Dermatology Practical & Conceptual

Dermoscopic Assessment of Nail Alterations in Egyptian Patients with Alopecia Areata

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ABSTRACT

Introduction: Alopecia areata (AA) is an autoimmune disorder characterized by non-scarring hair loss. Hair and nails have many commonalities related to their development and structure and both can be involved in a range of disorders. Dermoscopy is a valuable noninvasive diagnostic tool that enhances clinical evaluation and treatment monitoring by detecting subtle nail changes not visible to the naked eye.

Aim: The goals of this study were to assess the prevalence and types of various fingernail changes in patients with alopecia areata using dermoscopy and to compare the findings with those observed in healthy controls.

Methods: A case-control study was conducted including 120 patients diagnosed with alopecia areata and 120 healthy individuals as controls. Dermoscopic examination of the fingernails was done for all participants. The severity of alopecia areata was evaluated using the Severity of Alopecia Tool (SALT) score.

Results: Nail changes were observed in 78.3% of patients with alopecia areata, compared to only 14.2% in the control group, showing a statistically significant difference ($P<0.05$). The most frequent dermoscopic nail change was nail pitting (59%), followed by dry scales on the lateral nail fold (28.3%), scaly cuticle (18.3%), punctate leukonychia (17.5%), onychoschizia (14.2%), and longitudinal ridging (13.3%). There was a significant association between nail changes and disease severity, patient age, and alopecia areata duration.

Conclusions: Nail changes are common in patients with alopecia areata and may serve as valuable prognostic indicators for disease severity.

Introduction

Alopecia areata (AA) is an immune-mediated disorder that causes non-scarring hair loss on the scalp and any hair-bearing area. It affects up to 2% of the general population [1]. All age groups are susceptible, but children are more vulnerable compared to adults [2]. AA has been related to immune-mediated dysregulation, which is triggered in susceptible individuals due to environmental triggers or polygenic predisposition [1].

Normally the hair follicles are immune-privileged and protected from autoimmune diseases [3]. In AA, this immune privilege is disturbed leading to an autoimmune response targeting the follicular melanocyte and keratinocyte [4].

It is recognized that hair and nails share many similarities regarding their origins, anatomy, and involvement in numerous diseases. Both structures arise from the primitive epidermis and are primarily epithelial composed of keratinous fibrils embedded in a sulfur-rich matrix [5].

Nail abnormalities are prevalent in patients with alopecia areata and represent a primary contributor to both functional impairment as well as frequently asymptomatic cosmetic deformity [6].

Physical examination may reveal subtle nail changes though they are frequently missed. Therefore, the true frequency of nail changes in patients with alopecia areata may be underestimated [7].

Nail involvement can develop before or following hair loss in 10–66% of all alopecia areata patients and may persist despite treatment and hair growth [8].

Dermoscopy is a noninvasive tool that enhances the diagnosis, treatment, and monitoring of disease by providing a detailed view of lesions and revealing subtle features that are not visible to the naked eye [9].

Objectives

Few studies have evaluated nail changes by dermoscopy in AA. Therefore, this study aimed to assess the presence and characteristics of fingernail alterations in patients with AA by nail dermoscopy and to compare the findings with those of healthy controls.

Methods

Study Design

This case-control study was carried out at the Dermatology and Venereology Department, XXX University Hospital. Written informed consent was obtained from all participants. The study obtained ethical approval from the Research Ethics Committee of the Faculty of Medicine. (reference number RHDIRB 2023122207).

Participants

The study included 120 patients diagnosed with alopecia areata based on standard clinical and dermoscopic criteria, along with 120 age- and sex-matched healthy individuals as controls. All participants were recruited from the outpatient clinic of the Department of Dermatology and Venereology.

Individuals of any age and sex with scalp alopecia areata were included. All clinical types of AA were considered. All patients were evaluated and included before the initiation of any systemic treatment.

We excluded patients who were on systemic anti-inflammatory therapies or who received any topical or intralesional treatments targeting the nails or periungual area. We also excluded patients suffering from trichotillomania, telogen effluvium, cicatricial alopecia, and pattern hair loss from the study. Individuals with systemic and dermatological illnesses that lead to hair loss or are linked to nail alterations were also excluded.

