



## Subject Area : Dermatology

## AN OBSERVATIONAL STUDY ON ONYCHOSCOPIC EVALUATION OF VARIOUS NAIL DISORDERS AT SMS MEDICAL COLLEGE JAIPUR

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ARTICLE INFO	ABSTRACT
<p>Received 13<sup>th</sup> January, 2026            Received in revised form 25<sup>th</sup> January, 2026            Accepted 15<sup>th</sup> February, 2026            Published online 28<sup>th</sup> February, 2026</p>	<p><b>Introduction:</b> Nails are specialized structures reflecting systemic health and nail disorders may indicate trauma, infections, dermatological conditions or systemic illnesses. Onychoscopy, a non-invasive diagnostic technique, allows detailed visualization of the nail unit, aiding early diagnosis and reducing reliance on invasive procedures. <b>Aim:</b> To evaluate the dermoscopic (onychoscopic) features of various nail disorders and assess their diagnostic utility. <b>Materials and Methods:</b> This hospital-based, cross-sectional observational study was conducted at the Department of Dermatology, Venereology and Leprology, Sawai Man Singh Medical College, Jaipur, from November 2023 to October 2024. A total of 120 patients with clinically diagnosed nail disorders were enrolled. Detailed demographic, clinical and laboratory data were collected. Onychoscopic examination was performed using a handheld dermoscope (10× magnification, polarized and non-polarized modes). Findings were recorded and analyzed using SPSS version 20; <math>p &lt; 0.05</math> was considered significant. <b>Results:</b> Patients were aged 4–80 years (mean <math>37 \pm 14.75</math> years), with male predominance (59.17%). Housewives (35%) and students (24.17%) were most commonly affected. Onychomycosis (45%), nail psoriasis (25.83%) and nail lichen planus (8.33%) were the most frequent disorders. Common onychoscopic findings included chromonychia (83.33%), spike patterns (75.9%), distal irregular termination (70.37%), subungual hyperkeratosis (64.81%) and leukonychia (66.66%). Condition-specific features such as pterygium, nail pitting, tortuous capillaries, and pseudo-Hutchinson sign were useful in differentiating disorders. Rare conditions like onychopapilloma, melanonychia and pityriasis rubra pilaris showed distinctive patterns. Fingernails were more frequently involved than toenails. <b>Conclusion:</b> Onychoscopy is a valuable, non-invasive diagnostic tool for evaluating nail disorders, enabling identification of characteristic patterns and aiding differentiation of common and rare conditions. Its routine use can enhance diagnostic accuracy and guide appropriate management.</p>
<p><b>Key words:</b></p> <p>Nail disorders, Onychoscopy, Dermoscopy, Nail psoriasis, Onychomycosis, Nail lichen planus.</p>	
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### INTRODUCTION

Nails are specialized anatomical structures that protect the fingertips and facilitate fine motor functions. Their development occurs between the 9th and 17th weeks of gestation through complex mesenchymal–ectodermal interactions.<sup>1</sup> Studies on adult nail growth have enhanced understanding of nail physiology, with fingernails growing approximately 1.8 mm to over 4.5 mm per month, influenced by genetic and environmental factors.<sup>2</sup> Composed primarily of keratin, nails are extensions of the skin and often reflect systemic health. Changes in nail morphology may indicate underlying systemic diseases, nutritional deficiencies or hormonal imbalances.

Nail disorders comprise a wide spectrum of conditions affecting nail structure, function, and appearance. These may result from trauma, infections, dermatological conditions, systemic illnesses, or genetic factors. With increasing interest in natural remedies, up to 85% of individuals reportedly incorporate them into their care routines.<sup>3</sup> A comprehensive understanding of nail disorders is therefore essential, as nails frequently serve as indicators of overall health.

