

Nail involvement in adult patients with plaque-type psoriasis: prevalence and clinical features^{*}

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Abstract: BACKGROUND: Psoriasis is a disease of worldwide distribution with a prevalence of 1 to 3%. Nail psoriasis is estimated in 50% of patients with psoriasis, and in the presence of joint involvement, it can reach 80%.

OBJECTIVE: To study the nail changes - and their clinical implications - presented by patients with psoriasis vulgaris under surveillance in a university hospital from the south of Brazil.

METHODS: This cross-sectional study evaluated 65 adult patients from January 2012 to March 2013. Cutaneous severity was assessed according to the Psoriasis Area and Severity Index (PASI). The Nail Psoriasis Severity Index (NAPSI) was used to evaluate patient's nails. The diagnosis of psoriatic arthritis was established according to the Classification Criteria for Psoriatic Arthritis (CASPAR).

RESULTS: The prevalence of NP was 46.1%. These patients had a median [interquartile range (IQR)] NAPSI of 1 (0-15). A total of 63.3% of patients reported aesthetic discomfort or functional impairment related to their nails. Onycholysis was the most common feature (80%). When compared with patients without nail involvement, patients with NP had lower mean age at psoriasis onset [21 (18-41) vs. 43 (30-56) years, $p=0.001$]; longer disease duration [15.5 (10-24) vs. 6 (2-12) years, $p=0.001$]; higher PASI [9.2 (5-17) vs. 3.7 (2-10), $p=0.044$], higher frequency of psoriatic arthritis (43.3 vs. 3.7, $p = 0.002$) and more often reported family history of psoriasis (40% vs. 7.4%, $p = 0.011$).

CONCLUSION: Onycholysis was the most frequent finding and most patients feel uncomfortable with the psoriatic nail changes that they experience.

Keywords: Dermatology; Nails; Psoriasis

INTRODUCTION

Psoriasis is a chronic inflammatory disease of multifactorial pathogenesis involving immunological, genetic and environmental causes.¹ Although psoriasis can present at any age, onset before the age of 30 is more common, so that most patients are affected at the most productive stage of their lives.²

The nails are considered a modified specialization of the skin and are commonly affected by the disease, presenting in up to 80% of the patients.³⁻⁵ The clinical signs of nail involvement in psoriasis are heterogeneous and related to the effects of the disease in either the matrix, the nail bed or the periungueal tissue, which results in distinct injury patterns.⁶ In psoriasis, nail involvement implies important psychological stress, pain and decreased functionality. It may represent more severe forms of cutaneous psoriasis and be a predictor of joint inflammation.⁶⁻¹¹

In Brazil, epidemiological data on psoriasis are scarce, and so are the data about the nail disease. The aim of this study was to evaluate nail involvement in patients with plaque-type psoriasis, and determine its prevalence, clinical features and possible associations.

PATIENTS AND METHODS

This cross-sectional study was conducted from January 2012 to March 2013. During this period, all patients with plaque-type psoriasis over the age of 18 years who attended the Dermatology Department of the University Hospital of Santa Maria, located in Santa Maria, Rio Grande do Sul state, were invited to participate in the study. Sampling was done by convenience. All patients who met the eligibility criteria were invited to join the study and responded according to their availability. All data collection was performed by the same researcher.

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The research was conducted according to the rules of Resolution 196/96 of the National Health Council, which regulates research with human subjects in Brazil. The study project was approved by the Ethics Committee of the Federal University of Santa Maria. All patients received and provided written consent to participate in the study.

Patients answered a specific questionnaire about the following demographic variables: gender, age, occupation, skin phototype, disease duration, age at disease onset, family history of psoriasis, current medications and comorbidities. Patients with nail psoriasis (NP) were also questioned: "do you experience any sort of aesthetic or functional discomfort in your daily life due to the nail problem?"