All cases were subjected to a comprehensive medical history, followed by:

- General examinations to exclude systemic manifestations of other autoimmune diseases
- Dermatological examinations to identify alopecia lesions and nail involvement
- The severity score of AA was calculated by using the SALT scoring system. The patients were divided into five groups according to disease severity: S0; no hair loss, S1; <25% hair loss, S2; 26%–50% hair loss, S3; 51%–75% hair loss, S4; 76%–99% hair loss, and S5; complete scalp hair loss [10].
- Photographic and dermoscopic assessment of the nails, focusing on changes in nail surface, color, and nail plate-to-nail bed adhesion.

Statistical Analysis

Data were analyzed using SPSS version 27. Quantitative data were summarized as mean ± SD or median (IQR), and qualitative data as frequencies and percentages. Group comparisons were done using the Chi-square test for categorical variables, the independent t-test for parametric data, and the Mann-Whitney test for non-parametric data. Spearman's correlation was preformed to assess relationships between quantitative variables. A p-value of <0.05 was considered statistically significant.

Results

The study included 120 patients with AA and an equal number of healthy subjects as controls.

The patient group included 120 patients with AA: 85 (70.8%) males and 35 (29.2%) females, with a mean age of

24.24 ± 10.19 years, and a range of 3–42 years. The control group included 120 volunteers (88 (73.3%) males and 32 (26.7%) females with an age range of 3 to 43 years and a mean of 26.58 ± 10.1 years.

According to the pattern of AA, the study revealed that 64.2% of patients had alopecia areata focalis (AAF), 23.3% had alopecia areata multifocalis (AAMF), 8.3% had alopecia areata totalis (AAT), and 4.2% had alopecia areata universalis (AAU). Regarding dermoscopic features of AA, the most common dermoscopic finding was yellow dots, seen in 81 (67.5%) patients, followed by black dots in 68 (56.7%) patients. Exclamation marks were seen in 58 (48.3%) patients, while short broken hair was found in 56 (46.7%) patients and short villous hair in 42 (35%) (Table 1).

A highly statistically significant correlation between the duration of the disease and SALT score was found among the AA patients (*P*=0.000) (Figure 1).

Dermoscopy Assessment of the Studied Groups

Nail involvement was noticed in 94 patients (78.3%) in the patient group, while only 17 participants (14.2) in the control group showed nail involvement.

In the patient group, the most common dermoscopic nail changes were nail pitting in 71 patients (59%), followed by dry scales in lateral nail fold (LNF) in 34 patients (28.3%). A scaly cuticle was found in 22 patients (18.3%), punctate leukonychia in 21 patients (17.5%), onychoschizia in 17 patients (14.2%), longitudinal ridging in 16 patients (13.3%), and onycholysis in six patients (5%). Onychorrhexis was reported in five patients (4.2%), absent lunula in four patients (3.3%), longitudinal melanonychia in three patients (2.5%), and erythronychia in two patients (1.7%) (Table 2).

In the control group, the most common findings were scales in LNF in five patients (4.2%), onychorrhexis in four (3.3%), scaly cuticle in three (2.5%), onychoschizia in three (2.5%), onycholysis in one (0.8%), longitudinal ridging in one (0.8%), and punctate leukonychia in one (0.8%) patient.

Regarding dermoscopic nail changes among the studied groups, there was a highly statistically significant increase in the prevalence of nail changes in AA patients compared to healthy controls (Table 2).

Figures 2–4 show photographic examples of dermoscopic findings of nail changes in patients with AA.

There were highly significant differences between the patients and the control group regarding nail pitting, dry scales on the lateral nail fold (LNF), scaly cuticles, punctate leukonychia, onychoschizia, and longitudinal ridging. In addition, a significant difference in the absence of the lunula was observed. (Table 2).

There was no statistically significant difference between the patient and the control groups regarding melanonychia, onychorrhexis, or onycholysis. (Table 2).

There was a highly significant positive correlation observed between the presence of nail changes and disease severity (SALT) in patients (Figure 5). Moreover, the study identified a significant positive correlation between the total nail changes in AA patients and both patient age and disease duration, while no significant correlation was found with sex.