Onychoscopy is a specialized, non-invasive diagnostic technique that enables detailed visualization of the nail plate, nail bed, matrix, and surrounding structures. Derived from “onycho” (nail) and “scopy” (to examine), it reveals subtle abnormalities not visible to the naked eye. Due to reluctance toward nail biopsies and limitations in nail histopathology interpretation, onychoscopy has emerged as a crucial diagnostic alternative.<sup>4</sup> It aids in diagnosing fungal infections, nail psoriasis, trauma-related conditions, and systemic diseases, significantly enhancing diagnostic accuracy.<sup>5</sup>

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Originally adapted from dermatoscopy used for skin lesions, onychoscopy is now well established for differentiating benign from malignant nail lesions, particularly longitudinal melanonychia.<sup>6</sup> Modern dermatoscopes with polarized light, enhanced magnification, and interface media improve visualization of key features such as nail pitting, splinter hemorrhages, and onycholysis. The routine use of onychoscopy has reduced dependence on invasive procedures and assists in selecting optimal biopsy sites when required.<sup>7</sup>

This cross-sectional observational study aims to evaluate various nail disorders using onychoscopy and to assess its diagnostic utility in routine clinical practice.

## AIM

- To evaluate the dermoscopic (onychoscopic) characteristics observed in various nail disorders and assess their diagnostic utility.

## MATERIALS AND METHODS

This hospital-based, cross-sectional observational study was conducted in the Department of Dermatology, Venereology and Leprosy, Sawai Man Singh Medical College & Hospital, Jaipur, Rajasthan, from November 2023 to October 2024, after obtaining approval from the Institutional Ethical Committee. Written informed consent was obtained from all participants prior to enrollment; for minors, consent was obtained from legal guardians. Patient confidentiality and safety were strictly maintained throughout the study.

The study population included patients of any age and sex presenting with clinically involved nail units and confirmed nail disorders diagnosed by a dermatologist. Patients already receiving treatment for the primary nail condition or unwilling to provide informed consent were excluded.

The sample size was calculated to be 107 at a 95% confidence level with a 5% allowable error, based on a reported prevalence of 92.5% onycholysis in distal lateral subungual onychomycosis by Varma K et al. To account for possible attrition, the final sample size was rounded to 120 patients.

Eligible patients were evaluated using a pre-designed proforma to record demographic details and clinical information, including onset, duration, number of nails involved, and associated dermatological or systemic conditions. Detailed physical, systemic, and dermatological examinations were performed. Relevant laboratory investigations such as potassium hydroxide (KOH) examination, fungal culture, and nail biopsy were carried out where indicated.

Onychoscopic examination was performed for all patients using a handheld dermoscope with 10× magnification; higher magnification (up to 50×) was used in polarized and non-polarized modes with and without an interface medium such as ultrasound gel. Digital images were captured, and findings were recorded and tabulated.

Statistical analysis was performed using SPSS version 20. Categorical variables were analyzed using Fisher's exact test, and a p-value of <0.05 was considered statistically significant.

## RESULTS AND OBSERVATIONS

The study included 120 patients aged 4–80 years, with a mean

age of 37 ± 14.75 years. Most patients were 21–40 years old (51.67%), followed by 41–60 years (29.17%), 4–20 years (12.50%), and 61–80 years (6.67%). Males predominated (71; 59.17%) compared to females (49; 40.83%).

The most common occupation was housewife (35%), followed by students (24.17%), farmers (13.33%), and drivers and shopkeepers (7.5% each). Other occupations, including business, labor, teaching, journalism, mechanics, nursing, police, and salon work, accounted for ≤1.67% each, while 2.5% had no occupation. Toenail involvement of ≤5 nails occurred in 28.33% and >5 nails in 33.33% of patients, while fingernail involvement of >5 nails was more frequent (56.67%).

A history of skin lesions was reported in 45.83% of patients. The mean duration of illness was 24.85 ± 30.05 months, with 51.67% ill for ≤12 months, 26.67% for 13–24 months, 7.5% for 25–36 months, 4.17% for 37–48 months, and 10% for >48 months. Comorbidities included diabetes mellitus (5.83%), hypertension (5.83%), and HIV infection (1.67%).

