Dermatology Practical & Conceptual

A Study Proposing a Pattern-Based Dermoscopic Algorithm for Diagnosis of Nail Psoriasis

Ahu Yorulmaz[1]

1 Ankara Bilkent City Hospital, Department of Dermatology, Ankara, Turkey

Key words: Nail psoriasis, Dermoscopy, Algorithm, Diagnosis

Citation: Yorulmaz A. A Study Proposing a Pattern-Based Dermoscopic Algorithm for Diagnosis of Nail Psoriasis. *Dermatol Pract Concept.* 2026;16(1):5881. DOI: https://doi.org/10.5826/dpc.1601a5881

Accepted: June 29, 2025; **Published:** January 2026

Funding: None.

Competing Interests: None.

Authorship: All authors have contributed significantly to this publication.

Corresponding Author: Ahu Yorulmaz, Ankara Bilkent City Hospital, Department of Dermatology, Ankara, Turkey. ORCID ID: 0000-0003-4687-0522. E-mail: ahuyor@gmail.com

ABSTRACT

Introduction: Nail psoriasis (NP) presents with various morphological patterns. Identifying these patterns enhances the recognition and diagnosis of NP. Dermoscopy is the only modality capable of providing accurate information regarding these patterns.

Objective: This study aimed to identify and classify NP into distinct dermoscopic patterns and evaluate their relationships with disease severity and the risk of psoriatic arthritis. A secondary objective was to propose a pattern-based dermoscopic algorithm for NP diagnosis.

Methods: This prospective study included 208 patients diagnosed with NP and 418 individuals without any nail disorder as controls. Over one year, all participants underwent a dermoscopic examination of each nail.

Results: Two primary dermoscopic patterns were observed in NP patients: the bed and matrix (BM) pattern and trachyonychia. The BM pattern, the prototypical presentation of NP, involved findings related to both the nail bed and nail matrix. Trachyonychia was characterized by rough nail surfaces and pitting. The BM pattern was more prevalent than trachyonychia. However, patients with trachyonychia exhibited more severe psoriasis and NP and were more likely to develop psoriatic arthritis. Leukonychia was more common in the control group.

Conclusion: Although dermoscopy is a highly reliable diagnostic tool, it remains underutilized in NP diagnosis. This study demonstrates that NP exhibits specific morphological patterns that distinguish it from other nail disorders. A pattern-based dermoscopic algorithm is proposed, potentially eliminating the need for histopathological examination when these characteristic patterns are detected.

Introduction

Nail psoriasis (NP) manifests in diverse clinical forms, ranging from complete nail destruction in all nails to distal onycholysis in only one or two fingernails. It occurs when psoriatic inflammation affects the nail matrix, nail bed, or both. The lesions observed in NP vary based on the location and severity of inflammation [1-3]. Different combinations of these lesions produce distinct morphological patterns, some of which are detectable only through dermoscopy [4].

Dermoscopy has been used to investigate NP [4-10], identifying both common and rare features [4-6,11-14]. While some findings appear unique to NP, their diagnostic significance remains unproven due to the lack of histopathological correlation in previous studies. Nail biopsy, the gold standard for NP diagnosis, is invasive and prone to sampling errors [1]. Dermoscopy, while requiring specialized training and expertise, is a valuable alternative to nail biopsies in diagnosing NP, a common and benign inflammatory condition. When characteristic NP patterns are identified, dermoscopy serves as a reliable diagnostic method [12].

Objectives

This study aimed to investigate NP patterns in patients with psoriasis vulgaris (PV) and assess their relationship with disease severity and psoriatic arthritis risk. Additionally, we sought to propose a two-step, pattern-based dermoscopic algorithm to distinguish NP from other nail disorders.

Methods

This prospective study included 208 patients (164 males and 44 females) with PV and NP and 418 individuals without any nail disorder as a control group. The study was conducted over one year, adhering to the principles of the Declaration of Helsinki and approved by the Local Ethics Committee.

Patients were included in the study if they met the following criteria: age >18 years, histopathologically-confirmed diagnosis of PV with a lesional skin biopsy, and macroscopic NP changes in at least three nails.

Exclusion criteria included the presence of onychomycosis, nail trauma, or other nail disorders and cutaneous psoriasis lesions affecting <5% of the body surface area. Patients with onychomycosis were excluded from the study based on their positive direct microscopic examinations with potassium hydroxide.

Participants in the control group were required to have no macroscopic nail change indicative of a nail disorder. All participants underwent a complete clinical evaluation for any dermatological or systemic disease affecting the nails. The Psoriasis Area Severity Index (PASI) and Nail Psoriasis Severity Index (NAPSI) were used to assess PV and NP severity, respectively. If a patient had a prior medical diagnosis of psoriatic arthritis (PsA), it was recorded. Those without a confirmed diagnosis were referred to a rheumatologist, where PsA was diagnosed based on clinical assessment. A video dermoscope with 20× magnification was used to evaluate the nail unit in all participants. Individuals in the control group underwent handheld dermoscopic examinations to rule out nail lesions.

In the patient group, the following dermoscopic features were analyzed: longitudinal erythema of the nail bed (LE), fuzzy lunula (FL), mottled lunula (ML), dilated nail bed capillaries (DBCs), nail bed red spots (NBSs), splinter hemorrhages (SHs), salmon patches (SPs), distal onycholysis with an erythematous border (DO), subungual hyperkeratosis (SUH), red spots on the lunula (RSL), pitting, multiple white dots (MWDs), nail plate scaling, longitudinal ridging, leukonychia, Beau's lines, thickened white–yellow nail plates (TYPs), nail plate crumbling (NPC), nail plate loss, and pitting over SPs (PoSPs).

Pitting over SPs is a newly recognized finding in NP that was initially termed "pseudopitting" [11]. However, the term "pitting over SPs" was preferred to avoid terminological confusion in NP classification.

For NP pattern analysis, the following features were considered: SHs, SPs, DO, SUH, NBSs, RSL, pitting, PoSPs, ridging, leukonychia, Beau's lines, TYPs, and NPC. Based on clinical findings, two NP patterns were identified: the bed and matrix (BM) pattern (Figure 1) and trachyonychia (Figures 2–4). If the NP pattern varied across the 20 nails (either BM pattern or trachyonychia), the dominant pattern was selected as the defining characteristic for the patient.