There was a highly significant relation between nail changes and type of alopecia areata. Nail changes were

Table 1. Demographic data and characteristics of the studied groups.

		Patients group N=120	Controls group N=120	Test value	p-value	Sig.
Age	Mean±SD	24.24 ± 10.19	26.58 ± 10.1	1.781•	0.076	NS
	Range	3 – 42	3 – 45			
Sex	Female	35 (29.2%)	32 (26.7%)	0.186*	0.666	NS
	Male	85 (70.8%)	(73.3%)			
Duration of disease/ years	Median (IQR) Range	0.82 (0.41-2.17) (0.1 -10)	NA	-	-	-
SALT score	Median (IQR) Range	23.6 (8 - 65.4) 2 – 100	NA	-	-	-
Type of AA	AAF AAMF AAT AAU	77 (64.2%) 28 (23.3%) 10 (8.3%) 5 (4.2%)	NA	-	-	-
Total nail changes	Negative	26 (21.7%)	103 (85.8%)	99.376	0.000	HS
	Positive	94 (78.3%)	17 (14.2%)			

Abbreviations: AA: alopecia areata, AAF: alopecia areata focalis, AAMF: alopecia areata multifocalis, AAT: alopecia areata totalis, AAU: alopecia areata universalis. p-value >0.05: non-significant; p-value <0.05: significant; p-value <0.01: highly significant *: chi-square test; •: independent t-test.

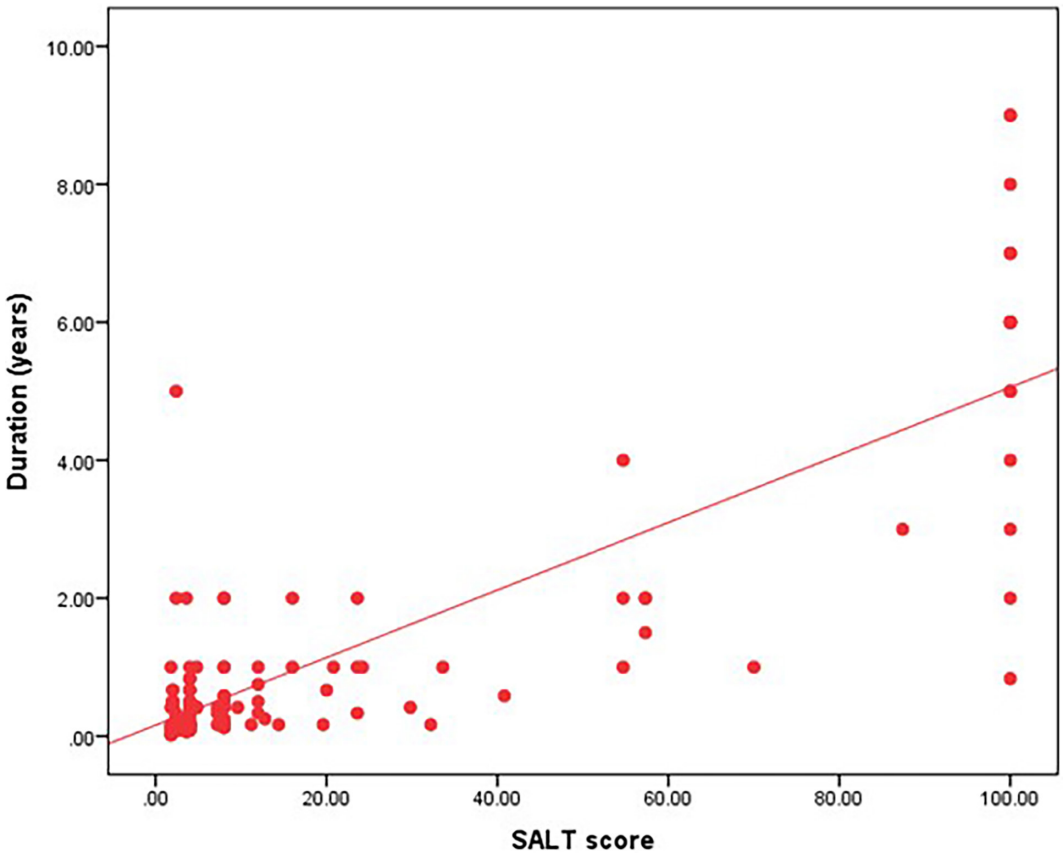

Figure 1. Correlation between duration of disease and SALT score in patients' group.

