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Dermoscopic Characteristics of Nail Involvement in Patients with Psoriasis Vulgaris: A Descriptive Cross-Sectional Study at a Tertiary Hospital in Surakarta, Indonesia

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A B S T R A C T

Psoriasis vulgaris is a chronic immune-mediated inflammatory disease that frequently involves the nails, yet nail changes are often overlooked despite their diagnostic and prognostic importance. Dermoscopy (onychoscopy) is a non-invasive tool that may improve detection of nail involvement, but data from Indonesian populations are scarce. This study aimed to describe the dermoscopic characteristics of nail changes in patients with psoriasis vulgaris. A descriptive cross-sectional study was conducted on 30 adults with clinically diagnosed psoriasis vulgaris (ICD-10 L40.0) attending the Dermatology and Venereology Polyclinic of Dr. Moewardi General Hospital, Surakarta, between November and December 2024, selected by purposive sampling. Each patient underwent full clinical and dermoscopic (DermLite) nail examination with digital photography. Proportions were summarised with 95% Wilson confidence intervals (CI). Subjects were predominantly male (17; 56.7%), and the largest age group was 45–64 years (13; 43.3%). Nail changes were detected dermoscopically in 24 patients (80.0%; 95% CI 62.7–90.5). Among affected patients (n=24), the most frequent features were nail pitting (75.0%), onycholysis (62.5%), crumbling (54.2%), splinter haemorrhage (50.0%) and subungual hyperkeratosis (41.7%); less frequent were leukonychia (33.3%), Beau's lines (16.7%), oil-spot/salmon patch (12.5%) and red lunula (4.2%). Nail involvement exceeded a pooled literature reference (p=0.006); matrix and nail-bed features occurred in comparable proportions (p=0.744); and feature frequencies departed from a uniform distribution (chi-square=28.7, p<0.001). In conclusion, dermoscopic nail changes were common in psoriasis vulgaris, most often nail pitting and onycholysis. Dermoscopy is an efficient, non-invasive method that can support the diagnosis of nail psoriasis in Indonesian clinical practice.

1. Introduction

Psoriasis vulgaris is a chronic, immune-mediated inflammatory disease characterised by cutaneous inflammation and epidermal hyperplasia that can involve both the skin and the nails, and its immunopathogenesis is driven principally by the interleukin (IL)-23/T-helper-17/IL-17 axis together with tumour necrosis factor-alpha.[1,2] Nail involvement is reported in roughly half of patients at any given time and in up to 80–90% over the course of the disease, and it carries a substantial impact on quality of life.[3,4] Beyond its cosmetic effect, nail disease is clinically important because it is frequently asymptomatic, may be an early marker of psoriatic disease, and is closely linked to psoriatic arthritis.[1,5]

Psoriatic nail disease may involve the nail matrix, nail bed, proximal nail fold or hyponychium, producing features such as nail pitting, leukonychia, Beau's lines, red lunula and crumbling (matrix signs) and onycholysis, oil-spot/salmon patch, splinter haemorrhage and subungual hyperkeratosis (nail-bed signs).[6,7] Patients with nail involvement have a higher risk of psoriatic arthritis, because the nail is anatomically and immunologically integrated with the distal interphalangeal joint through the enthesis; nail changes are therefore an important early predictor of joint disease, making their accurate identification clinically valuable.[2,5]

The diagnostic gold standard for nail psoriasis is histopathological examination of a nail biopsy, but this is an invasive and painful procedure that may cause permanent nail deformity.[8] Dermoscopy applied to the nail apparatus, termed onychoscopy, is a non-invasive, inexpensive, magnified examination that improves detection of nail changes and refines calculation of the Nail Psoriasis Severity Index (NAPSI) because of its higher diagnostic accuracy than naked-eye examination.[8,9,10] It provides *in vivo* visualisation of the nail plate, free edge, hyponychium, periungual folds and the visible nail bed, revealing morphological and vascular details—such as the pattern and depth of pits, the erythematous border of psoriatic onycholysis and dilated hyponychial capillaries—that are difficult to appreciate with the naked eye.[6,11]

Despite growing interest, studies of dermoscopy in nail psoriasis remain limited and data specific to Indonesian populations are scarce.[4,12] This study was therefore conducted to describe the dermoscopic characteristics of nail changes in patients with psoriasis vulgaris attending the Dermatology and Venereology Polyclinic of Dr. Moewardi General Hospital, Surakarta. As a descriptive study, it was not designed to test associations between nail features and clinical variables; rather, it aimed to characterise the frequency and pattern of dermoscopic nail involvement and to support the use of dermoscopy as a practical, non-invasive diagnostic aid in Indonesian dermatological practice.