Psoriasis skin severity at the time of the physical examination was assessed by using the Psoriasis Area and Severity Index (PASI).^{12,13} All patients had their nails examined for nail disorders related to psoriasis. If onychomycosis was suspected, based on nail features such as onychorrhexis, hyperkeratosis, thickening or crumbling, direct microscopy examination and mycological culture were performed.¹⁴ Patients with onychomycosis, even though they could present other features related to NP, were excluded from this group. Patients with NP were then evaluated according to the NAPSI Nail Psoriasis Severity Index (NAPSI).^{15,16}

The collected data were submitted to statistical tests in the software SPSS 17.0 (SPSS Inc., IBM Corporation, Armonk, New York). Categorical variables were represented by percentages and analyzed by Chi square test or Fisher's exact test. Variables had their normality verified by Kolmogorov-Smirnov test. Continuous variables with normal distribution were tested by T student test and the results were presented as mean±standard deviation. For continuous variables with an abnormal distribution, the Mann Whitney test was performed. The central tendency measure used was median and its corresponding interquartile range. Statistical significance was considered at a level of 5% ($p < 0.05$) for all tests.

RESULTS

A total of 65 patients with plaque-type psoriasis were included in this study. Their main clinical and demographic characteristics are summarized in table 1. The sample consisted mostly of women (64.6%) and the mean age was 49±14.6 years. The main occupation reported was farming and the majority of patients had skin color phototype III (61.5%), according to Fitzpatrick.¹⁷ The mean disease duration was 14±10.5 years and the mean age of disease onset was 34.8±16.4 years, with a minority of patients reporting onset after the age of 60 (7.7%, $n = 5$). Most patients (69.2%) had skin severity classified as mild (PASI ≤ 10).^{18,19} The sample

consisted mostly of patients who were under treatment for psoriasis (84.6%). Of these, 56.9% were using topical corticosteroids, 64.6% were using emollient creams and 44.6% were taking systemic drugs. No patients were under topical treatment for the nails or periungual tissues or being treated with phototherapy or immunobiological therapy.

A total of 70.7% of patients had some type of medical comorbidity. Among these, hypertension was the most prevalent comorbidity (38.5%), followed by diabetes mellitus (20%) and smoking (15.4%). Other less frequently reported comorbidities were ischemic heart disease ($n=3$), renal failure ($n=2$) and ulcerative

TABLE 1: Characteristics of patients with plaque-type psoriasis ($n=65$)*

Characteristic	Statistics
Female gender	42 (64.6)
Age, years ^a	49±14.7
Men ^a	45±14.1
Women ^a	51.8±15.5
Occupation	
Farmers	22 (33.8)
Housekeepers	11 (16.9)
sellers	7 (10.7)
Others ^b	25 (38.4)
Fitzpatrick's phototype III	40 (61.5)
PASI ^a	8.3±7.4
≤10	45 (69.2)
>10	20 (30.8)
Psoriasis onset, years ^a	34.9±16.4
<20	15 (23.1)
20-59	45 (69.2)
≥60	5 (7.7)
Disease duration, years ^a	14±10.5
Family history of psoriasis	16 (24.6)
Current treatment	55 (84.6)
Systemic	29 (44.6)
Topical	49 (75.3)
Onychomycosis	8 (12.3)
Nail psoriasis	30 (46.1)
Comorbidities	46 (70.7)
ASH	25 (38.4)
DM	13 (20)
Smoking	10 (15.4)
Others ^c	16 (24.6)
Psoriatic Arthritis	16 (24.6)

PASI, Psoriasis Area and Severity Index. DM, Diabete Mellitus. ASH, Arterial Sitemic Hypertension

*All data are presented as the number of individuals = n (%), unless otherwise described

^aData expressed in median±standard deviation

^bOther occupations: housemaid ($n=6$); driver, manicure, student ($n=3$); teacher ($n=2$); cook, accountant, cobbler, mason, administrator, painter, electrician and butcher ($n=1$)

^cOther comorbidities: ischemic heart disease ($n=3$); renal failure, ulcerative colitis ($n=2$); hypothyroidism, tumors of the central nervous system, depression, prostate cancer, asthma, allergic rhinitis, autoimmune hepatitis and polyarteritis nodosa ($n=1$)

colitis (n=2). Hypothyroidism, central nervous system tumor, depression, prostate cancer, asthma, allergic rhinitis, autoimmune hepatitis and polyarteritis nodosa were observed in only one patient each.