Table 2. Dermoscopic findings of nail changes among the studied groups.

Nail involvement	Control group N=120	Patients group N=120	Test value*	p-value	Sig.
Total nail changes	17 (14.2%)	94 (78.3%)	99.376	0.000	HS
Punctate leukonychia	1 (0.8%)	21 (17.5%)	20.017	0.000	HS
Pitting	0 (0%)	71 (59.2%)	100.828	0.000	HS
Scaly cuticle	3 (2.5%)	22 (18.3%)	16.119	0.000	HS
Longitudinal ridging	1 (0.8%)	16 (13.3%)	14.244	0.000	HS
Absent lunula	0 (0%)	4 (3.3%)	4.068	0.044	S
Melanonychia	0 (0%)	3 (2.5%)	3.038	0.081	NS
Erythronychia	0 (0%)	2 (1.7%)	2.017	0.156	NS
Onychoschizia	3 (2.5%)	17 (14.2%)	10.691	0.001	HS
Scales in LNF	5 (4.2%)	34 (28.3%)	25.748	0.000	HS
Onychorrhexis	4 (3.3%)	5 (4.2%)	0.115	0.734	NS
Onycholysis	1 (0.8%)	6 (5%)	3.679	0.055	NS

p-value >0.05: non-significant; p-value <0.05: significant; p-value <0.01: highly significant. LNF; lateral nail fold. *: chi-square test

found in all patients of alopecia areata multifocalis (AAMF), alopecia totalis, and universalis. (Table 3).

Discussion

Alopecia areata is an autoimmune disease characterized by T cell invasion and release of cytokines surrounding anagen-stage hair follicles [11]. Previous research on humans suggested that the initial stage of AA is primarily a Th1-based immune response, while a change from a Th1 response to a more chronic Th2 immune profile is responsible for the maintenance of cytotoxic cells' destruction of hair follicles [12].

A male predominance was observed in the current study, with 73.3% of patients being male and 29.2% female. In contrast, Roest et al. [13] reported a higher proportion of female

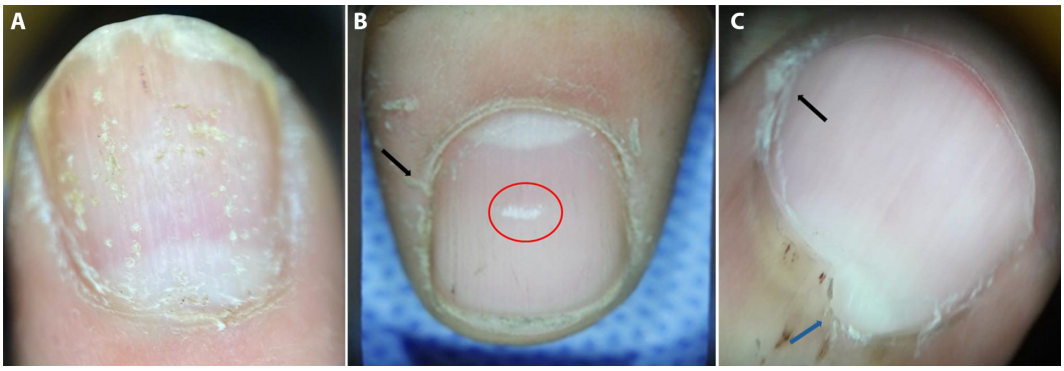

Figure 2. A: Nail pitting, scaly cuticle, and scales in the lateral nail fold. B: Punctate leukonychia (red circle) and scales in the lateral nail fold (black arrow). C: Absent lunula, scaly cuticle (blue arrow), and scales in the lateral nail fold (black arrow).

