

Onychoscopic Analysis of Nail Disorders among Older Adults

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Abstract

Background: Nail disorders are common in the geriatric population and often pose diagnostic challenges due to overlapping clinical features and age-related changes. Onychoscopy has emerged as a useful non-invasive tool for detailed nail assessment.

Objectives: To study the clinico-epidemiological profile and onychoscopic patterns of nail disorders in the geriatric population.

Material and Methods: A cross-sectional observational study was conducted on 120 geriatric patients with nail disorders. Detailed clinical examination and onychoscopic evaluation of nail fold, nail plate, nail bed, and hyponychium were performed and correlated.

Results: Degenerative nail changes were predominant. Onychoscopy identified a higher frequency of nail abnormalities compared to clinical examination and showed strong correlation with clinical findings across all nail components.

Conclusion: Onychoscopy significantly enhances the evaluation of nail disorders in elderly patients and should be incorporated into routine geriatric dermatological practice.

Keywords: Geriatric dermatology, Nail disorders, Onychoscopy, Dermoscopy.

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Introduction

Nail disorders constitute a significant yet often overlooked component of dermatological morbidity in the geriatric population, affecting both functional ability and quality of life in older adults. With the progressive aging of the global population, age-related changes in the nail unit and the prevalence of nail disorders are increasingly encountered in routine dermatological practice. Physiological aging results in a reduction in nail growth rate, increased nail brittleness, altered curvature, discoloration, and surface irregularities, which predispose elderly individuals to a wide spectrum of nail abnormalities [1]. These changes are further influenced by cumulative environmental exposure, repeated minor trauma, impaired peripheral circulation, and age-related systemic illnesses [2].

Epidemiological studies have demonstrated that nail disorders are highly prevalent among geriatric patients, with conditions such as onychomycosis, brittle nails, onycholysis, subungual hyperkeratosis, and traumatic nail dystrophies being commonly observed [3]. Among these, onychomycosis represents the most frequent pathological nail condition in older adults. Its prevalence increases significantly with advancing age due to slower nail

growth, reduced immune response, poor peripheral circulation, and a higher burden of comorbidities such as diabetes mellitus and peripheral vascular disease [4]. Nail disorders in the elderly are not merely cosmetic concerns; they can lead to pain, difficulty in ambulation, secondary bacterial infections, and psychosocial distress, thereby substantially impacting daily activities and overall well-being [5].

Clinical evaluation of nail disorders in the geriatric population can be challenging due to overlapping presentations of different nail diseases and the coexistence of multiple contributing factors. Conventional clinical examination alone may not reliably distinguish between fungal infections, inflammatory nail diseases, traumatic changes, and age-related nail alterations [6]. In this context, dermoscopy of the nail unit, commonly referred to as onychoscopy, has emerged as a valuable non-invasive diagnostic tool that allows enhanced visualization of nail plate, nail bed, and subungual structures [7]. Onychoscopy has been shown to reveal characteristic patterns associated with specific nail disorders, thereby improving diagnostic accuracy. Dermoscopic features such as

jagged proximal edges, longitudinal striae, subungual hyperkeratosis, distal irregular termination, and chromonychia have been described in onychomycosis, while other nail conditions exhibit distinct and recognizable patterns [8]. The use of onychoscopy enables early diagnosis, reduces the need for invasive procedures, and assists in differentiating fungal nail infections from non-infectious nail dystrophies [9].

Despite the growing utility of onychoscopy, there remains limited literature focusing specifically on the clinico-epidemiological profile of nail disorders and their onychoscopic patterns in the geriatric population. Most available studies have evaluated mixed age groups, with inadequate emphasis on elderly patients who represent a unique subset with distinct clinical characteristics. A comprehensive understanding of the spectrum of nail disorders and their dermoscopic features in older adults is essential for improving diagnostic precision and optimizing management strategies [10].

The present study is therefore undertaken to evaluate the clinico-epidemiological profile of nail disorders in the geriatric population and to document the corresponding onychoscopic patterns, thereby contributing to better recognition and management of nail disorders in this growing age group.