A patient was classified as having the BM pattern if they exhibited a combination of at least three nail bed-related features (DO, SHs, and SPs) along with at least one matrix-related feature (pitting). The number of pits was not a determining factor; the presence of at least one pit, along with nail bed-related findings, was sufficient for classification under the BM pattern. Patients with rough nail surfaces and pitting were classified under the trachyonychia group.

Patients with NP were further categorized into subpatterns. Those with the BM pattern were classified under the spots with halos sub-pattern if they displayed any of the following: i) NBSs with a peripheral white halo, ii) SPs with a peripheral white halo, iii) PoSPs, or iv) pits with peripheral erythema. This was the only sub-pattern identified within the BM pattern (Figure 5). Patients with trachyonychia were further divided into three subgroups: classical trachyonychia (rough nail surface, pitting, and ridging; Figure 2), thick trachyonychia (rough surface, pitting, ridging, and TYPs; Figure 3), and proximal NPC

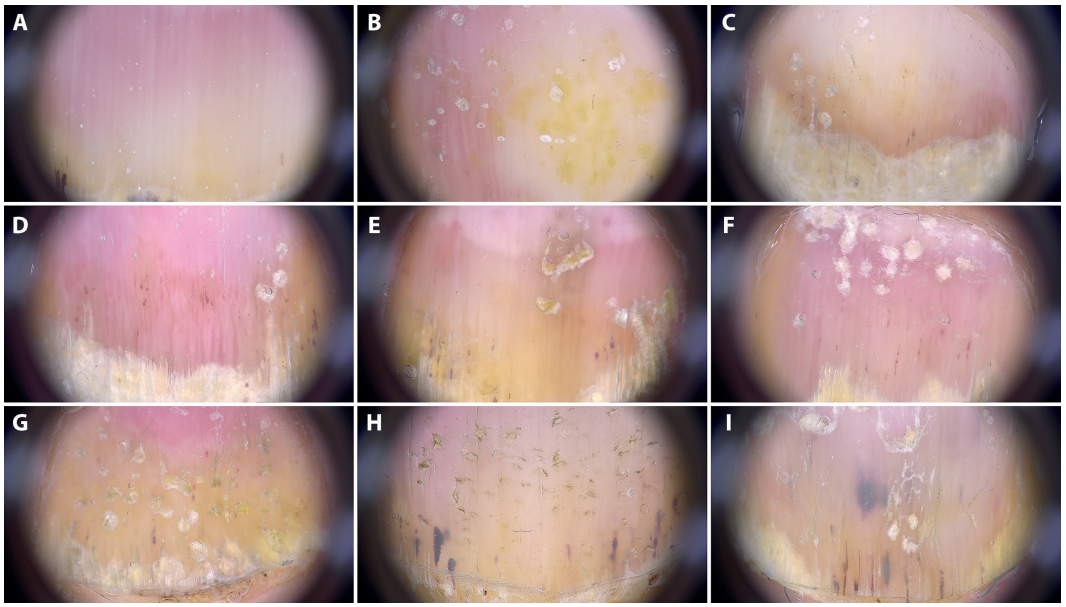


Figure 1. Bed and matrix pattern. This pattern is the prototypical presentation of nail psoriasis, in which findings related to both the nail bed and nail matrix are observed.

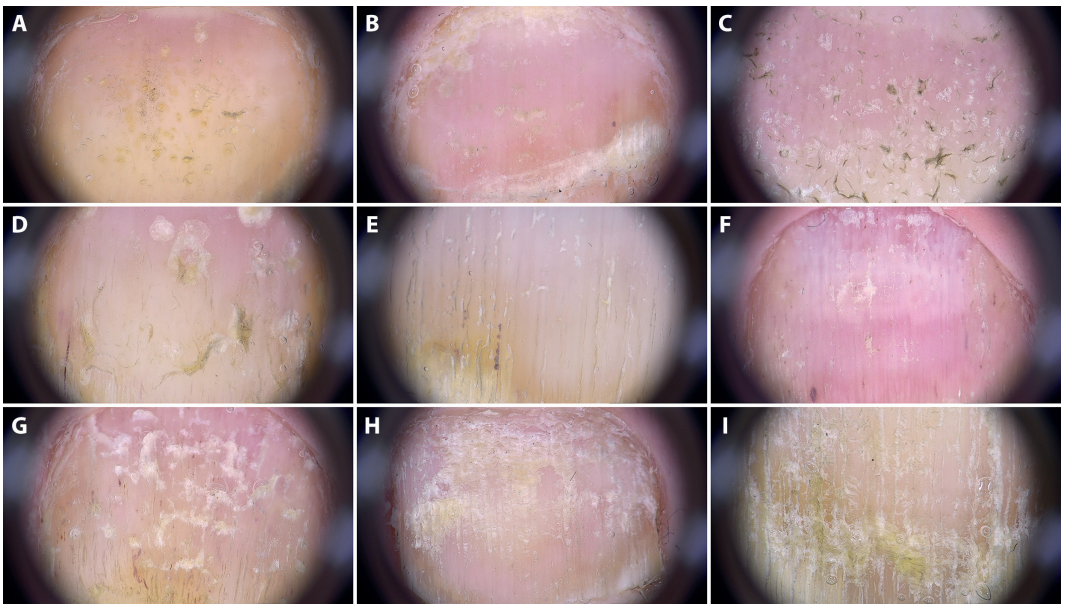


Figure 2. Trachyonychia. Rough nail surfaces, pitting, and longitudinal ridging. There is distal onycholysis with erythematous border in every image other than (C) and (F). Note subtle lateral erythemas in (F) and elkonyxis in (D).

pattern (rough surface, pitting, and proximal NPC; Figure 4). For the trachyonychia group, nail bed-related findings were considered only if the patient did not exhibit the diagnostic features of psoriatic pitting. Haneke et. al. [1-3] suggested that the presence of 10 pits in a single nail or >50 pits across all nails is diagnostic for NP. If patients did not meet this criterion, DO and other nail bed-related features were assessed.