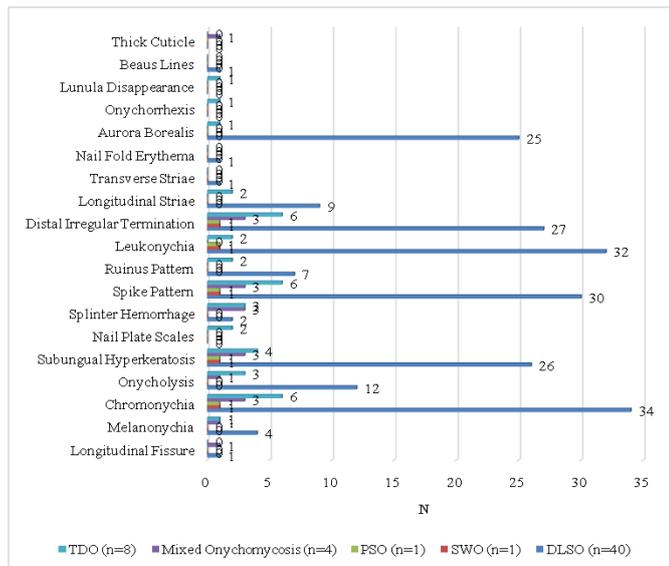
**Table 1.** Diagnosis in Patients according to their nail disorders

Onychoscopic Diagnosis	No. of Patients	Percentage
Onychomycosis	54	45
Nail Psoriasis	31	25.83
Nail Lichen Planus	10	8.33
Alopecia Areata	6	5.00
Chronic Paronychia	4	3.33
MCDH	3	2.50
Melanonychia	3	2.50
Systemic Sclerosis	3	2.50
Trachyonychia	3	2.50
Onychopapilloma	1	0.83
Pityriasis Rubra Pilaris	1	0.83
Traumatic Subungual Hematoma	1	0.83
Total	120	100.00

Among the 120 patients, Onychomycosis was the most common diagnosis, seen in 54 patients (45%). Nail psoriasis was diagnosed in 31 cases. Other nail disorders included nail lichen Planus (10; 8.33%), alopecia areata (6; 5.0%), chronic paronychia (4; 3.33%), MCDH, melanonychia, systemic sclerosis and trachyonychia (3 each; 2.5%), while rare conditions such as onychopapilloma, pityriasis rubra pilaris and traumatic subungual hematoma were noted in 1 patient each (0.83%).

Among the 54 cases of onychomycosis, Distal Lateral Subungual Onychomycosis (DLSO) was found in 40 cases, Total Dystrophic Onychomycosis in 8 cases, Mixed Onychomycosis in 4 cases, Proximal Subungual Onychomycosis and Superficial White Onychomycosis in 1 case each. **chromonychia** (83.33%) was the most common onychoscopic finding, followed by **spike pattern** (75.9%), **distal irregular termination** (70.37%), **leukonychia** (66.66%) and **subungual hyperkeratosis** (64.81%). **Aurora borealis** (48.1%), **splinter hemorrhage** (33.3%) and **onycholysis**

(29.6%) were moderately frequent, while other features were uncommon ( $\leq 3.7\%$ ).