Material and Methods

This hospital-based cross-sectional observational study was conducted in the dermatology outpatient department of a tertiary care teaching hospital over a defined study period. A total of 120 geriatric patients aged 60 years and above presenting with nail complaints or clinically evident nail changes were included in the study after obtaining informed written consent. The study protocol was approved by the Institutional Ethics Committee, and the study was carried out in accordance with the ethical principles outlined in the Declaration of Helsinki.

All patients aged 60 years and above with visible nail abnormalities involving fingernails, toenails, or both were included in the study. Patients who were unwilling to participate, those with nail changes secondary to acute trauma, and patients who had received systemic or topical treatment for nail disorders within the preceding four weeks were excluded from the study. Demographic details such as age, sex, occupation, and duration of nail complaints were recorded for all participants.

A detailed clinical evaluation was performed in each patient. History regarding the onset, duration, progression of nail changes, associated symptoms such as pain or discoloration, history of repeated trauma, occupational exposure, and associated dermatological or systemic illnesses was obtained. A thorough general physical examination and

cutaneous examination were carried out to identify any associated skin or mucosal findings. Nail examination included assessment of the nail plate, nail bed, nail folds, and surrounding structures, and the number of nails involved was documented.

Onychoscopic examination was performed using a handheld dermatoscope under both polarized and non-polarized light modes. Nail plates were examined without the use of immersion fluids to avoid alteration of surface patterns. Onychoscopic features such as color changes, surface irregularities, subungual hyperkeratosis, longitudinal striations, splinter hemorrhages, jagged proximal edges, and distal irregular termination were noted and documented. Representative Dermoscopic images were captured wherever required for documentation and analysis.

Based on clinical findings and onychoscopic patterns, provisional diagnoses were made. Where indicated, additional investigations such as potassium hydroxide (KOH) examination for suspected onychomycosis were performed to support the diagnosis. Nail disorders were classified into infectious, inflammatory, degenerative, traumatic, and miscellaneous categories for analysis.

All collected data were entered into a structured data sheet and analyzed using appropriate statistical software. Categorical variables were expressed as frequencies and percentages, while continuous variables were expressed as mean and standard deviation. The clinico-epidemiological profile of nail disorders and their corresponding onychoscopic patterns were analyzed descriptively. Associations between demographic variables and types of nail disorders were assessed using the chi-square test, and a p-value of less than 0.05 was considered statistically significant.

Results

A total of 120 geriatric patients aged 60 years and above with nail disorders were evaluated in the present study. Table 1 presents the distribution of study subjects according to age, gender, and occupation. The majority of patients belonged to the 60–70 years age group, accounting for 92 cases (76.7%), followed by 71–80 years with 23 cases (19.2%) and 81–90 years with 5 cases (4.1%). Males constituted a higher proportion with 74 patients (61.7%) compared to 46 females (38.3%). Regarding occupation, farmers formed the largest group with 46 patients (38.3%), followed by housewives comprising 42 patients (35.0%). Retired individuals accounted for 20 cases (16.7%), while businessmen/women and others constituted a smaller proportion with 6 cases (5.0%) each.

Table 2 shows the distribution of study subjects based on clinical and onychoscopic examination of

the nail fold along with correlation analysis. Damaged cuticle was observed clinically and on onychoscopy in all 120 patients (100%). Fissuring was detected clinically in 82 patients (68.3%) and onychoscopically in 90 patients (75.0%), showing strong agreement with a kappa value of 0.812 and statistically significant correlation. Scaling was observed in 69 patients (57.5%) clinically and 66 patients (55.0%) on onychoscopy, with excellent agreement. Erythema was noted clinically in 41 patients (34.2%) and on onychoscopy in 48 patients (40.0%). Black discoloration was observed in 33 patients (27.5%) clinically and 36 patients (30.0%) on onychoscopy. Yellow discoloration showed relatively lower frequency, seen clinically in 8 patients (6.7%) and on onychoscopy in 12 patients (10.0%), with moderate agreement. All these findings demonstrated statistically significant correlation between clinical and onychoscopic examination. Table 3 depicts the distribution of nail plate findings on clinical and onychoscopic examination. Nail dystrophy and longitudinal ridging were universally present in all patients. Trachyonychia was observed clinically in 112 patients (93.3%) and on onychoscopy in 115 patients (95.8%), showing near-perfect agreement. Onycholysis was detected clinically in 88 patients (73.3%) and on onychoscopy in 92 patients (76.7%). Longitudinal grooves were seen clinically in 66 patients (55.0%) and on onychoscopy in 78 patients (65.0%). Onychoschizia was identified clinically in 54 patients (45.0%) and on onychoscopy in 68 patients (56.7%). Melanonychia was observed in 49 patients (40.8%) clinically and