Table 1 outlines the diagnostic clues and criteria for NP patterns and sub-pattern classification, developed based on our findings.

Statistical Analysis

Data were analyzed using SPSS software, version 20 (SPSS Inc.). Categorical variables are presented as frequencies and percentages, whereas continuous variables are described using medians and interquartile ranges (IQRs). The Kolmogorov–Smirnov test was used to assess data normality. Categorical variables were compared using the chi-square test or Fisher's exact test, while the Mann–Whitney U test was applied for comparisons of continuous variables. Correlations between variables were determined using Spearman's correlation test. A p-value <0.05 was considered statistically significant.

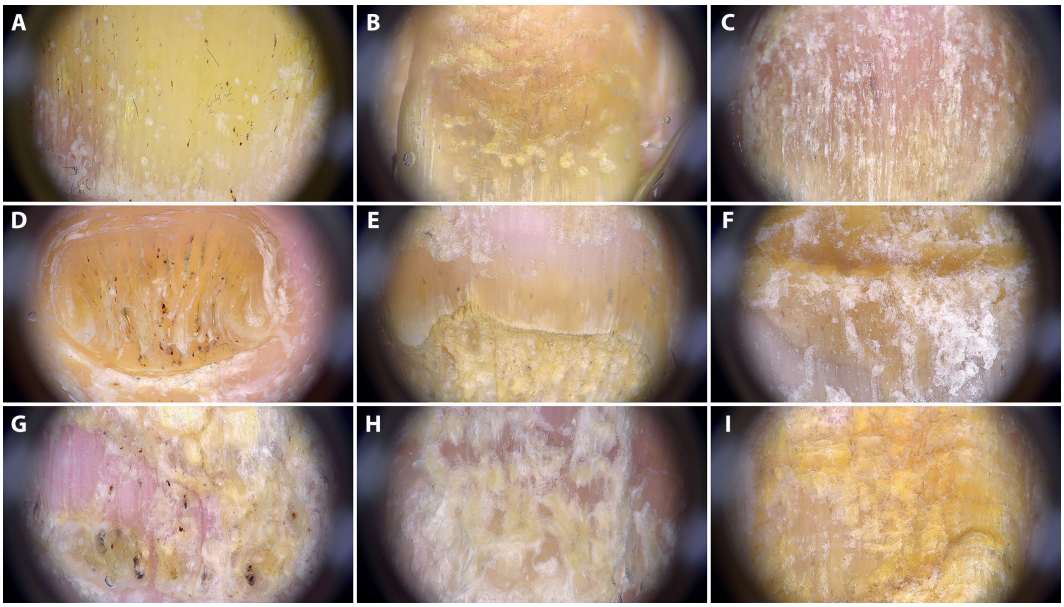


Figure 3. Thick trachyonychia. Both trachyonychia and thick trachyonychia manifest with rough nail surfaces, ridging and pitting. The distinguishing feature of thick trachyonychia is the presence of thickened white–yellow nail plates. Yellow colour represents psoriatic keratinization.

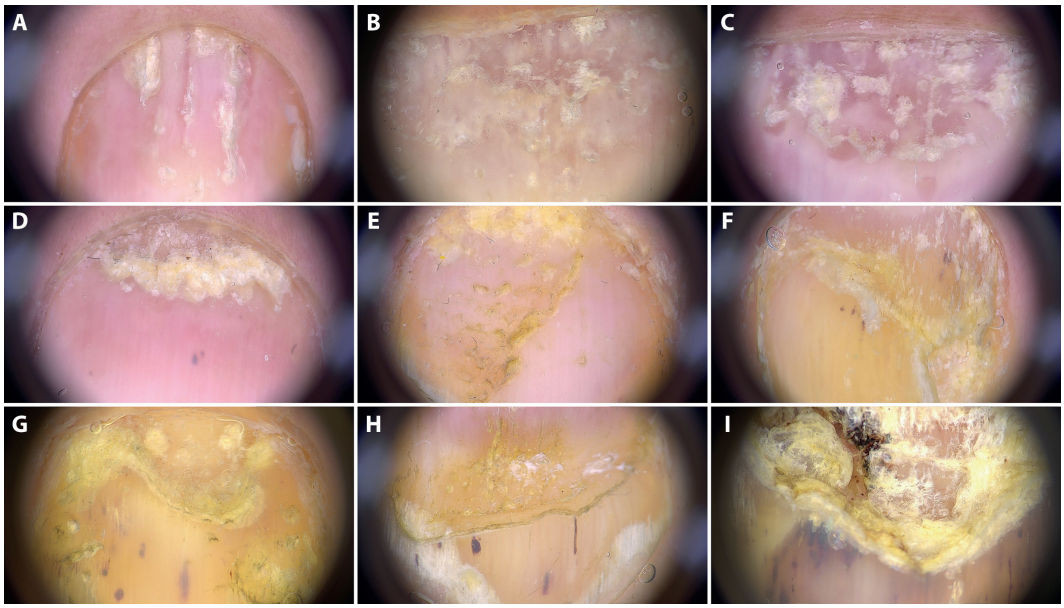


Figure 4. Proximal nail plate crumbling sub-pattern. The presence of a red lunula (A-D) suggests active nail psoriasis. Other images demonstrate proximal nail plate loss, potentially indicating a recent exacerbation of psoriasis.

Results

The demographic and clinical characteristics of the patient group are presented in Table 2. A family history of psoriasis was observed in 84 patients (40.4%), while PsA was present in 73 patients (35.1%). The median PASI score was 8 (IQR, 3.43–13.2), whereas the median NAPSI score was 30 (IQR, 18–49.5). Among the patients, 71.2% exhibited the BM pattern, while 28.8% exhibited trachyonychia.

Regarding sub-patterns, the spots with halos sub-pattern were identified in 11.1% of patients, classical trachyonychia in 13.9%, thick trachyonychia in 7.7%, and the proximal NPC sub-pattern in 7.2%. Among patients classified under the BM pattern (N=146), all but two exhibited SHs, DO, SPs, pitting, and other features, thus meeting the BM pattern criteria outlined in Table 1. The two exceptions did not display SPs but exhibited DO, SHs, and pitting. All patients classified under trachyonychia met the respective criteria described in Table 1.