2. Methods

Study design and setting

This was a descriptive cross-sectional study conducted at the Dermatology and Venereology Polyclinic of Dr. Moewardi General Hospital, Surakarta, Indonesia, between November and December 2024, and reported in accordance with the STROBE guideline for cross-sectional studies. The study included patients clinically diagnosed with psoriasis vulgaris based on history and physical examination and coded as ICD-10 L40.0.

Participants and sampling

Sampling was performed by purposive sampling, in which patients meeting the inclusion criteria were consecutively selected from those attending the polyclinic during the study period. The inclusion criteria were adult patients diagnosed with psoriasis vulgaris who were willing to undergo photographic and dermoscopic examination; the exclusion criterion was unwillingness to undergo dermoscopic examination. A total of 30 patients who met the criteria and consented to participate were enrolled. Each patient underwent a complete history, general physical examination and dermatological examination, and was evaluated for psoriatic skin lesions and nail abnormalities.

Dermoscopic examination and instruments

Nail abnormalities were assessed by both clinical and dermoscopic examination using a DermLite dermoscope (polarised mode with a gel interface), and findings were documented photographically using a 24-megapixel Canon digital camera. Both fingernails and toenails were examined, and a dermoscopic feature was recorded as present for a patient if it was observed in at least one nail. Dermoscopic assessment covered abnormalities of the nail matrix (nail pitting, leukonychia, Beau's lines, red lunula and crumbling) and of the nail bed (oil-spot/salmon patch, splinter haemorrhage, subungual hyperkeratosis and onycholysis), consistent with the recognised anatomical

classification of nail psoriasis.[1,6] Dermoscopic examinations were performed and interpreted by dermatology clinicians at the centre; formal inter-observer and intra-observer reliability were not quantified, which is acknowledged as a limitation. All patients were receiving medical therapy (oral, topical or phototherapy).

Variables

Data comprised the demographic characteristics of the subjects (sex, age, education and occupation) and the dermoscopic findings. Age was categorised into four adult life stages: young adult (18–34 years), early middle adult (35–44 years), late middle adult (45–64 years) and late adult (≥65 years). Data were recorded as counts and percentages.

Statistical analysis

No formal sample-size calculation was performed as the study was exploratory and descriptive. Categorical variables were summarised as frequencies and percentages, and 95% confidence intervals (CI) for proportions were calculated using the Wilson score method, which is preferred over the Wald approximation for small samples and for proportions near the boundaries. Feature prevalences were computed with the number of patients with nail involvement (n=24) as the denominator and are also expressible relative to the whole sample (n=30). For contextualisation, the observed proportion of each dermoscopic feature was compared with an approximate pooled reference proportion derived from recent cross-sectional studies and systematic reviews (the mid-point of reported ranges) using an exact two-sided binomial test; these reference values are approximate, so the comparisons are regarded as hypothesis-generating rather than confirmatory, with no adjustment made for multiple comparisons in the primary analysis and a Bonferroni-corrected threshold reported for sensitivity. The overall distribution of feature frequencies was tested against a uniform distribution using a chi-square goodness-of-fit test, and the sex ratio and the matrix-versus-bed feature balance were each tested against a 1:1 ratio using exact binomial tests. A two-sided p-value <0.05 was considered statistically significant. Analyses were performed using a reproducible Python (NumPy) routine, and the anonymised aggregate data are available from the corresponding author on reasonable request.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. Written informed consent, including consent for the use of clinical images, was obtained from all participants before enrolment, and each patient was assigned a code number to preserve confidentiality. Ethical approval was obtained from the Health Research Ethics Committee of Dr. Moewardi General Hospital/ Faculty of Medicine, Universitas Sebelas Maret.