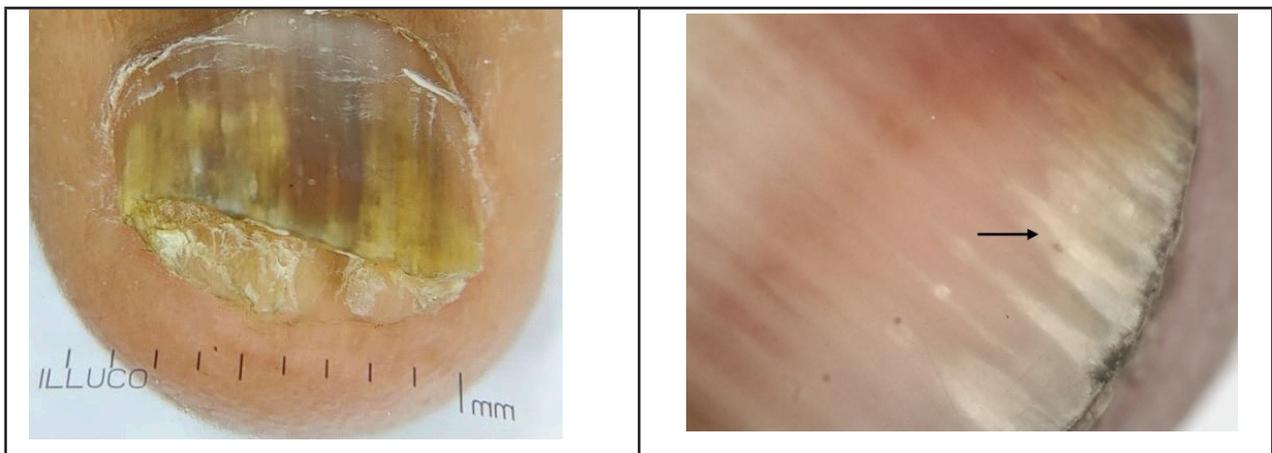


**Figure 1.** Onychoscopic Findings Identified in Patients with Onychomycosis

pitting in 26 patients (83.9%). A reddish onycholytic border was seen in 21 patients (67.7%), and subungual hyperkeratosis in 20 patients (64.5%). Splinter hemorrhages were noted in 17 patients (54.8%), while leukonychia was present in 15 patients (48.4%). Less common findings included the oil drop sign in 8 patients (25.8%), nail plate scales in 5 patients (16.1%), and Beau’s lines in 4 patients (12.9%). Rare features such as distal irregular termination, longitudinal striae, and red lunula were each observed in 1 patient (3.2%).

Among patients with **nail lichen planus** (n = 10), the predominant onychoscopic findings were **pterygium, longitudinal fissures, and nail splitting** (80.0% each), followed by **melanonychia** (70.0%), **longitudinal striae** (50.0%), and **nail pitting** (40.0%). **Onycholysis** (20.0%) and **transverse striae** (10.0%) were less common. In **alopecia areata**, **nail pitting** was the most frequent finding (83.3%), with **longitudinal striae** (50.0%) and **trachyonychia** (33.3%) also observed; **nail plate scales** and **Beau’s lines** were infrequent (16.7% each).

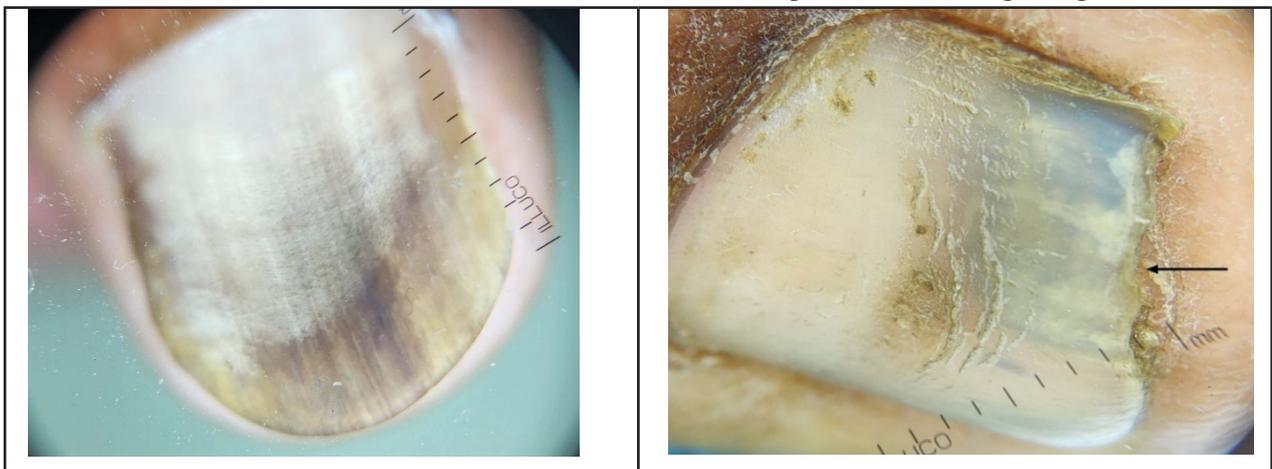
In **chronic paronychia** (n = 4), **chromonychia, nail plate scales, and nail fold erythema** were present in all patients (100%), while the **aurora borealis pattern** and **thick cuticle** were seen in 25%. Among patients with **MCDH** (n = 3), **nail**