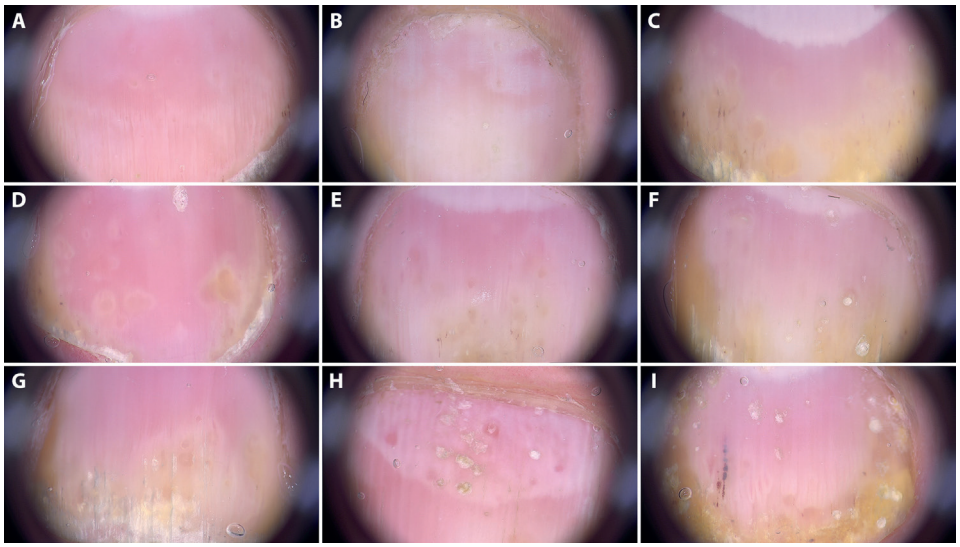


Figure 5. Spots with halos sub-pattern. Peripheral white halos are obvious around nail bed spots, dilated bed capillaries, and salmon patches. Note white patchy areas in (B); pits over salmon patches in (F) and (I); pits over red spots on the lunula in (H).

Table 1. Criteria for patterns and sub-patterns of NP.

	Patterns and sub-patterns of NP	Essential findings (Need at least)	Additional findings (Commonly seen + others)	Key characteristics	Diagnostic clue
1	BM	DO, SHs, SPs Pitting	SUH + others	Characterized by a combination of at least three nail bed-related findings (DO, SHs, and SPs) along with at least one matrix-related finding (pitting)	BM pattern is diagnostic of NP
	Spots with halos sub-pattern	DO, SHs, SPs Pitting + a. NBSs with halo b. SPs with halo c. PoSPs d. Pits with peripheral erythema	DBCs + others	If a patient with the BM pattern shows any of (a-d), they're categorized as having the spots with halos sub-pattern	
2	Trachyonychia				
	Classical trachyonychia§	Rough nail surface, pitting, ridging	DO, SHs + others	The diagnosis of trachyonychia necessitates the presence of matrix-related findings, although patients may also exhibit nail bed –related findings	Presence of pitting* or DO is diagnostic of NP
	Thick trachyonychia▲	Rough nail surface, pitting, TYPs	Ridging, SHs + others		Presence of pitting* or DO or SPs is diagnostic of NP
	Proximal NPC sub-pattern▲	Rough nail surface, pitting, proximal NPC	RSL + others		Presence of pitting* or DO or SPs is diagnostic of NP

Abbreviations: NP: Nail psoriasis; BM: bed and matrix pattern; DO: distal onycholysis; SHs: splinter hemorrhages; SPs: salmon patches; SUH: subungual hyperkeratosis; NBSs: nail bed spots; PoSPs: pits over SPs; TYPs: thickened white-yellow nail plates; DBCs: dilated nail bed capillaries; NPC: nail plate crumbling; RSL: red spots on the lunula.

*10 pits in one nail or >50 pits in all nails.
§For the diagnosis of NP, look for either pitting (10 pits in one nail or >50 pits in all nails), or DO.
▲For the diagnosis of NP, look for either pitting (10 pits in one nail or >50 pits in all nails), or DO, or SPs.

Table 2. Demographic and clinical characteristics of the patient group.

Clinical Characteristics	Clinical Results
Age (years), Md (IQR), range	**43 (35-55.75), 18-7**
Sex, Female/ Male, N (%)	44 (21.2) / 164 (78.8)
Family history of psoriasis, N (%)	84 (40.4%)
Psoriasis duration (months), Md (IQR)	120 (48-240)
Pts with PsA, N (%)	73 (35.1)
Previous treatments, N (%)	
Systemic conventional treatments	116 (55.8)
Phototherapy	72 (34.6)
Biologics	38 (18.3)
Current treatment, N (%)	
Only topical treatment	78 (37.5)
Acitretin	13 (6.3)
Methotrexate	55 (26.4)
Cyclosporine A	4 (1.9)
Biologics	58 (27.9)
Affected fingernails/ toenails/ total nails, Md (IQR)	7 (4-10) / 2 (0-6) / 10 (5-15)
Pts with toenail involvement, N (%)	119 (57.2)
Pts with 10 fingernail/ 20 nail involvement, N (%)	83 (39.9) / 32 (15.4)
PASI, Md (IQR)	8 (3.43-13.2)
NAPSI, Md (IQR)	30 (18-49.5)
Patterns, N (%)	
BM pattern/ Trachyonychia	148 (71.2) / 60 (28.8)
Sub-patterns, N (%)	
Spots with halos sub-pattern	23 (11.1)
Classical trachyonychia	29 (13.9)
Thick trachyonychia	16 (7.7)
Proximal NPC sub-pattern	15 (7.2)

Abbreviations: Md: median; IQR: interquartile range; Pts: patients; PsA: psoriatic arthritis; PASI: psoriasis area and severity index; NAPSI: nail psoriasis severity index; BM: bed and matrix; NBSs: nail bed spots; NPC: nail plate crumbling.