3. Results and Discussion

The characteristics of the 30 study subjects and the dermoscopic findings are presented across Table 1, Table 2 and Figures 1–3, and are described below.

Demographic characteristics

The demographic characteristics of the 30 patients with psoriasis vulgaris are detailed in Table 1 and illustrated in Figure 1. As shown in Table 1, the subjects were predominantly male (17; 56.7%; 95% CI 39.2–72.6) compared with female (13; 43.3%; 95% CI 27.4–60.8), although this male-to-female excess was not statistically significant (exact binomial test against a 1:1 ratio, p=0.585). The most frequent age group was 45–64 years (13; 43.3%; 95% CI 27.4–60.8), followed by the 18–34-year and 35–44-year groups (each 6; 20.0%) and the ≥65-year group (5; 16.7%). In terms of education, half of the subjects had completed senior high school (15; 50.0%; 95% CI 33.2–66.8), followed by diploma/bachelor education (9; 30.0%). As Figure 1 further shows, the most common occupations were private employee (9; 30.0%) and homemaker (8; 26.7%).

Table 1. Demographic characteristics of study subjects (n=30).				
Characteristic	**Category**	**n**	**%**	**95% CI**
Gender	Male	17	56.7	39.2–72.6
	Female	13	43.3	27.4–60.8
Age (years)	18–34	6	20.0	9.5–37.3
	35–44	6	20.0	9.5–37.3
	45–64	13	43.3	27.4–60.8
	≥65	5	16.7	7.3–33.6
Education	Primary (SD)	3	10.0	3.5–25.6
	Junior high (SMP)	3	10.0	3.5–25.6
	Senior high (SMA/SMK)	15	50.0	33.2–66.8
	Diploma/Bachelor	9	30.0	16.7–47.9
Occupation	Student	2	6.7	1.8–21.3
	Homemaker	8	26.7	14.2–44.4
	Private employee	9	30.0	16.7–47.9
	Self-employed	3	10.0	3.5–25.6
	Civil servant	1	3.3	0.6–16.7
	Farmer	2	6.7	1.8–21.3
	Retired	4	13.3	5.3–29.7
	Tailor	1	3.3	0.6–16.7
Nail involvement	With nail changes	24	80.0	62.7–90.5
	Without nail changes	6	20.0	9.5–37.3

Note: Age-subgroup counts reconstructed to be consistent with the reported predominant 45–64-year band; PNS = pegawai negeri sipil (civil servant).