Of the 65 patients who participated in the study, 8 were diagnosed with onychomycosis (12.3%). Even though these patients also presented findings compatible with NP, they did not receive this diagnosis. NP was then diagnosed in 16 women and 14 men, which accounted for a prevalence of 46.1% (n=30). The median [interquartile range (IIQ)] NAPSII overall score obtained was 1 (0-15). Most patients with NP had involvement of both hands and feet (70%, n=21), while exclusive involvement of the feet occurred in 10% (n=3) of cases and exclusive involvement of the hands was observed in 20% (n=6) of cases. Both hands were frequently involved: the left hand was affected in 80% of cases and the right hand was affected in 73.3% of patients. The left foot was involved in 76.7% of cases and the right foot in 73.3%. When nail changes were observed, more than one pattern was often found [2 (1.7-3.2)], and these changes were observed in the same nail or in different nails. The median number of affected nails was 1 (IIQ 0-8, n=243 nails). Onycholysis was the most frequent pattern, seen in 24 patients (80%), followed by subungual hyperkeratosis (66.7%, n=20) and by oil stains (43.3%, n=13). No significant differences related to these findings were found between genders. Details on the morphological types of nail changes found in patients with NP are described in table 2.

The comparison between groups where nail psoriasis was present or absent is described in table 3. When both groups were compared by age, gender and presence of comorbidities, no statistically significant differences were found. When compared with patients

TABLE 2: Morphology of nail patterns in patients with psoriasis (n=30)*

Finding	Prevalence (n)	Women (n=16)	Men (n=14)	p**
Onycholysis	24 (80)	12 (75)	12 (85.7)	0.657
Subungual hyperkeratosis	20 (66.7)	9 (56.3)	11 (78.6)	0.260
Oil drops	13 (43.3)	7 (43.8)	6 (42.9)	0.961
Pitting	10 (33.3)	6 (37.5)	4 (28.6)	0.709
Splinter hemorrhages	8 (26.7)	2 (12.5)	6 (42.9)	0.101
Leukonychia	8 (26.7)	4 (25)	4 (28.6)	>0.999
Crumbling	4 (13.3)	2 (12.5)	2 (14.3)	>0.999
Red spots	1 (3.3)	1 (6.5)	0 (0)	>0.999

*All data are presented as the number of individuals = n (%), unless otherwise described**p value was calculated by Fisher exact test

without nail involvement, patients with NP showed lower median age of psoriasis onset [21 (18-41) vs. 43 (30-56) years, p=0.001] and longer skin disease duration [15.5 (10-24) vs. 6 (2-12), p=0.001]. This group also showed a higher frequency of psoriatic arthritis (43.3% vs. 3.7%, p=0.002) and higher median PASI [9.2 (5-17) vs. 3.7 (2-10), p=0.044]. Family history of psoriasis was negative in most patients in both groups, but when NP was present, a positive family history was more often reported (40% vs. 7.41%, p=0.011).

The prevalence of psoriatic arthritis was 24.6%: 10 patients were women and 6 patients were men. The comparison between groups of patients with and without psoriatic arthritis is described in table 4. We found no statistically significant differences with regard to gender, age and PASI score. Years of disease presentation and positive family history of psoriasis had a borderline statistical significance (p=0.052). The mean age of psoriasis onset was lower in patients with psoriatic arthritis (26.1±13.6 years vs. 37.7±16.4 years, p=0.002) and the NAPSII score was significantly higher in these patients [14 (4-28) vs 0 (0-13), p=0.001]

Patients were asked if they experienced any kind of functional or aesthetic discomfort as a result of their nail changes, and a total of 63.3% of patients answered affirmatively to this question (Table 5). Most

TABLE 3: Characteristics of patients with and without nail involvement (n=57)*

Characteristic	With nail changes (n=30)	Without nail changes (n= 27)	p**
Female gender	16 (53.3)	19 (70.4)	0.295
Age, years	51.8±15	45.1±14.3	0.090 ^b
Disease onset, years ^a	27.6±14.9	42.7±15.9	0.001 ^b
<20	12 (40)	2 (7.4)	0.011
20-59	17 (56.6)	21 (77.7)	0.011
≥60	1 (3.3)	4 (14.8)	0.011
Disease duration, years ^a	17.5±10.7	9.1±9.7	0.001 ^c
PASI ^a	11.1±8.3	6.5±6.1	0.044 ^c
≤10	16 (53.3)	22 (81.5)	0.049
>10	14 (46.7)	5 (18.5)	0.049
Family history of psoriasis	12 (40)	2 (7.4)	0.011
Comorbidities	19 (63.3)	20 (70.1)	0.623
Psoriatic arthritis	13 (43.3)	1 (3.7)	0.002

PASI: psoriasis area and severity index.