Furthermore, all patients within the thick trachyonychia and proximal NPC sub-pattern groups, except for seven patients from the classical trachyonychia group, exhibited either 10 pits in a single nail or >50 pits across all nails. These seven exceptions displayed DO and other nail bed-related findings.

The dermoscopic findings of the patient group are summarized in Table 3. SHs were the most frequently observed feature, followed by DO and pitting. In the control group, LE was the most prevalent finding, followed by ridging, scaling, and leukonychia. The associations between dermoscopic findings within the patient group are shown in Table 4.

Table 3. Dermoscopic findings of the study group.

Dermoscopic findings, N (%)	Patient Group (N=208)	Control Group (N=418)
Nail bed-related findings		
SHs	202 (97.1)	30 (7.2)
DO	201 (96.6)	2 (0.5) ‡
SPs	170 (81.7)	-
LE	167 (80.3)	121 (28.9)
SUH	113 (54.3)	-
DBCs	85 (40.9)	-
NBSs	36 (17.3)	-
PoSPs	19 (9.1)	-
Nail matrix-related findings		
Pitting	198 (95.2)	6 (1.4)
Ridging	136 (65.4)	52 (12.4)
Scaling	128 (61.5)	44 (10.5)
FL	123 (59.1)	19 (4.5)
TYPs	82 (39.4)	-
Beau's lines	56 (26.9)	2 (0.5)
RSL	46 (22.1)	-
ML	42 (20.2)	6 (1.4)
NPC	40 (19.2)	-
Leukonychia	39 (18.8)	44 (10.5)
MWDs	29 (13.9)	11 (2.6)
Nail plate loss	23 (11.1)	-

Abbreviations: SHs: splinter hemorrhages; DO: distal onycholysis; SPs: salmon patches; LE: longitudinal erythema of the nail bed; SUH: subungual hyperkeratosis; DBCs: dilated nail bed capillaries; NBSs: nail bed spots; PoSPs: pits over SPs; FL: fuzzy lunula; TYPs: thickened white-yellow nail plates; RSL: red spots on the lunula; ML: mottled lunula; NPC: nail plate crumbling; MWD: multiple white dots.

‡: without proximal erythematous border.

Analysis of the Clinical Profile of the Study Group and its Significance

Male patients were significantly more likely to exhibit scaling and ridging but were less likely to present with TYPs ($P<0.05$). Conversely, female patients were significantly less likely to exhibit scaling and ridging ($P<0.05$). Patients with trachyonychia were older than those with BM pattern ($P<0.001$).

Older patients were more likely to present with LE, FL, ML, scaling, ridging, Beau's lines, NPC, nail plate loss, and MWDs ($P<0.05$). In contrast, younger patients exhibited NBSs, SPs, and PoSPs ($P<0.05$). Patients with TYPs and ridging had a longer history of psoriasis than those without these findings ($P<0.05$).

Patients with the BM pattern were more likely to present with SHs, SPs, scaling, and ridging but were less likely to

Table 4. Significant associations between dermoscopic findings within the patient group.

	SPs	SHs	DBCs	LE	NBSs	RSL	SUH	TYPs	Scal	Ridg	BL	NPC	FL	DO
DO	***	***												
SPs		*									* ¶			
DBCs				*				* ¶						
NBSs	*		***	*										
PoSPs			*	* ‡	***	***								
Pitt										*				
Ridg							***		***					
Scal							***	***						
FL			***	***		*								
TYPs						* ¶	***		***	***				
BL	*						***	***	*	***				
NPL			*				***	***	*	*	***	***		
NPC							***	***	*	*	***			
MWDs													*	
ML				*** ‡						*			***	
RSL			*	*			*	*		*				*

***: $p<0.001$; *: $p<0.05$.

‡: All patients with PoSPs and all patients with ML had LE.
¶: Inverse relationship. Patients with SPs were less likely to exhibit Beau's lines. Patients with DBCs were less likely to exhibit TYPs. Patients with TYPs were less likely to exhibit RSL.

Abbreviations: DO: distal onycholysis; SPs: salmon patches; DBCs: dilated nail bed capillaries; NBSs: nail bed spots; PoSPs: pits over SPs; Pitt: pitting; Ridg: ridging; Scal: scaling; FL: fuzzy lunula; TYPs: thickened white-yellow nail plates; BL: Beau's lines; NPL: nail plate loss; NPC: nail plate crumbling; MWDs: multiple white dots; ML: mottled lunula; RSL: red spots on the lunula; SH: splinter hemorrhages; LE: longitudinal erythema; SUH: subungual hyperkeratosis.

have Beau's lines, TYPs, nail plate loss, and NPC ($P<0.05$). In contrast, those with trachyonychia had a higher incidence of scaling, ridging, Beau's lines, TYPs, SPs, and SHs ($P<0.05$).

Psoriatic arthritis was significantly more common in patients with trachyonychia (51.7%) compared with those with the BM pattern (48.3%; $P<0.05$). Patients with trachyonychia were also more likely to exhibit involvement of all 10 fingernails and toenails ($P<0.05$). Toenail involvement was observed in 84.9% of male patients and 15.1% of female patients ($P=0.014$). These patients were more likely to present with SUH, scaling, ridging, and TYPs but were less likely to have DBCs and NBSs ($P<0.05$). A family history of psoriasis was significantly associated with toenail involvement ($P=0.047$).

The number of affected fingernails was significantly higher in males, patients with PsA, those with trachyonychia or toenail involvement, and those exhibiting LE, DBCs, RSL, SUH, scaling, ridging, Beau's lines, TYPs, NPC, nail plate loss, and PoSPs ($P<0.05$).

Analysis of the Association between Clinical Variables and Psoriatic Arthritis

Psoriatic arthritis was significantly associated with a family history of psoriasis and a longer disease duration ($P<0.05$). Patients with PsA were more likely to exhibit SUH, scaling, ridging, and TYPs as well as involvement of all 10 fingernails and toenails ($P<0.05$). PsA was also linked to more severe psoriasis and NP ($P<0.001$). The median PASI scores were 12.5 (IQR: 8–20.9) in patients with PsA and 4.8 (IQR: 2.5–10.4) in those without PsA. The median NAPSI scores were 44 (IQR: 27.5–82) in patients with PsA and 22 (IQR: 16–38) in those without PsA. PsA was observed in 71.9% of patients with involvement of all 20 nails ($P<0.001$).