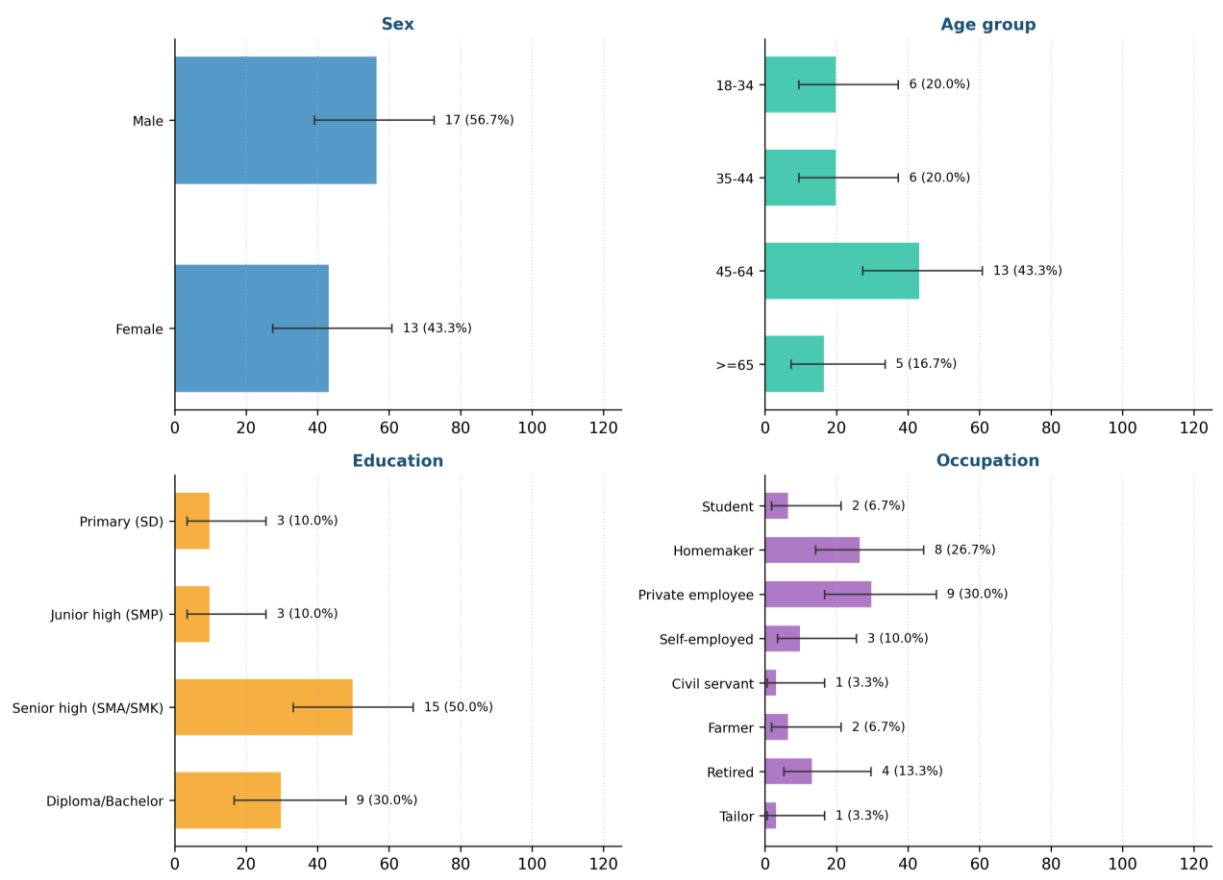

Figure 1. Demographic characteristics of the study subjects (n=30) with 95% confidence intervals.

Nail involvement and dermoscopic findings

Nail changes were detected on dermoscopic examination in 24 of the 30 subjects (80.0%; 95% CI 62.7–90.5), while 6 subjects (20.0%; 95% CI 9.5–37.3) had no nail changes. This prevalence was significantly higher than an approximate pooled literature reference of 55% (exact binomial test, p=0.006), consistent with the greater sensitivity of dermoscopy relative to naked-eye examination.[8,13] The dermoscopic characteristics of nail involvement among the 24 affected patients are detailed in Table 2 and displayed in Figure 2, and representative dermoscopic images from the study subjects are shown in Figure 3. As detailed in Table 2, the most frequently observed feature was nail pitting (18; 75.0%; 95% CI 55.1–88.0), followed by onycholysis (15; 62.5%; 95% CI 42.7–78.8), crumbling (13; 54.2%; 95% CI 35.1–72.1), splinter haemorrhage (12; 50.0%; 95% CI 31.4–68.6) and subungual hyperkeratosis (10; 41.7%; 95% CI 24.5–61.2). Less frequent features were leukonychia (8; 33.3%), Beau's lines (4; 16.7%), oil-spot/salmon patch (3; 12.5%) and red lunula (1; 4.2%). Expressed relative to the whole sample (n=30), these correspond to nail pitting in 60.0%, onycholysis in 50.0% and crumbling in 43.3% of all patients. As the confidence intervals in Figure 2 make clear, the estimates were imprecise for low-frequency features such as red lunula, reflecting the modest sample size.

