail Matrix changes (n=65)	Nail Pitting	54	83.1%
	Leukonychia	4	6.2%
	Nail crumbling	5	7.7%

	Red spots in the lunula	0	0.0
Nail Bed changes (n=65)	Onycholysis	48	73.8%
	Splinter hemorrhage	3	4.6%
	Oil patch sign	2	3.1%
	Subungual hyperkeratosis	15	23.1%
Nail fold changes (n=65)	Nail fold involvement by the cutaneous lesion	7	10.8%
Others (n=65)	Beaus's lines	14	21.5%
	Trachyonychia	3	4.6%
	Longitudinal ridges	20	30.8%
	Onychomadesis	5	7.7%
	Onychorrhexis	7	10.8%
	Melanonychia	3	4.6%

Fig. 1: Nail pitting

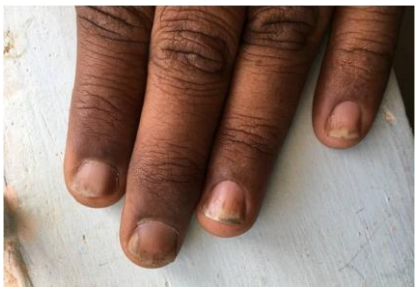

Fig. 2: Onycholysis seen over all finger nails

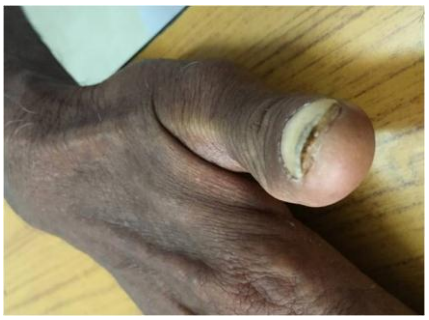

Fig. 3: Subungual hyperkeratosis

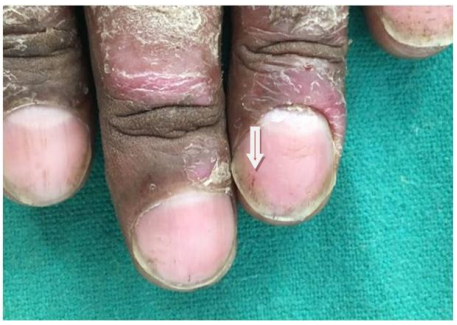

Fig. 4: Splinter hemorrhage with cutaneous psoriasis over proximal and lateral nail folds

Fig. 5: Oil drop sign or salmon patch with onycholysis

In our study, 28 patients (43.1%) had nail changes over finger nails without toe nail involvement, 37 patients (56.9%) had both finger and toe involvement. Isolated toe nail involvement was not seen in any patient. Finger nails were more commonly affected then toe nails in our study. In finger nails, nail matrix changes were noted commonly and nail pitting was the most common nail change seen in nail matrix. On the other hand, nail bed changes were seen commonly in toe nail and onycholysis was the most common change observed.

Based on BSA, 14 patients (21.5%) had mild psoriasis, 28 patients (43.1%) had moderate psoriasis, 21 patients (32.3%) had severe psoriasis. Two patients

(3.1%) presented exclusively with nail changes without cutaneous involvement. Most of the patients (43.1%) who had nail involvement in our study were in the category of moderate psoriasis whose BSA was between 3-10%. Mean BSA score in our study was 8.86+/-14.76 (Table 2).

Table 2: Distribution of study population according to Body surface area (BSA)

BSA	Number of patients	Percentage
Only nail involvement	2	3.1%
1-2% BSA (mild psoriasis)	14	21.5%
3-10% BSA (moderate psoriasis)	28	43.1%
>10% BSA (severe psoriasis)	21	32.3%
Total	65	100.0

Most of the patients (29.2%) had their total finger nail NAPSI score between 31- 40. Mean total finger NAPSI score was 23.81+/-21.57. Regarding total toe nail NAPSI score, most of the patients (35.4%) had their score between 11- 20. Mean toe nail NAPSI score was 18.02+/-12.21. The NAPSI scores were higher for finger nails than toe nails (23.81+/-21.57 Vs18.02+/-12.21). Most of the patients (30.8%) had their total NAPSI score between 41- 60. Mean total NAPSI score was 30.1+/-29.19 and Median was 29.5. Body surface area (BSA) showed a positive and statistically significant correlation with NAPSI (r=0.49448; p=0.00003), suggesting that with increase in cutaneous severity, the nail involvement also worsened (Table 3).

Table 3: Correlation between total NAPSI and BSA:

BSA	Total NAPSI score						
	1-20 Score	21-40 Score	41-60 Score	61-80 Score	81-100 Score	101-120 Score	Total
No skin involvement	1(1.5%)	0	1(1.5%)	0	0	0	2
1-2% BSA	3(4.61%)	6(9.23%)	5(7.69%)	0	0	0	14
3-10% BSA	6(9.2%)	10(15.3%)	10(15.3%)	2(3.07%)	0	0	28
>10% BSA	1(1.5%)	3(4.61%)	4(6.15%)	8(15.3%)	3(4.61%)	2(3.07%)	21
Total	11(16.9%)	19(29.2%)	20(30.7%	10(15.3%)	3(4.61%)	2(3.07%)	65

Spearman correlation coefficient r=0.49448; p=0.00003.