Analysis of the Association between Clinical Variables and Disease Severity

Patients with trachyonychia were more likely to have severe psoriasis (P=0.002). Their median PASI score was 11.05 (IQR: 4.57–18.87), compared with 6.15 (IQR: 3–11.6) in those with the BM pattern. Severe psoriasis was significantly associated with toenail involvement, 20-nail involvement, and the presence of LE, RSL, SUH, scaling, ridging, Beau's lines, TYPs, NPC, and nail plate loss ($P<0.05$).

Similarly, patients with trachyonychia were more likely to have severe psoriasis ($P=0.002$). Their median PASI score was 11.05 (IQR: 4.57–18.87), compared with 6.15 (IQR: 3–11.6) in those with the BM pattern. Males and patients with toenail or 20-nail involvement, LE, DBCs, RSL, NBSs, SUH, scaling, ridging, Beau's lines, TYPs, NPC, nail plate

loss, and PoSPs were more likely to develop severe NP (P<0.05).

Spearman's correlation analysis revealed a significant positive relationship between age and psoriasis severity (P= 0.007, r = 0.185). Disease duration correlated positively with both psoriasis severity (P=0.012, r=0.174) and NP severity (P=0.044, r=0.139). The total number of affected fingernails correlated positively with psoriasis severity (P<0.001, r=0.451) and strongly positively with NP severity (P<0.001, r=0.831). Additionally, psoriasis severity was significantly correlated with NP severity (P<0.001, r=0.501).

Analysis of the Clinical Profile of the Control Group and its Significance

The median age of the control group was 45.5 yr (range: 18–79; IQR: 34–58). Males comprised 74.9% (N=313) of the control group, while females accounted for 25.1% (N=105). There was no significant difference in age or sex distribution between the patient and control groups (P>0.05). Dermoscopy of the control group revealed the following features: LE, FL, ML, SHs, DO without an erythematous border, pitting, scaling, ridging, leukonychia, Beau's lines, and MWDs (Table 3). Within the control group, patients with LE, FL, and ridging were significantly older than those without these findings, whereas those with scaling and leukonychia were younger (P<0.05). Leukonychia was significantly more common in the control group than in the patient group (53% vs. 47%; P=0.004). However, all other observed findings were significantly more common in the patient group (P<0.001).

Discussion

Dermoscopy is an invaluable tool for assessing NP, allowing clinicians to reach a diagnosis without the delays and discomfort associated with nail biopsy [12]. Although pathognomonic dermoscopic findings of NP have been described [6,11,12], no standardized dermoscopic algorithm exists for NP diagnosis. This study sought to identify previously unexplored NP patterns, introduce a classification system, and develop a two-step, pattern-based dermoscopic algorithm for NP diagnosis.

The BM pattern was the most prevalent, observed in 71.2% of patients. The other pattern identified was psoriatic trachyonychia, which was associated with more severe psoriasis and NP as well as with a higher likelihood of PsA compared with the BM pattern. Patients with trachyonychia exhibited a higher incidence of scaling, ridging, Beau's lines, TYPs, SPs, and SHs as well as involvement of all 10 fingernails and toenails. Similarly, patients with PsA were more likely to exhibit scaling, ridging, TYPs, SUH, and 10-nail involvement.

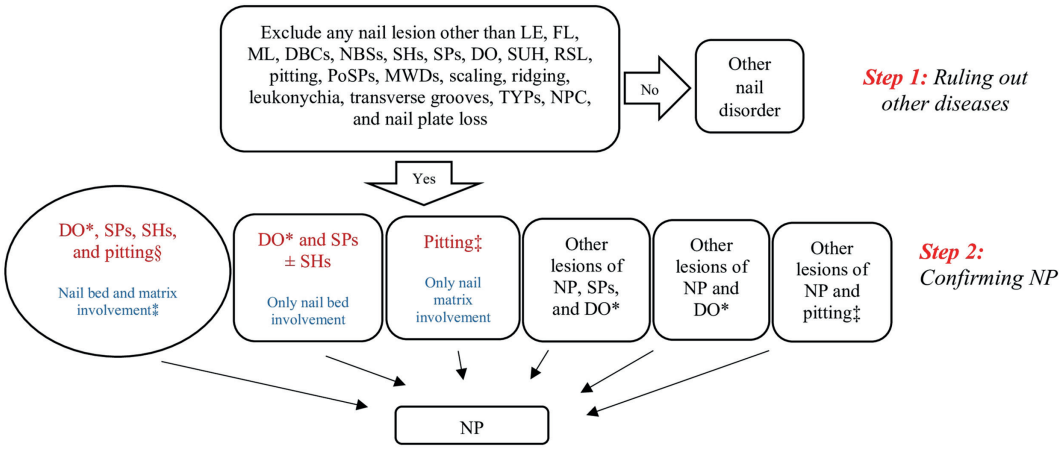
Psoriatic arthritis was diagnosed in 35.1% of the study population and was associated with a family history of psoriasis and longer disease duration. Patients with PsA were also more likely to have severe psoriasis and severe NP. Notably, 71.9% of patients with 20-nail involvement had PsA. This study identified several significant associations with disease severity. Patients with 20-nail and toenail involvement, LE, RSL, SUH, scaling, ridging, Beau's lines, TYPs, NPC, and nail plate loss were more likely to have severe psoriasis. Likewise, severe NP was more common in males and in patients with toenail or 20-nail involvement, LE, DBCs, RSL, NBSs, SUH, scaling, ridging, Beau's lines, TYPs, NPC, nail plate loss, and PoSPs. The total number of affected fingernails and disease duration were positively correlated with both psoriasis and NP severity.