Considering the anatomical compartments summarised in Figure 2, matrix features accounted for 44 and nail-bed features for 40 of the 84 total feature observations; this near-equal split did not differ significantly from a 1:1 distribution (exact binomial test, p=0.744), indicating that the nail matrix and nail bed were affected to a comparable degree. Patients with nail involvement exhibited a mean of 3.5 dermoscopic features each, and the disease burden was concentrated in a few features: the two commonest (pitting and onycholysis) accounted for 39.3% and the three commonest (adding crumbling) for 54.8% of all feature observations. The frequencies of the nine dermoscopic features differed significantly from a uniform distribution (chi-square=28.7, degrees of freedom=8, p<0.001), confirming that certain features—particularly nail pitting and onycholysis—were markedly more common than others. When the observed proportions were compared with approximate pooled reference values from the literature (Table 2), crumbling was significantly more frequent in this cohort than the literature reference (54.2% vs approximately 20%; p<0.001), and splinter haemorrhage was also more frequent (50.0% vs approximately 30%; p=0.043); after Bonferroni correction for the nine comparisons (adjusted threshold p<0.0056), only the difference for crumbling remained statistically significant. The frequencies of nail pitting, onycholysis, subungual hyperkeratosis, leukonychia, Beau's lines, oil-spot/salmon patch and red lunula did not differ significantly from their reference values (all p>0.05; Table 2).

Table 2. Dermoscopic nail features among patients with nail involvement (n=24).

Dermoscopic feature	Compartment	n/24	%	95% CI	Lit. (%)	p*
Nail pitting	Matrix	18	75.0	55.1–88.0	66	0.398
Onycholysis	Bed	15	62.5	42.7–78.8	50	0.307
Crumbling	Matrix	13	54.2	35.1–72.1	20	<0.001
Splinter haemorrhage	Bed	12	50.0	31.4–68.6	30	0.043
Subungual hyperkeratosis	Bed	10	41.7	24.5–61.2	40	1.000
Leukonychia	Matrix	8	33.3	18.0–53.3	20	0.122
Beau's lines	Matrix	4	16.7	6.7–35.9	12	0.523
Oil spot/salmon patch	Bed	3	12.5	4.3–31.0	25	0.236
Red lunula	Matrix	1	4.2	0.7–20.2	8	1.000

*Notes: *p-value from an exact two-sided binomial test comparing the observed proportion with an approximate pooled reference proportion from the literature (Lit.). CI = confidence interval. Denominator = 24 patients with nail involvement.*

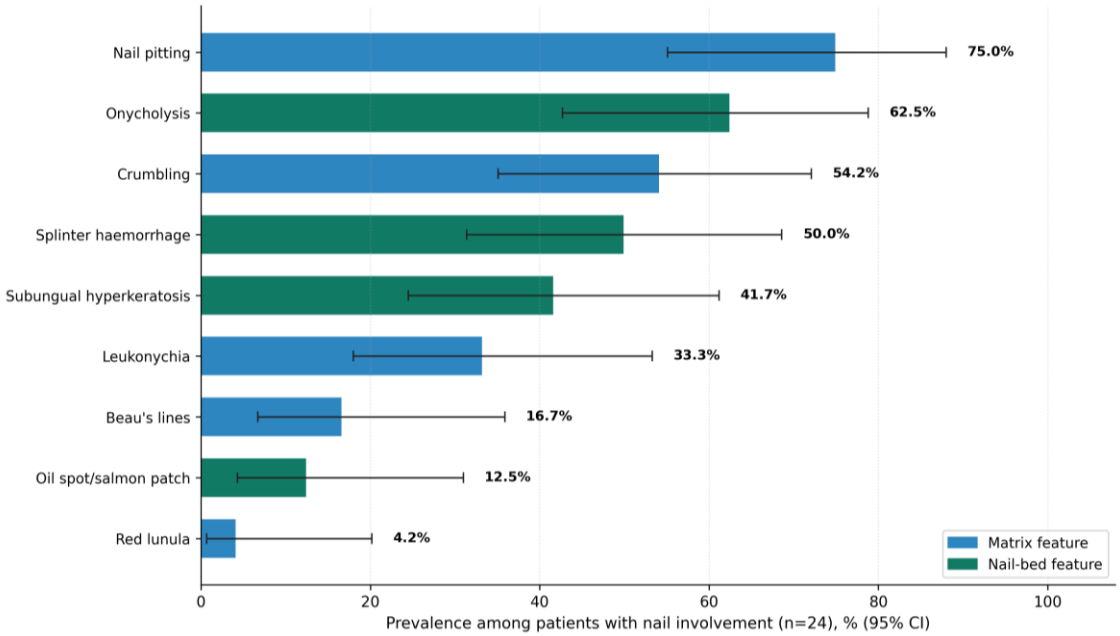

Figure 2. Dermoscopic nail features among patients with nail involvement (n=24) by nail compartment, shown as percentages with 95% confidence intervals.