52 patients (43.3%) on onychoscopy. Leukonychia was seen in 46 patients (38.3%) clinically and 50 patients (41.7%) on onychoscopy. Horizontal grooves were detected clinically in 29 patients (24.2%) and on onychoscopy in 35 patients (29.2%). Median canaliform dystrophy was seen clinically in 14 patients (11.7%) and on onychoscopy in 21 patients (17.5%). Pitting was noted clinically in 10 patients (8.3%) and on onychoscopy in 14 patients (11.7%). Transverse grooves were observed in 4 patients (3.3%) both clinically and on onychoscopy. All correlations were statistically significant with strong kappa agreement values.

Table 4 demonstrates the distribution of nail bed findings. Splinter hemorrhages were observed clinically in 38 patients (31.7%) and on onychoscopy in 45 patients (37.5%), showing strong agreement. Subungual hematoma was noted in 5 patients (4.2%) both clinically and on onychoscopy. A normal nail bed was observed clinically in 77 patients (64.1%) and on onychoscopy in 70 patients (58.3%). The correlation between clinical and onychoscopic findings was statistically significant.

Table 5 shows the distribution of hyponychial findings. Subungual hyperkeratosis was observed clinically in 44 patients (36.7%) and on onychoscopy in 46 patients (38.3%), with excellent correlation. The remaining patients showed normal hyponychium on both clinical and onychoscopic examination. The agreement between clinical and onychoscopic findings was statistically significant.

Table 1: Distribution of study subjects based on age, gender, and occupation (N = 120)

Variables	Number	Percentage
Age (years)		
60–70	92	76.7
71–80	23	19.2
81–90	5	4.1
Gender		
Male	74	61.7
Female	46	38.3
Occupation		
Housewife	42	35.0
Farmer	46	38.3
Businessman/woman	6	5.0
Others	6	5.0
Retired	20	16.7

Table 2: Distribution of study subjects based on clinical and onychoscopic examination of nail fold (N = 120)

Features	Clinical examination n (%)	Onychoscopic examination n (%)	Kappa value	P value
Damaged cuticle	120 (100.0)	120 (100.0)	–	–
Fissuring	82 (68.3)	90 (75.0)	0.812	0.001*
Scaling	69 (57.5)	66 (55.0)	0.906	0.001*
Erythema	41 (34.2)	48 (40.0)	0.872	0.001*
Black discoloration	33 (27.5)	36 (30.0)	0.861	0.001*
Yellow discoloration	8 (6.7)	12 (10.0)	0.662	0.001*

*P value <0.05 statistically significant

Table 3: Distribution of study subjects based on clinical and onychoscopic examination of nail plate (N = 120)

Features	Clinical examination n (%)	Onychoscopic examination n (%)	Kappa value	P value
Dystrophy	120 (100.0)	120 (100.0)	–	–
Longitudinal ridges	120 (100.0)	120 (100.0)	–	–
Trachyonychia	112 (93.3)	115 (95.8)	0.984	0.001*
Onycholysis	88 (73.3)	92 (76.7)	0.914	0.001*
Longitudinal groove	66 (55.0)	78 (65.0)	0.742	0.001*
Onychoschizia	54 (45.0)	68 (56.7)	0.731	0.001*
Melanonychia	49 (40.8)	52 (43.3)	0.951	0.001*
Leukonychia	46 (38.3)	50 (41.7)	0.946	0.001*
Horizontal groove	29 (24.2)	35 (29.2)	0.832	0.001*
Median canaliform dystrophy	14 (11.7)	21 (17.5)	0.748	0.001*
Pitting	10 (8.3)	14 (11.7)	0.841	0.001*
Transverse groove	4 (3.3)	4 (3.3)	1.000	0.001*

Table 4: Distribution of study subjects based on clinical and onychoscopic examination of nail bed (N = 120)