Discussion

Nail changes in psoriasis are common but it is relatively less explored and often overlooked, especially in the Indian setup. In many cases it causes psychologic stress, pain, impairment of manual dexterity and a significant negative impact on a patient's quality of life. Such an impact of nail psoriasis definitely warrants an insight into its clinical manifestations and treatment options by a present day dermatologist.[7] The present study evaluated clinical profile of 65 psoriasis patients with nail involvement.

Scoring systems are necessary for the evaluation and comparison of medical treatments. Due to the promising treatment options which have become available for nail psoriasis, has increased the need for an appropriate scoring system for nail psoriasis**.** Nail Psoriasis Severity Index (NAPSI), initially described by Rich and Scher[5] was an objective and a reproducible tool for estimating the severity of psoriatic nail involvement. NAPSI was the first quantitative nail assessment tool published in 2003.

Prevalence of Nail Changes: We found a 65% prevalence of nail changes among the 100 studied cases of psoriasis which is almost identical with other studies[8-10] done elsewhere as shown in Table 4. Isolated nail involvement was found in 2% of individuals in our study. As per previous studies only 1% to 5% of nail psoriasis are not accompanied by skin manifestations.[11] so our study is in concordance with previous studies. Prevalence of nail psoriasis in our study is more or less similar to other studies. These minimal differences in the prevalence of may be explained by many factors like inclusion of histopathologically confirmed cases in certain studies and recruitment of an appropriate study population is a crucial point in any study design.

Sex and Nail Changes: As per Reich K et al study nail psoriasis is approximately 10% more common in males than in females and is positively associated with higher bodyweight.[12] A German study conducted in 2010 on 3531 patients with psoriasis found that nail involvement was more prevalent in male individuals (11.2%).[13] In our study also nail changes were more commonly seen in males (64.6%) when compared with females (35.4%).

Type of Nail Change & NAPSI: Generally, psoriasis of the nail matrix and nail bed result in most of the observed pathologic changes, whereas psoriasis of the hyponychium and nail folds contribute less to the pathologic changes. None of the features of nail

psoriasis are unique to psoriasis. It is the collection of features that allow us to recognise a diseased nail as psoriatic.[14]

As per majority of other studies (Table 5) nail pitting was the most common nail change in our study also**.** Reports of prevalence of clinical features of nail psoriasis vary considerably in the literature, which may partly be a result of differences in descriptions and definitions used in previous studies. The most prevalent finger nail change found in our study was nail pitting. Few studies reported pitting,[2,8,9,15-22] oil-drop discoloration,[23] or subungual hyperkeratosis[3,24] to be the most prevalent nail changes in psoriatic patients. Grover et al.[25] and few others [26,27]reported onycholysis as the most prevalent nail change in 76.0% of patients. Gisondi et al.[28] studied nail involvement in psoriatic patients using ultrasonography and found onycholysis to be the most common clinical sign. Three previous studies found splinter hemorrhages to be the second (20.4%)[17] or third (39.3%, 42%)[16,2] most common manifestation in fingernail psoriasis. But in our study splinter hemorrhage was seen in 4.6% of the study population.

The red spotted lunula is an infrequent nail change in psoriasis. In our study population, none of the patient showed red spots in the lunula. In previous studies this nail symptom was observed in 0.4% by Aktan et al.,[24] in 1.3% by Kyriakou et al.[23] and in 10.2% by Rich et al.[15]

In previously published literatures concerning nail psoriasis additional nail symptoms such as Beau's lines and longitudinal ridging were not taken into account and scored, probably because these features are not included in the NAPSI score and may be even less specific for psoriasis than the eight above-mentioned features. Nevertheless, we found Beau's lines in 21.5% of our patients. Longitudinal ridging was present in 30.8% of our study population, making this feature as one of the common nail changes in psoriasis. Both longitudinal ridging and Beau's lines can be explained by the inflammatory process in the proximal nail matrix.

Leukonychia was present in over 6.2 % of our study population where as Beau's line (21.5%) and longitudinal ridges (30.8%) were seen in more cases in our study. However, van der Velden et al.[29] in a case-controlled study on nail psoriasis found that leukonychia was present in 65% of the control population and therefore questioned the position of leukonychia in NAPSI score. Consequently, the NAPSI score and especially the positioning of leukonychia in this score should perhaps be reconsidered. The same applies to the red spotted lunula, because this sign was rarely observed.