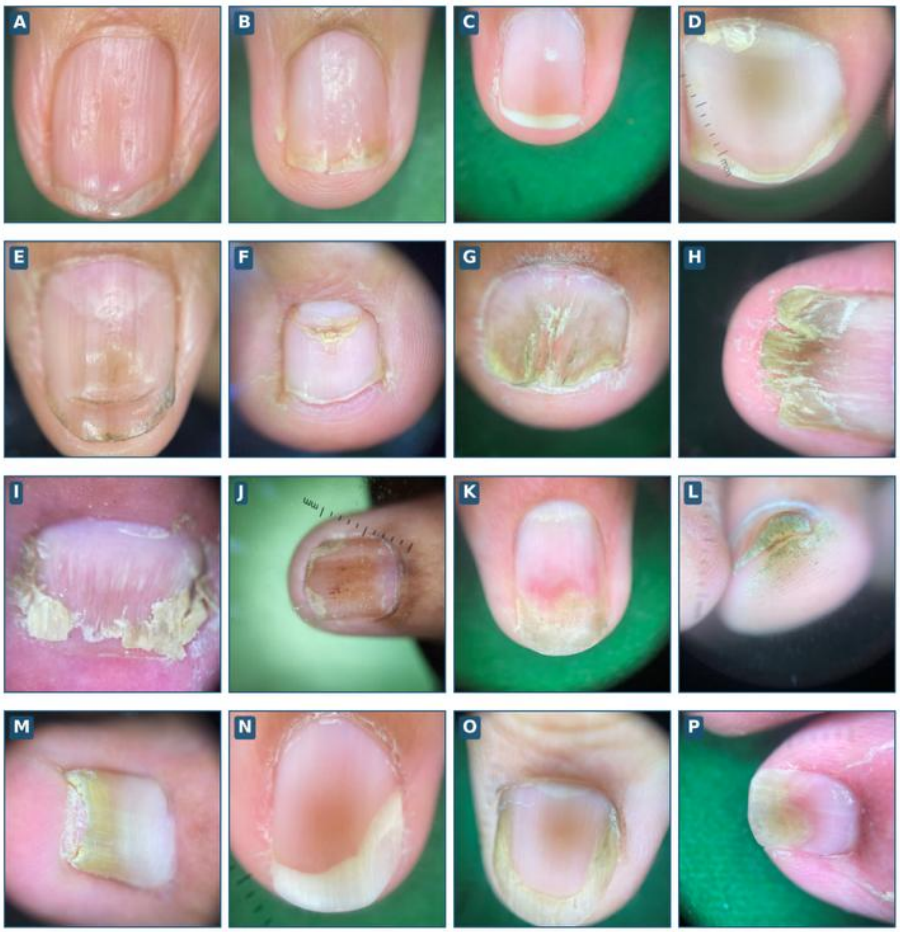

Figure 3. Representative dermoscopic images from study subjects. (A–B) Nail pitting; (C–D) leukonychia; (E–F) Beau's lines; (G) red lunula; (H–I) crumbling; (J) splinter haemorrhage; (K) oil-spot/ salmon patch; (L–M) subungual hyperkeratosis; (N–P) onycholysis.