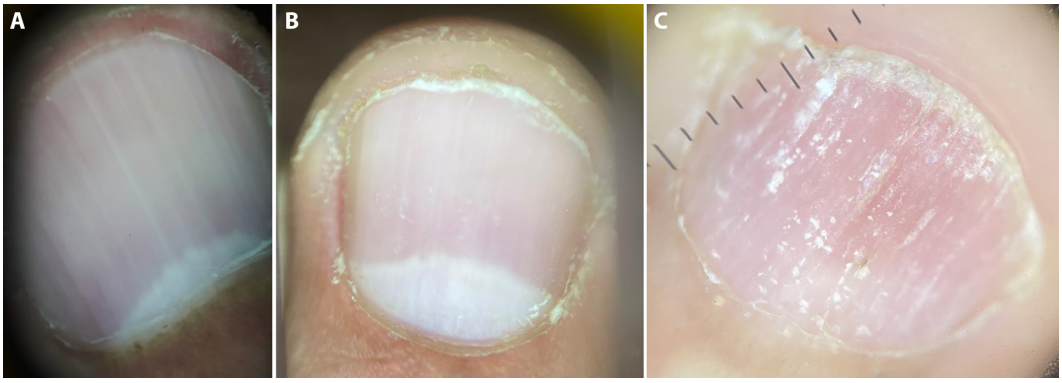

Figure 3. A: longitudinal ridging. B: Onychoschizia, scaly cuticle, and scales in the lateral nail fold. C: Longitudinal ridging, absent lunula, nail pitting, and punctate leukonychia.

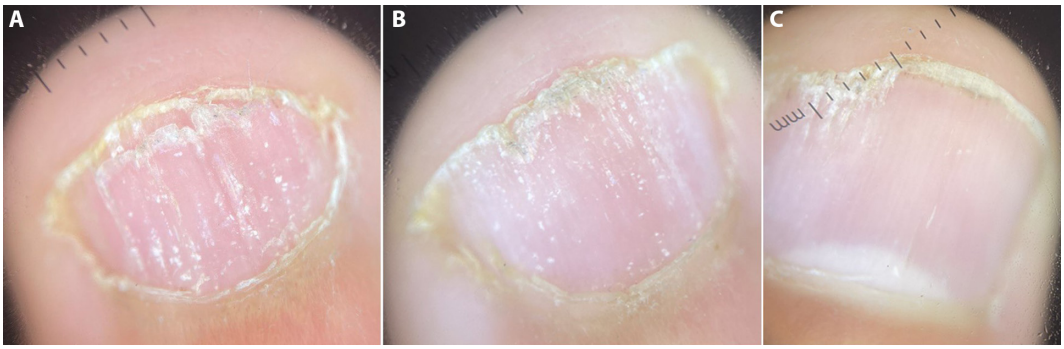

Figure 4. A: Scales in the lateral nail fold, Onychoschizia, and nail pitting. B: Scales in the lateral nail fold, onychorrhexis, punctate leukonychia, and nail pitting. C: Onychorrhexis and longitudinal ridging.

patients compared to males (22.4% vs. 14.2%). This discrepancy in sex distribution may be affected by demographic or regional differences in the study populations and varying healthcare-seeking behaviors between males and females.

In the present analysis, the yellow dots were the most common dermoscopic feature in patients of AA, followed by black dots, exclamation marks, short broken hair, and villous hair in descending order. Similarly, Al-Dhubaibi et al. [14] reported the characteristic dermoscopic features of AA as yellow dots, black dots, broken hair, tapering hair, and short vellus hairs.

Previous research [6] has raised concerns about the link between AA and nail changes like pitting, brittleness, fragility, onychorrhexis, beau's lines, and red-spotted lunula, which can occur before, after, or concurrently with hair loss.

Our goal in this study was to investigate the dermoscopic findings of fingernail abnormalities in AA patients to assist doctors in correctly evaluating the patients with dermoscopy.