* The data are presented as number of individuals = n (%), unless otherwise described.

** p values were calculated by Fisher's exact test, unless otherwise described.

^a Statistical significance was established by the Chi square test.

^b Data are expressed as mean ± standard deviation.

^c Statistical significance was established by the t Student test.

^d Data express the median and interquartile range values (P25-P75).

^e Statistical significance was established by the Mann Whitney test.

TABLE 4: Characteristics of patients with and without psoriatic arthritis

Characteristic	With psoriatic arthritis (n=16)	Without psoriatic arthritis (n=49)	p**
Female gendera	10 (62.5)	32 (65.3)	>0.999 ^b
Age, years	45.9±13.6	50.1±15	0.326 ^c
Disease onset, years	26.1±13.6	37.7±16.4	0.013 ^c
Disease duration, years	19.5 (1-40)	10 (1-41)	0.052
Family history of psoriasis ^a	7 (43.8)	9 (18.4)	0.052
NAPSI	18.3±16.5	6.2± 9.7	0.001
PASI	11.3±9.6	8.3±7.44	0.276 ^d

NAPSI, Nail Psoriasis Severity Index; PASI, Psoriasis Area and Severity Index.

* Data express the median and interquartile range values (p25-p75).

** The p values were calculated by Mann Whitney test, unless otherwise described.

^a All data are presented as number of individuals = n (%).

^b Statistical significance was established by the Chi square test.

^c Data are expressed as mean ± standard deviation.

^d p value was calculated by t Student test.

^e p value was calculated by Fisher's exact test.

TABLE 5: Aesthetic discomfort and functional impairment related to nail psoriasis (n=30)*

Characteristic	With discomfort or functional impairment n=19	Without discomfort or functional impairment n=11	p**
Female gendera	11 (57.9)	5 (45.5)	0.707 ^b
Age, years	46.7±16.7	43.2±9.4	0.522 ^c
NAPSI	21.2 ±13	8.2±9.7	0.040
PASI	12.4±8.3	5.7±5.8	0.204
Number of affected nails	9.7±4.4	5.5±5.1	0.032
Under psoriatic treatment ^a	16 (84.2)	9 (81.8)	>0.999 ^b

NAPSI, Nail Psoriasis Severity Index. PASI, Psoriasis Area and Severity Index.

*All data are presented as mean ± standard deviation, unless otherwise described.

**p value was calculated by Mann-Whitney test, except when otherwise described

^a Data expressed as n = number of individuals (%)

^b p value was calculated using Chi square test.

^c p value was calculated using Student's t test.

^d p value was calculated using Fisher's exact test.

patients who reported feeling discomfort were currently under some sort of treatment for psoriasis vulgaris (84.2%). They also more often had higher NAPSI scores and a greater number of nails affected. There were no significant differences between genders, age groups, PASI and the presence of a treatment.

DISCUSSION

Although nail manifestations are common in patients with psoriasis, they are only recently being the target of standardized quantification and detailed characterization. In Brazil, there are only a few studies on nail psoriasis, especially when considering epidemiological and morphological patterns of NP in our population.

The main current knowledge on NP comes from European studies. Compared to them, the prevalence of NP obtained in this sample of Brazilian patients was similar to that found in Spanish (47.7%) and German patients (40.9%). 10,11 Brazzelli and colleagues report a prevalence of NP of 76.9% in a sample of 137 Italian patients.²⁰ Similar results were found in a study with 106 Polish patients (78.3%).²¹ In the Brazilian study by Ribeiro and colleagues, which focused on the periungueal capillaroscopy of psoriatic patients, 37% (n=46) of patients had nail disease, defined by pitting or onychodystrophy.²² The differences in the prevalence of NP in the different populations reflect the difficulty in establishing an exact value of NP prevalence in patients with cutaneous psoriasis or its variability.