Trachyonychia refers to rough nails with a sandpaper-like appearance and may be associated with alopecia areata, lichen planus, psoriasis, and other conditions. Psoriatic trachyonychia differs from other forms in that additional NP features are present. It has been suggested that variations in severity, distribution, and inflammation timing within the nail unit contribute to different trachyonychia subtypes [3,15]. In this study, classical trachyonychia and two sub-patterns were described, each with distinct lesion combinations beyond their shared features of rough nail surfaces and pitting. Thick trachyonychia was distinguished by TYPs, indicative of psoriatic hyperkeratinization as yellow coloration represents keratinization in dermoscopic nomenclature [16]. In the proximal NPC sub-pattern, some patients exhibited proximal nail plate loss, while others showed RSL, a marker of highly active disease [1].

The only previous study on NP dermoscopic patterns focused on palmoplantar psoriasis [4], revealing that NP presents heterogeneous clinical manifestations in nonpustular palmoplantar psoriasis, palmoplantar pustulosis, and PV. That study identified classical trachyonychia as the most common dermoscopic pattern in nonpustular palmoplantar psoriasis. The authors suggested that variations in dermoscopic nail lesion patterns among these conditions may reflect distinct biological and immunological pathways as the mechanisms underlying plaque and pustular psoriasis differ [4].

The BM pattern is the prototypical NP presentation, characterized by both nail bed- and matrix-related findings. Based on our findings, NP diagnosis can be confirmed by the presence of at least three nail bed-related features (DO, SPs, and SHs) along with one matrix-related feature (pitting), provided no other unrelated nail lesion is present. The number of pits is not a determining factor in this scenario.

However, in the rare cases where nail bed-related findings are absent, given that psoriasis pathogenesis is driven



Step 1: Conduct a comprehensive initial clinical assessment, including a detailed patient history and a thorough physical examination to rule out any systemic or dermatological disease that affects nail. Consider laboratory investigations when indicated.

Step 2: Confirm diagnosis of NP by identifying characteristic lesions of NP and the presence of specific combination of these lesions. Differentiate NP from other nail disorders when shared morphologies are present.

* Always with proximal erythematous border
§ The number of pits is not important
‡ Most typical presentation of NP
‡ 10 pits in a single nail or > 50 pits across all nails

Figure 6. A pattern-based dermoscopic algorithm for the diagnosis of NP. Abbreviations: NP: nail psoriasis; LE: longitudinal erythema of the nail bed; FL: fuzzy lunula; ML: mottled lunula; DBCs: dilated nail bed capillaries; NBSs: nail bed red spots; SHs: splinter hemorrhages; SPs: salmon patches; DO: distal onycholysis with an erythematous border; SUH: subungual hyperkeratosis; RSL: red spots on the lunula; PoSPs: pitting over SPs; MWDs: multiple white dots; TYPs: thickened white–yellow nail plates; NPC: nail plate crumbling.

by inflammatory angiogenesis [17-22], the Haneke et al. [1-3] criterion can be applied: 10 pits in a single nail or >50 pits across all nails are diagnostic for NP. One histological hallmark of psoriasis is the presence of dilated and tortuous vessels in the dermal papillae [21], which supports the hypothesis that nail bed-related findings are key characteristics of NP [6,12]. This association is linked to the physiopathological mechanism of psoriasis, including increased vascular dilation and hyperpermeability [17-22]. An SP is a pathognomonic feature of NP, representing psoriatic plaques in the distal matrix and nail bed. When an SP extends to the hyponychium, parakeratosis ruptures, leading to DO, which explains why these features are often found together [1-3].

A pattern-based dermoscopic algorithm for NP diagnosis is presented in Figure 6. Given that DO, SPs, SHs, and pitting were the most frequent findings in the study group, the algorithm was developed based on these features. However, NP presents with a variety of dermoscopic characteristics, some of which are specific, such as PoSPs and NBSs with peripheral white halos. Others are nonspecific, such as LE and leukonychia [6,11,12]. Our study found that LE was observed in 28.9% of cases and leukonychia in 10.5% of the control group, confirming that these features are not exclusive to NP. Leukonychia was more common in the control group than in NP patients. In the spots with halos sub-pattern, the following features were identified: PoSPs, pits over RSL, peripheral white halos around SPs, NBSs, DBCs, and white patchy areas. Since these characteristics have only been described in NP, they are considered highly specific diagnostic markers [6,11,12].

Conclusions

Nail psoriasis exhibits a wide range of clinical and morphological patterns [1-3]. Recognizing these patterns is critical, as they provide valuable insights into the progression of psoriasis and the risk of associated PsA [6,12]. This study proves that dermoscopy remains the only noninvasive method for detecting these patterns. However, the study has potential limitations. The lack of histopathological confirmation of dermoscopic findings may impact its validity. The proposed algorithm was developed based on observations and the existing literature on dermoscopic features of NP rather than on histopathological findings. Although invasive procedures are increasingly recognized as impractical for diseases with well-established dermoscopic profiles, histopathological confirmation remains the gold standard for diagnosing skin conditions. Further limitations are the lack of

analysis regarding disease severity and PsA risk among NP sub-patterns, the gender imbalance in the study population, and the absence of video-dermoscopic examination in the control group. Differences in examination methods between groups may raise questions about detection bias.

Despite these limitations, the study's strengths include being the first to systematically classify NP patterns and develop a two-step, pattern-based algorithm for NP diagnosis. The BM pattern is the most characteristic presentation of NP. When identified, it can eliminate the need for histopathological examination, provided that other nail disorders are ruled out. The primary strength of the algorithm lies in its practicality. However, the exclusion of other nail disorders or any systemic disease that affects nails is of utmost importance for algorithm's efficiency. The first step in the algorithm involves ruling out other potential diagnoses; the second step involves determining whether findings are indicative of psoriasis. While the algorithm appears simple and concise, its effective application requires expertise.

To address this study's limitations, multicenter validation studies are essential. These should involve larger, more diverse populations, including patients with comorbidities like onychomycosis, to ensure the proposed algorithm's applicability and reliability. Moreover, further research is needed to fully characterize NP sub-patterns and their clinical significance.