The present study emphasizes the variability and frequency of nail alterations in patients with AA, with a significantly higher prevalence (78.3%) compared to healthy controls (14.2%). These findings are consistent with Shakoei

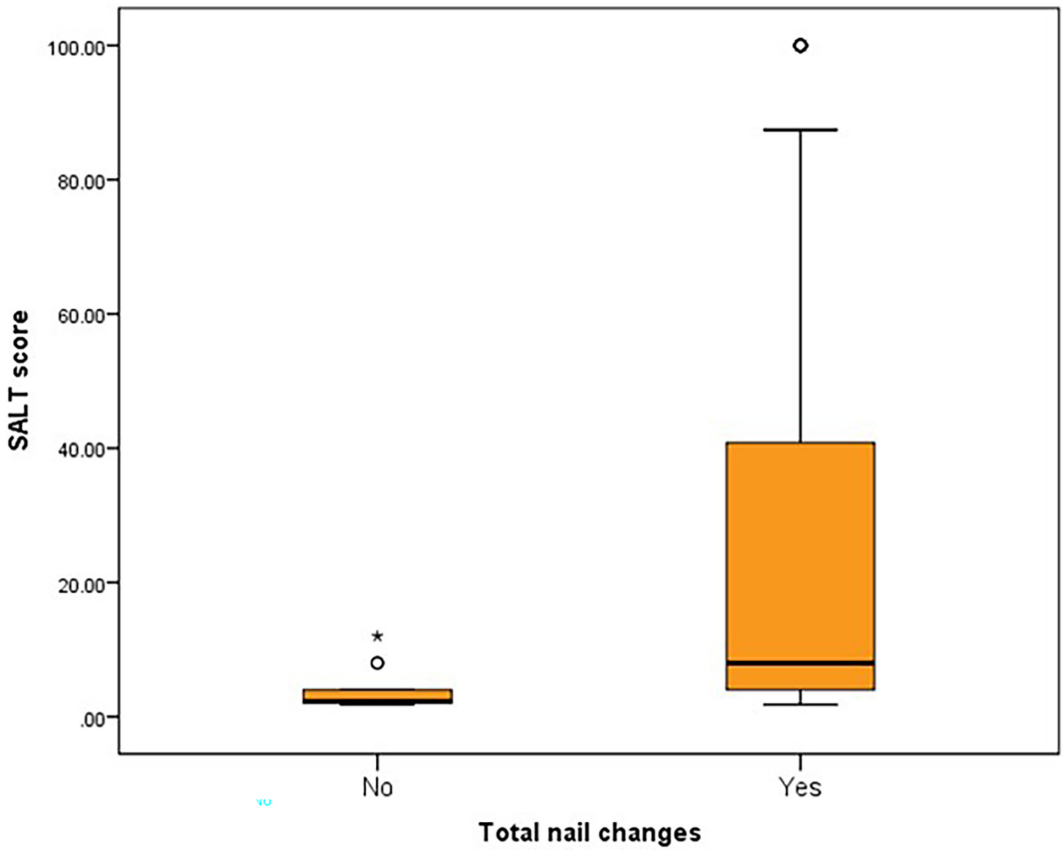

Figure 5. Relation between SALT score and total nail changes among the patients studied.

Table 3. Relation between type of alopecia and nail changes.

Type of Alopecia	No nail changes		Nail changes		Test value	p-value	Sig.
	N	%	N	%			
AAF	26	100.0%	51	54.3%	18.536*	<0.001	HS
AAMF	0	0.0%	28	10.6%			
AAT	0	0.0%	10	5.3%			
AAU	0	0.0%	5	29.8%			

*: chi-square test, $P<0.01$: highly significant (HS). AAF; alopecia areata focalis, AAMF; alopecia areata multifocalis, AAT: alopecia areata totalis, AAU; alopecia areata universalis.

et al. [7], who also reported a high incidence of nail changes in AA patients.

The pathogenic mechanisms underlying nail changes in AA remain unclear; however, it is suggested that, like hair follicles, the nail unit is affected by the same autoimmune inflammatory process. The onset and severity of these changes are linked to result from a complex interaction of genetic and immunological factors [13].

In our study, nail pitting was the most common dermoscopic nail change in AA patients, with significantly higher frequencies found when compared to the healthy controls. Similarly, Kasumagic-Halilovic et al. [15] reported pitting as the most frequent nail change in patients with AA. This finding may be related to the autoimmune nature of AA, in which the immune system targets not only hair follicles but also the nail matrix. Nail pitting may reflect disease severity and may persist even after hair regrowth or treatment [16].