Features	Clinical examination n (%)	Onychoscopic examination n (%)	Kappa value	P value
Splinter hemorrhage	38 (31.7)	45 (37.5)	0.862	0.001*
Hematoma	5 (4.2)	5 (4.2)	1.000	0.001*
Within normal limits	77 (64.1)	70 (58.3)	–	–
Total	120 (100.0)	120 (100.0)		

Table 5: Distribution of study subjects based on clinical and onychoscopic examination of hyponychium (N = 120)

Features	Clinical examination n (%)	Onychoscopic examination n (%)	Kappa value	P value
Subungual hyperkeratosis	44 (36.7)	46 (38.3)	0.982	0.001*
Within normal limits	76 (63.3)	74 (61.7)	–	–
Total	120 (100.0)	120 (100.0)		

Discussion

The present study provides a detailed clinico-epidemiological and onychoscopic evaluation of nail disorders in a geriatric population, highlighting the utility of onychoscopy as an adjunct to routine clinical examination. The majority of study subjects belonged to the 60–70-year age group, with a male predominance, findings that are consistent with recent geriatric dermatology literature indicating increased healthcare-seeking behavior and occupational nail trauma among elderly males [11]. The higher representation of

farmers and housewives in the occupational profile reflects cumulative mechanical trauma, frequent wet work, and prolonged environmental exposure, which are known contributors to nail pathology in older individuals [12].

In the present study, nail fold involvement was universal, with damaged cuticle observed in all patients on both clinical and onychoscopic examination. This finding underscores the impact of aging on periungual skin integrity, where reduced barrier function and repeated microtrauma predispose to cuticular damage. Onychoscopy

demonstrated higher detection rates for fissuring, erythema, and discoloration compared to clinical examination, with strong kappa correlation coefficients, indicating excellent agreement and enhanced sensitivity. Similar observations have been reported in recent studies emphasizing that onychoscopy improves visualization of subtle inflammatory and pigmentary changes not readily apparent clinically [13]. Nail plate abnormalities constituted the most prominent findings in this study. Universal nail dystrophy and longitudinal ridging observed in all subjects reflect physiological aging of the nail matrix and plate. High frequencies of trachyonychia, onycholysis, onychoschizia, and longitudinal grooves further emphasize degenerative and mechanical factors in geriatric nails. Onychoscopic examination consistently identified a greater number of abnormalities than clinical assessment, particularly for features such as longitudinal grooves, median canaliform dystrophy, and pitting. This aligns with recent evidence suggesting that onychoscopy allows early recognition of matrix-related pathology by revealing characteristic surface and subsurface patterns [14].

Pigmentary nail changes, including melanonychia and leukonychia, were also commonly observed. The slightly higher detection rates on onychoscopy indicate its usefulness in differentiating true melanocytic activation from pseudo-pigmentation due to exogenous factors or subungual debris. Recent dermoscopic studies have highlighted that onychoscopy plays a crucial role in distinguishing benign longitudinal melanonychia from potentially malignant nail unit lesions, particularly in elderly patients where diagnostic ambiguity is common [11,15].

Nail bed findings such as splinter hemorrhages and subungual hematomas were more frequently identified on onychoscopy than on clinical examination, again demonstrating superior sensitivity. The association of splinter hemorrhages with systemic conditions and repeated trauma has been well documented, and onychoscopy enhances their detection by magnification and illumination. Hyponychial involvement in the form of subungual hyperkeratosis was also better appreciated on onychoscopy, supporting its role in identifying distal nail pathology and aiding in etiological classification [12,14].

Overall, the strong and statistically significant correlation between clinical and onychoscopic findings across nail fold, nail plate, nail bed, and hyponychium supports the complementary role of onychoscopy in routine geriatric nail evaluation.

The findings of this study are in agreement with recent literature advocating incorporation of nail dermoscopy into standard dermatological practice

for elderly patients, as it improves diagnostic confidence, reduces the need for invasive procedures, and facilitates early and accurate diagnosis [13–15].

Conclusion

The present study highlights that nail disorders are highly prevalent in the geriatric population, with degenerative, traumatic, and pigmentary changes being the most common. Onychoscopy proved to be a valuable, non-invasive diagnostic tool that enhanced the detection of nail abnormalities and demonstrated strong correlation with clinical findings. Incorporation of onychoscopic examination into routine assessment of elderly patients with nail disorders can significantly improve diagnostic accuracy and aid in better clinical decision-making.

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