Baran[30] also has recognized the relevance of Beau's lines for estimating disease activity in nail psoriasis and included the number of Beau's lines in his nail psoriasis severity scoring system. As already shown by Parrish et al, the NAPSI might lack sensitivity to reflect responsiveness because it scores only presence or absence of manifestations.[31]

Correlation between NAPSI and BSA: The severity of skin disease was scored according to BSA in our study. Body surface area is a simple method to assess the severity of skin disease when compared to PASI (Psoriasis area severity index) which needs some expertise. Then inter observer variability for PASI is more when compared with BSA. Regarding spearman correlation coefficient between BSA and NAPSI, we observed that BSA showed a positive and statistically significant correlation with NAPSI (r=0.49448; p=0.00003), demonstrating worsening of nail involvement with increased severity of skin disease.

Nail psoriasis engenders both physical and psychological handicap, leading to significant negative repercussions in the quality of life.[19] Cosmetic handicap in nail psoriasis is sometimes so extensive that the patients tend to hide their hands and/or feet or shy away from social and business interactions.[19] The variability of clinical manifestations makes treatment challenging, and the efficacy of therapies in nail disease seems limited because of the impermeability of the nail plate and inaccessibility of the nail matrix.[1]

Limitation of the Study:

1. Absence of control group
2. NAPSI does not assess the impact of nail psoriasis on quality of life.

Table 4: Prevalence of nail changes in psoriasis patients from comparable studies done elsewhere

S.No	Researcher	Study population	Year	Sample	Prevalence
1	Our Study	Salem South India	2016-2017	100	65%
2	Nermina Ovcina-Kurtovic et al.[8]	Bosnia	2013	110	60.9%
3	Luiz Eduardo Fabricia de Melo Garbers et al.[9]	Brazil	2016	40	65%
4	Augustin M et al [13]	German	2005 & 2007	3531	40.9%
5	Taieb C et al[10]	France	2005		61%
6	Brazzelli et al[17]	Italy	2012	178	76.9%
7	Salomon J et al[3]	Poland	2003	106	78.3%

Table 5: Prevalence of common nail changes in psoriasis patients from comparable studies done elsewhere

S.No.	Researcher	Study population	Year	Sample	Common nail change
1	Our Study	Salem South India	2016-2017	100	1.Nail pitting-83.1% 2. Onycholysis –73.8% 3.Sub-ungual hyperkeratosis-23.1%
2.	Daulatabad et al[20]	Newdelhi India	2016	38	1.Nail pitting-97.4% 2. Onycholysis – 94.7% 3.Sub-ungual hyperkeratosis- 89.5%
3.	Zaias[21]	Norwalk	1990		1.Nail pitting 2. Nail bed discoloration 3.Onycholysis
4	Tham et al[22]	Singapore	1988		1.Nail pitting -68% 2.onycholysis -67%
5	Natarajan V et al[26]	Puduchery IndiaNorwalk	2009	72	1.Onycholysis 44.79% 2.Subungual hyperkeratosis-32.9% 3. Pitting- 29.06%
6	Klaassen et al[27]	Netherlands	2011-2012	36	1.Onycholysis -97.2% 2.Splinter haemorrhage-91.7% 3.Pitting -80.6%
7.	Nermina Ovcina-Kurtovic et al.[8]	Bosnia	2013	110	1.Pitting -47.8% 2. Discoloration of nail plate- 17.49% 3.Subungual hyperkeratosis—14.9%
8.	Luiz Eduardo Fabricia de Melo Garbers et al.[9]	Brazil	2016		1.Nail pitting 2.Onycholysis 3.Sub-ungual hyper keratosis
9.	Brazzelli V et al [17]	Italy	2012	178	Onycholysis- most common nail change
10	Salomon J et al [3]	Poland	2003	106	Subungual hyperkeratosis--most common nail change

Conclusion

Nail involvement in psoriasis may indicate a severe form of the disease which must be taken into account when selecting a treatment option, with an aim to reduce pain, functional impairment as well as emotional distress. Despite its clinical repercussions such as pain, functional impairment and aesthetic consequences, nail psoriasis is still a poorly studied condition. It is a marker for more severe cutaneous manifestations and joint involvement. Nail pitting (83.1%), onycholysis (73.8%), and subungual hyperkeratosis (23.1%) occupied the top three common nail changes in psoriatic patients in our study followed by longitudinal ridges (23.1%) and Beau's lines (21.5%).

The quantitative assessment of nail psoriasis also allows for a more objective evaluation of the evolution of the disease. The NAPSI scoring system would be helpful in following patient progress during treatment and would allow comparison between different treatment modalities. But NAPSI does not quantify the existing lesions and might not have the sensitivity to detect small changes. But this method detects the nail changes numerically, so it can be used for the assessment of treatment, but it must used in conjunction with a tool that also assesses quality of life.

To our knowledge this study is the first to compare NAPSI in correlation with body surface area (BSA), leading to lesser inter observer variability in assessing the severity of skin and nail involvement when compared with PASI. It is necessary to increase the awareness of nail psoriasis and more research is needed in the field of nail psoriasis because of its impact on patient's quality of life. Nail psoriasis seems to be an ignored featured of the disease and further research must focus on the effect of psoriasis treatment on the nails.

Acknowledgement: Nil

Conflicts of Interest: Nil

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