The current study found that scales in the lateral nail fold (LNF) (28.3%) and dry scaly cuticle (18.3%) were the second most frequent nail abnormalities in AA patients, occurring at significantly higher rates than in healthy controls. Darwish et al. [17] noted higher proportions of scaly cuticles and scales in LNF, with percentages of 75% and 67%, respectively.

LNF scales refer to dry, flaky skin at the side of the nail, suggesting inflammatory or autoimmune activity at the nail unit. Dry, scaly cuticles point to poor nail matrix hydration or altered keratinization, which may reflect the immune dysregulation seen in AA. Such findings are not specific, but their higher frequency in AA patients supports a link between nail and hair unit involvement in autoimmune diseases.

These findings may be influenced by external factors, including minor trauma or frequent exposure to irritants, which could act as contributing factors rather than being directly related to AA.

Autoimmune disorders are associated with a ragged, hyperkeratotic cuticle; a greater prevalence rate of the scaly cuticle may have an autoimmune origin [6]. Similarly, Elmansour et al. [18] reported that patients with systemic sclerosis and dermatomyositis presented with a ragged hyperkeratotic cuticle, which is one of the nail abnormalities associated with connective tissue illnesses. We speculate that the autoimmune mechanism causing this nail alteration in our AA patients may be the same as that of other autoimmune illnesses.

Punctate leukonychia was the third most prevalent nail alteration (17.5%) found in our study, and there was a highly statistically significant difference when compared to controls. Dermoscopy revealed a smooth, transparent nail plate surface with one or more white dots. These non-uniform spots could arise from sporadic mild harm as they show up in different locations on different nails [19]. Furthermore, it is probably connected to the immune-mediated processes [20]. In contrast to our results, Darwish et al. [17] found that punctate leukonychia was seen in 60% of AA patients.

Onychorrhexis and onychoschizia are symptoms of brittle nail condition. In our study, onychoschizia was detected in 14.2% of AA patients, with a significant difference from controls, whereas onychorrhexis was found in 4.2% of AA patients without a significant difference from controls. This agrees with Darwish et al. [17], who reported onychorrhexis in 2% of patients with AA. This might be related to physical trauma or nail injury as well as to dryness or prolonged exposure to detergents and irritants, which can cause the nail to become brittle or develop ridges.

Our study also revealed that onycholysis was found in 5% of AA patients without a significant difference from controls. In the same context, Pelzer et al. [6] reported onycholysis in 2.6% of the patients in their study, which may be attributed to causes other than alopecia areata (AA).

Longitudinal ridging is another reported nail abnormality in the current study, found in 13.3% of AA patients. Likewise, Gandhi et al. [21] reported longitudinal ridging in 26.21% of patients with AA. Hair follicles and nails are thought to be affected by the same inflammatory reactions due to their similar structure and growth patterns [13].

Absent lunula, defined as the absence of the visible portion of the nail matrix [22], is another recognized nail abnormality, observed in 3.3% of patients with AA. We suggested that absent lunula in AA patients may be related to immune system attacks on hair follicles and nail structures.

In our study, we found pigmentation (longitudinal melanonychia) in 2.5% and erythronychia in 1.7% of AA patients, with no significant difference from controls.

The results of our study showed a significant relationship between the patients with altered nails and the patient's age, disease duration, and SALT score. Nail changes in AA are more frequent in the severe forms of AA and may reflect the disease's severity and prognosis [6]. However, there was no significant relation between patients with altered nails and the sex of the patients. Furthermore, Shakoei et al. [7] showed that there is a significant correlation between the duration of alopecia areata and changes in nails and the age of the patient.

The current study found a highly significant relation between the severity of AA and nail changes in AA patients. Similarly, previous research [22] reported a high prevalence of nail changes in patients with severe AA. Also, Ferreira et al. [16] reported that changes in the nails are a typical sign of AA and are frequently observed in more severe cases, indicating a more severe and treatment-resistant type of illness.

The limitation of the study is the absence of age-based stratification, which may have affected the interpretation of nail findings across pediatric and adult patients. Future research should include age-based groups to assess how age affects nail changes in alopecia areata.

Conclusions

Nail changes frequently occur in patients with AA. The most common reported sign is pitting, followed by scales in the lateral nail fold and scaly cuticle. These nail alterations are related to the severity of the disease, the patient's age, and the disease duration.

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