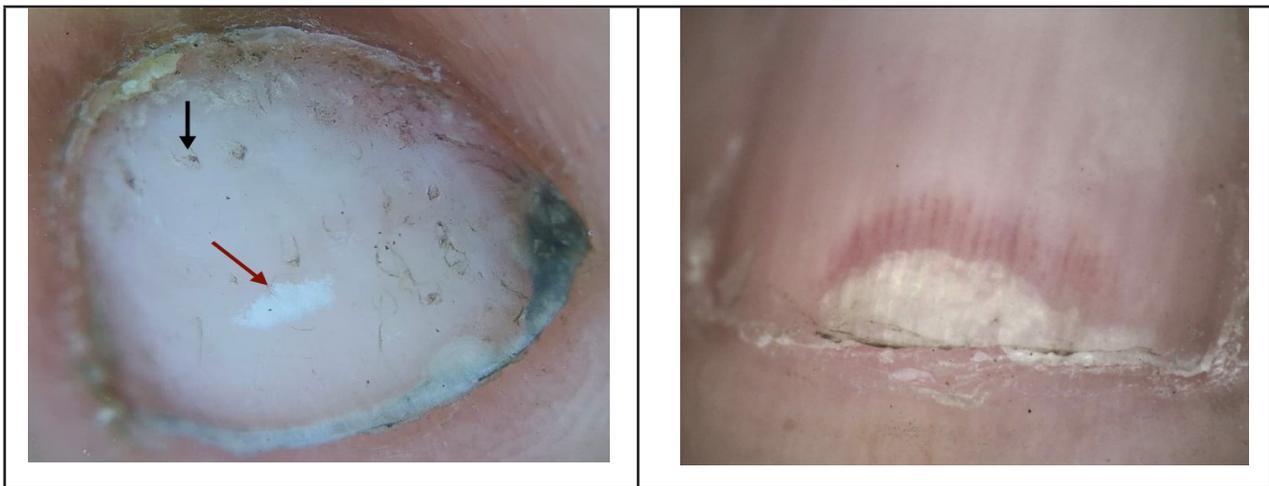
**Image 1: a)** Onychomycosis: Chromonychia- multiple colors of nail plate and bed. **b)** Onychomycosis: Spike pattern- proximal irregular longitudinal white line

In Nail psoriasis cases Onycholysis was the most frequent finding, observed in 27 patients (87.1%), followed by nail

**plate scales, nail fold erythema, transverse grooves, and longitudinal grooves** were most common (66.7% each), whereas **splinter haemorrhage, longitudinal and transverse**



**Image 2: a)** Aurora borealis- Multicolored, streaky appearance. **b)** Distal irregular termination- ragged edge of the nail plate



**Image 3.** Nail Psoriasis: a) Proximal reddish onycholytic border (black arrow) with splinter hemorrhage (yellow arrow). b) Pitting seen as circular punctate depressions (black arrow), Leukonychia seen as white discoloration (red arrow)

**striae**, and **large lunula** were less frequent (33.3% each). In **systemic sclerosis** (n = 3), **tortuous capillaries** were universally present (100%), with **leukonychia** and **Beau's lines** seen in 66.7%, and **longitudinal fissures**, **longitudinal striae** and **capillary dropout** each observed in 33.3%.

All melanonychia cases showed grey-brown lines, with pseudo-Hutchinson sign in 66.7%. The single onychopapillomacase showed a subungual mass with splinter erythronychia.

Among the three patients with trachyonychia, longitudinal ridges were present in all cases (100%). The oil drop sign and thick cuticle were each observed in 2 patients (66.7%), while subungual hyperkeratosis was noted in 1 patient (33.3%).

## DISCUSSION

Onychoscopic evaluation is an invaluable, non-invasive tool in dermatological practice, enabling detailed visualization of the nail plate, matrix, nail bed, and periungual structures. As many nail disorders share overlapping clinical features, onychoscopy facilitates early and accurate diagnosis by identifying disease-specific patterns, thereby reducing the need for invasive procedures such as nail biopsy. It is particularly useful in differentiating inflammatory, infectious, autoimmune, and connective tissue-related nail disorders, as well as in monitoring disease progression and treatment response.

In the present cross-sectional study of 120 patients, onychomycosis, particularly distal lateral subungual onychomycosis (DLSO) (33.33%), was the most common nail disorder, followed by nail psoriasis (25.83%) and nail lichen planus (8.33%). Similar patterns were reported by Sutaria A et al.8 and Rathod D et al.9, who also identified onychomycosis and psoriasis as the predominant nail disorders. Marak A et al.10 similarly reported DLSO as the most frequent subtype, indicating its consistent predominance across different study populations.