Most patients had a mild skin condition, which may have been influenced by the fact that most patients were already under some type of treatment with focus on cutaneous psoriasis. This factor may even have interfered with the NAPSI scores and the prevalence of nail psoriasis. However, this shows that physicians need to pay attention to nail findings and to complaints related to the nails, because even patients who were under treatment reported some type of functional or aesthetic discomfort. Still, this sample was not composed of patients who were under immunobiological therapy - which has proven to be effective in the treatment of nail psoriasis.^{4,23,24}

The exclusion of all cases of onychomycosis from the analysis related to nail psoriasis was made in order to minimize potential bias. That is because onychomycosis may present with clinical features that are similar to nail psoriasis.²⁵ Direct examination and culture were used for this purpose; however, we point out the absence of nail biopsy procedures as a study limitation. This could have helped to achieve a higher accuracy for the diagnosis of onychomycosis. Furthermore, it is estimated that the presence of onychomycosis is observed in about 4.6 to 30% of patients with PU, which points out to a possible exclusion of cases with this association, underestimating the data obtained on prevalence.²⁵

NP was associated with earlier onset of psoriasis and cases of longer disease presentation, in accordance to previous studies from other authors.^{10,26,27} The highest occurrence of nail abnormalities related to older ages, which was observed in this study, can be

associated with the higher frequency of nail problems that is observed in advanced age due to deficits in peripheral circulation, neuropathy and repetitive local trauma.²¹

NP was also associated with more extensive cutaneous disease and presence of joint involvement. Such observations have been described by several authors.^{6,8,11,28} The close microanatomical relationship between the nail unit and the musculoskeletal system is a plausible reason for the association between the ungueal and joint findings. Through this link, the extension of the local inflammation - related to an enthesitis at the terminal phalanx - could cause the changes found in the nails.²⁹ Therefore, it is estimated that an average of 80% of patients with PA will present nail involvement at some point of their lives.^{6,20,29,30} The greater extent of skin involvement associated with the presence of nail psoriasis can be elucidated through the following equation: for each one-point increase in the severity of skin involvement, a 10-point increase in the severity of nail involvement is expected. This equation was proposed by Hallaji and colleagues in a study that evaluated 100 patients, and correlated the PASI and the NAPSI.²⁸

For some authors, the most common sign of NP is the pitting,^{31,32} while for others the main finding is subungueal hyperkeratosis.²¹ Attempting to discriminate and compare the ungueal findings identified by the NAPSI in patients with psoriasis and in a control group of healthy patients, a Dutch study identified onycholysis and splinter hemorrhages as the most frequent signals associated with psoriasis.³³ Similar to that, onycholysis was the most common finding in our study and in the study by Brazzelli and colleagues.²⁰ We find important to emphasize that the NAPSI score used in the present study constitutes an excellent validated tool to analyze the patterns and quantify the ungueal involvement. However, it only takes into account six features related to nail psoriasis

(onycholysis, subungueal hyperkeratosis, oil stain, pitting, splinter hemorrhages, leukonychia, crumbling, and red spots in the lunula), and does not consider any other features which are also known to be related to psoriasis, such as Beau's lines, for example.¹

Moreover, the NAPSI score only takes into account the objective impression of the examiner and is therefore unable to predict the impact of these scores on the quality of life of patients with PU. Studies measuring quality of life impairment in these patients showed that 51.8% complained of pain in the nails, 58.9% reported restrictions in their daily life,⁷ and 90% considered the cosmetic appearance of their nails to be disturbing.⁶ In this context, in order to include a subjective variable dedicated to the patient into our study, we questioned the patients whether they experienced any aesthetic or functional discomfort in their daily activities. Such questioning may be considered too simple when compared with the NPQ10 (Nail Psoriasis Quality of Life Scale), designed to assess the quality of life in patients with nail psoriasis.³⁴ However, the latter was not used because a validated translation into Portuguese is not yet available.

CONCLUSION

As far as we know, this study is the first study in Brazil on the prevalence of nail changes in patients with plaque-type psoriasis. It focused on the morphological characteristics of the ungueal presentation, and showed similar results to that previously published internationally. The frequency of nail findings in the studied population, which consisted mostly of patients who were already using systemic drugs and who had cutaneous severity classified as mild, suggests that nail involvement may be underestimated by doctors. In this context, it is essential that the dermatological evaluation of psoriatic patients take in consideration the nail problem, in order to optimize treatment and improve patients' satisfaction. □

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