Discussion

In this cross-sectional study of 30 patients with psoriasis vulgaris, dermoscopy detected nail changes in 80% of subjects, and the most frequent dermoscopic features were nail pitting and onycholysis. These findings, summarised in Table 2 and Figure 2, reinforce the value of dermoscopy as a practical, non-invasive tool for identifying nail involvement in psoriasis and provide locally relevant data from an Indonesian tertiary centre.[1,8]

With respect to sex, male patients predominated (56.7%), a distribution consistent with other nail-psoriasis cohorts in which men constituted the majority.[7,13] However, in the present sample this male excess did not reach statistical significance (p=0.585), so our data are consistent with, but do not independently demonstrate, a male predominance, and this observation should be interpreted descriptively. The majority of patients were aged 45–64 years, in keeping with the middle-age preponderance reported in comparable tertiary-centre studies.[7,13] Because the study was not powered for association testing, any apparent demographic pattern is descriptive only.

The nail unit comprises four epithelial structures—the nail matrix, nail bed, hyponychium and the proximal and lateral nail folds—which produce, attach and protect the nail plate, and the anatomical site of inflammation determines the dermoscopic phenotype.[11] Psoriasis is the most common dermatosis causing nail abnormalities, and nail changes frequently accompany skin lesions. Importantly, the nail is connected to the distal interphalangeal joint through the enthesis, and immunohistological evidence supports an entheseal, CD8-driven mechanism linking nail disease to psoriatic arthritis; nail changes are therefore an accessible marker of deeper musculoskeletal inflammation, and dermoscopically guided assessment of nail involvement has been used to track biologic treatment responses in the matrix and bed separately.[2,5]

In this study, 80% of patients had nail involvement, a proportion at the upper end of the range reported in the literature and consistent with dermoscopy-based series, which detect subtle changes missed by naked-eye examination.[1,13,14] The predominance of nail pitting followed by onycholysis mirrors the pooled pattern of the systematic review by Rachadi and Chiheb and several cross-sectional studies (Table 3), in which pitting is the commonest matrix feature and onycholysis the commonest nail-bed feature.[1,6,7,15] Some differences were nonetheless observed: crumbling and splinter haemorrhage were more frequent in this cohort than pooled reference values, whereas the oil-spot/salmon patch was comparatively uncommon. These differences are plausibly attributable to differences in sample size, disease severity and duration, whether fingernails or toenails predominated, examiner experience, inter-observer variability, and the type of dermoscope used, rather than to fundamentally different disease biology.[9,15] These benchmark comparisons should be interpreted with caution: the reference proportions are approximate mid-points drawn from heterogeneous studies, and after Bonferroni correction only the excess of crumbling remained significant. The robustly elevated frequency of crumbling—an indicator of severe, confluent matrix disease—most plausibly reflects a tertiary-referral population enriched for more advanced nail involvement, linking the statistical signal to the likely clinical severity of the cohort.[6]

Two further analytical observations sharpen the interpretation. First, matrix and nail-bed features were present in almost equal measure (44 vs 40 feature observations; p=0.744 against a 1:1 split), indicating that psoriatic inflammation affected the proximal matrix and the distal bed comparably rather than being confined to one compartment; this is biologically coherent and argues for systematic inspection of both compartments during onychoscopy.[1,6] Second, the disease burden was concentrated in a few signs—two features accounted for roughly 40% and three for over half of all observations—so a focused search for pitting, onycholysis and crumbling will identify most dermoscopic involvement efficiently, a practical

point for busy outpatient settings. Because these compartment and concentration analyses rest on feature-instance counts rather than patient-level cross-tabulations, and because the sample is small, they are best regarded as descriptive and hypothesis-generating.

Table 3. Comparison of dermoscopic nail findings with selected recent studies.

Study (year, country)	Design / n	Most frequent dermoscopic features
Present study (2024, Indonesia)	Cross-sectional, n=30	Pitting 75.0%, onycholysis 62.5%, crumbling 54.2%
Long et al. (2021, China)	Cross-sectional, n=135	Onycholysis 93.3%; pitting; severity correlation
Arora et al. (2022, India)	Cross-sectional, n=120	Subungual hyperkeratosis and pitting 68.3% each
Kesiezie et al. (2022, India)	Cross-sectional, n=155	Onycholysis 91%, pitting 78.8%, hyperkeratosis 78.1%
Mashal et al. (2023, Egypt)	Cross-sectional, n=50	Pitting 86%, onycholysis 82%
Rachadi & Chiheb (2024, review)	Systematic review, 723 cases	Pitting (matrix) and onycholysis (bed) most common