Onychomycosis was most frequently characterized by chromonychia, spiked patterns, distal irregular termination, leukonychia, and aurora borealis pattern. DLSO, SWO, and PSO showed most of the classical features, with PSO uniquely demonstrating Beau's lines. Mixed onychomycosis showed variable findings, occasionally including melanonychia and thick cuticle. Comparable observations were reported

by Vasava D et al.11, Puri N et al.12, and Bhat Y J et al.13, who emphasized nail discoloration, spiked borders, and distal irregular termination as key onychoscopic markers of onychomycosis.

In nail psoriasis, the most common findings were onycholysis, nail pitting, and subungual hyperkeratosis, frequently accompanied by reddish onycholytic borders and splinter hemorrhages. These findings were consistent with those reported by Abdulla T A et al.14, Puri N et al.12, and Bhat Y J et al.13, who highlighted combined nail matrix and nail bed involvement, including capillary abnormalities and inflammatory borders.

In nail lichen planus, pterygium, longitudinal fissures, nail splitting, and melanonychia were the most prominent findings, reflecting significant nail matrix damage. Similar features were described by Abdulla T A et al.14, Puri N et al.12, and Bhat Y J et al.13, further supporting the role of onychoscopy in detecting early and potentially irreversible nail changes in lichen planus.

Among patients with alopecia areata, nail pitting was the most frequent finding, followed by longitudinal striae and trachyonychia, indicating autoimmune-mediated nail matrix involvement. These observations are in agreement with findings reported by Varma K et al.15, Abdulla T A et al.14, and Puri N et al.12, all of whom emphasized nail pitting as a characteristic and diagnostically significant feature.

In chronic paronychia, chromonychia, nail plate scaling, and nail fold erythema were present in all cases, indicating persistent periungual inflammation. Similar findings were noted by Nakamura R C et al.16, who highlighted periungual erythema and inflammation, and by Vasava D et al.11, who reported paronychia in association with secondary fungal infection.

In median canaliform dystrophy of Heller, nail plate scaling, nail fold erythema, transverse grooves, and longitudinal grooves were the most frequent findings, suggesting combined matrix and periungual involvement. Comparable observations were reported by Grover C et al.17, who described nail plate scaling, splinter hemorrhages, and exposure of the nail bed epithelium.

In the single case of onychopapilloma, a subungual mass and erythronychia were observed, consistent with the findings reported by Tosti A et al.18, who described subungual mass, erythronychia, and splinter hemorrhages as characteristic features.

In cases of trachyonychia, nails appeared rough and sandpaper-like, with longitudinal ridging observed in all patients, followed by thickened cuticle and oil drop sign. Similar findings were reported by Bhat Y J et al.13, Sutaria A et al.8, and Grover C et al.17, all of whom emphasized longitudinal ridging, surface roughness, and brittle nails as hallmarks of matrix pathology.

Overall, this study reinforces the diagnostic value of onychoscopy in differentiating a wide spectrum of nail disorders based on characteristic patterns, highlighting its role as an essential, non-invasive diagnostic adjunct in routine dermatological practice.

### LIMITATIONS

The study had several limitations. The small sample size restricted the use of onychoscopy as a standalone diagnostic tool, and larger studies are needed to validate the findings. Being a single-center study, the results may not be generalizable to a broader population. Histopathological correlation was not performed to confirm diagnoses, and the limited existing literature underscores the need for further research to identify clinically valuable onychoscopic features. Additionally, higher-magnification dermoscopes (up to 100×) could provide more detailed findings compared to the 10× magnification used in this study.

### CONCLUSION

This cross-sectional study highlights the spectrum of nail disorders and their onychoscopic features across varied ages and occupations, with a slight male predominance and housewives and students most commonly affected. Most patients presented within a year of symptom onset, with few reporting systemic illness. Onychoscopy proved valuable in identifying characteristic patterns, with distal lateral subungual onychomycosis being the most common, followed by nail psoriasis and lichen planus. Toenail involvement was generally limited, while fingernail disease was more extensive. Common findings included spike patterns, subungual hyperkeratosis, and leukonychia, while condition-specific features such as chromonychia, pitting, pterygium, and tortuous capillaries aided diagnosis. Rare disorders like onychopapilloma, melanonychia, and pityriasis rubra pilaris also showed distinctive features, underscoring onychoscopy as a non-invasive, useful diagnostic tool.

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