References

1. Haneke E. Nail psoriasis: clinical features, pathogenesis, differential diagnoses, and management. *Psoriasis*. 2017; 7: 51–63. doi: 10.2147/PTT.S126281. PMID: 29387608.
2. Haneke E. Onychomycosis in Foot and Toe Malformations. *J Fungi (Basel)*. 2024;10:399. DOI: 10.3390/jof10060399. PMID: 38921385.
3. Haneke E. Non-infectious inflammatory disorders of the nail apparatus. *J Dtsch Dermatol Ges*. 2009 Sep;7(9):787-97. English, German. DOI: 10.1111/j.1610-0387.2009.07037.x. PMID: 19386022.
4. Yorulmaz A. Onychoscopy in Palmoplantar Psoriasis: A Comparative Study of Nonpustular Palmoplantar Psoriasis and Palmoplantar Pustulosis. *Dermatol Pract Concept*. 2024 Oct 30;14(4):e2024227. DOI: 10.5826/dpc.1404a227. PMID: 39652960.
5. Yorulmaz A, Artuz F. A study of dermoscopic features of nail psoriasis. *Postepy Dermatol Alergol*. 2017 Feb;34(1):28-35. DOI: 10.5114/ada.2017.65618. Epub 2017 Feb 7. PMID: 28286468.
6. Yorulmaz A, Aksoy GG. Dermoscopic Features of Nail Psoriasis: Revisited. *Skin Appendage Disord*. 2022 Sep;8(5):389-398. DOI: 10.1159/000524109. Epub 2022 Apr 19. PMID: 36161089.
7. Long F, Zhang Z, He F, et al. Dermoscopic features of nail psoriasis: Positive correlation with the severity of psoriasis. *J Dermatol*. 2021 Jun;48(6):894-901. DOI: 10.1111/1346-8138.15908. Epub 2021 Apr 24. PMID: 33894071.
8. Arora S, Paul D, Kumar R, et al. Study of Nail Psoriasis and Dermoscopic Correlation with Dermoscopic and Modified Dermoscopic Nail Psoriasis Severity Indexes (dNAPSI and dmNAPSI). *Dermatol Pract Concept*. 2022 Jan 1;12(1):e2022010. DOI: 10.5826/dpc.1201a10. PMID: 35223155.
9. Wanniang N, Navya A, Pai V, Ghodge R. Comparative study of clinical and dermoscopic features in nail psoriasis. *Indian Dermatol Online J*. 2020; 11: 35–40. doi: 10.4103/idoj.IDOJ_51_19. PMID: 32055506.
10. Chauhan A, Singal A, Grover C, Sharma S. Dermoscopic features of nail psoriasis: an observational, analytical study. *Skin Appendage Disord*. 2020; 6: 207–15. doi: 10.1159/000508165. Epub 2020 Jun 11. PMID: 32903967.
11. Yorulmaz A. Dermoscopy Reveals Pseudopitting of the Nail in Psoriasis. *Dermatol Pract Concept*. 2023 Oct 1;13(4):e2023240. DOI: 10.5826/dpc.1304a240. PMID: 37992359.
12. Yorulmaz A. Dermoscopy: the ultimate tool for diagnosis of nail psoriasis? A review of the diagnostic utility of dermoscopy in nail psoriasis. *Acta Dermatovenerol Alp Pannonica Adriat*. 2023 Mar;32(1):11-15. PMID: 36945761.
13. Hwang JK, Grover C, Iorizzo M, et al. Nail psoriasis and nail lichen planus: Updates on diagnosis and management. *J Am Acad Dermatol*. 2024 Mar;90(3):585-596. DOI: 10.1016/j.jaad.2023.11.024. Epub 2023 Nov 24. PMID: 38007038.
14. Rachadi H, Chiheb S. Dermoscopic features of nail psoriasis: a systematic review. *Int J Dermatol*. 2024 Aug;63(8):1013-1019. DOI: 10.1111/ijd.17138. Epub 2024 Mar 22. PMID: 38520074.
15. Haber JS, Chairatchaneeboon M, Rubin AI. Trachyonychia: Review and Update on Clinical Aspects, Histology, and Therapy. *Skin Appendage Disord*. 2017 Jan;2(3-4):109-115. DOI: 10.1159/000449063. Epub 2016 Sep 21. PMID: 28232917.
16. Calik J, Pilarski B, Migdał M, Sauer N. Assessing Excessive Keratinization in Acral Areas through Dermatoscopy with Cross-Polarization and Parallel-Polarization: A Dermatoscopic Keratinization Scale. *J Clin Med*. 2023 Nov 14;12(22):7077. DOI: 10.3390/jcm12227077. PMID: 38002691.
17. Hou H, Li J, Wang J, Hou R, Li J, Zhang K. Abnormal dermal microvascular endothelial cells in psoriatic excessive angiogenesis. *Microvasc Res*. 2024 Sep; 155:104718. DOI: 10.1016/j.mvr.2024.104718. Epub 2024 Jul 15. PMID: 39019108.
18. Li Q, Pang B, Dang E, Wang G. Endothelial Dysfunction in Psoriasis: An Integrative Review. *J Invest Dermatol*. 2024 Sep;144(9):1935-1942. DOI: 10.1016/j.jid.2024.02.013. Epub 2024 Mar 15. PMID: 38493385.
19. Micali G, Verzì AE, Broggi G, Caltabiano R, Musumeci ML, Lacarrubba F. Evaluation of capillary density in psoriasis: An intrapatient study and literature review. *PLoS One*. 2021 Mar 10;16(3): e0247835. DOI: 10.1371/journal.pone.0247835. PMID: 33690732.
20. Niu X, Han Q, Liu Y, et al. Psoriasis-associated angiogenesis is mediated by EDIL3. Microvasc Res. 2020 Nov; 132:104056. DOI: 10.1016/j.mvr.2020.104056. Epub 2020 Aug 12. PMID: 32795468.
21. Micali G, Lacarrubba F, Musumeci ML, Massimino D, Nasca MR. Cutaneous vascular patterns in psoriasis. *Int J Dermatol*. 2010 Mar;49(3):249-56. DOI: 10.1111/j.1365-4632.2009.04287. x. PMID: 20465659.
22. Aldahan AS, Chen LL, Fertig RM, et al. Vascular Features of Nail Psoriasis Using Dynamic Optical Coherence Tomography. *Skin Appendage Disord*. 2017 Jan;2(3-4):102-108. DOI: 10.1159/000449230. Epub 2016 Sep 21. PMID: 28232916.