Dermoscopy exploits the underlying pathology of nail psoriasis by magnifying the plate, bed and periungual tissues and revealing features—such as the erythematous border of psoriatic onycholysis and dilated, tortuous hyponychial capillaries—that are difficult to appreciate with the naked eye.[6,16] Psoriatic pits are typically larger, deeper and more irregularly distributed than the fine, regular pits of alopecia areata, which aids differentiation, and dermoscopy also assists in distinguishing nail psoriasis from nail lichen planus and from trachyonychia.[16-18] Onychomycosis is the most important mimic and frequently coexists with nail psoriasis; because dermoscopic signs of fungal disease can be obscured in dystrophic psoriatic nails, mycological confirmation remains necessary before attributing changes solely to psoriasis.[19] Compared with the invasive histopathological gold standard, dermoscopy is inexpensive and non-invasive; it detects more features than naked-eye examination, refines NAPSI scoring, shows good agreement with expert and automated scoring, and has been proposed as a potential future first-line diagnostic adjunct for nail psoriasis.[8,9,20,21]

These findings have practical implications for clinical care in Indonesia, where dermatological services and equipment are unevenly distributed and access to histopathology may be limited; the low cost, portability and non-invasiveness of dermoscopy make it a particularly attractive addition to routine psoriasis care, complementing the severity-assessment and treatment-monitoring approaches used in local practice.[4,12,22] Because nail changes were detectable in four of five patients and were frequently multiple (a mean of 3.5 features per affected patient), routine onychoscopy of every psoriasis patient is likely to reclassify a substantial number previously considered to have skin-limited disease, with implications for prognosis and monitoring.[8] Given the established association between nail disease and psoriatic arthritis, the identification of nail changes should prompt enquiry into joint symptoms and, where indicated, rheumatological referral.[2,5] Dermoscopy can also document baseline severity and monitor treatment response over time, which is valuable because nail responses lag behind skin responses; where onychomycosis is prevalent, combining dermoscopy with mycological testing avoids misdiagnosis.[2,3,19]

This study has several strengths, including the systematic use of dermoscopy with photographic documentation (Figure 3), the anatomically based classification of features into matrix and nail-bed groups, and the reporting of proportions with 95% confidence intervals. Several limitations should be acknowledged. The sample was small and drawn from a single tertiary centre using purposive sampling, which limits both internal precision (wide

confidence intervals) and external validity, since referral populations are enriched for more severe disease and the estimates may not generalise to primary-care or community settings; the small sample also precludes robust subgroup or association analyses, and the study was not powered or designed to test associations. The design was cross-sectional and descriptive, without a control group or histopathological confirmation, so diagnostic accuracy could not be formally established; NAPSI severity and the inter-observer reliability of dermoscopic assessment were not quantified, the latter being an important gap for a visual outcome.[21] Mycological testing to exclude concomitant onychomycosis was not systematically performed, and the comparison with pooled literature reference proportions is indicative rather than definitive. Larger, multicentre studies incorporating NAPSI scoring, inter-observer reliability testing and mycological confirmation are warranted to build on these findings in Indonesian populations.

4. Conclusion

In this study, male subjects outnumbered female subjects, and the most common age group was 45–64 years. Nail changes were detected dermoscopically in 80% of patients with psoriasis vulgaris, and the most frequently observed dermoscopic features were nail pitting and onycholysis, followed by crumbling, splinter haemorrhage and subungual hyperkeratosis. Dermoscopy is an efficient, easy and non-invasive method that can support the diagnosis of nail psoriasis and is well suited to routine use in Indonesian dermatological practice.[8,12] Larger multicentre studies with severity scoring and mycological confirmation are recommended to strengthen and extend these findings.

Declarations

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Conflicts of interest

The authors declare no conflicts of interest.

Data availability

Anonymised aggregate data are available from the corresponding author on reasonable request; reporting followed STROBE.

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