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Onychoscopic Evaluation of Inflammatory Nail disorder and Their Relationship with Disease Duration: A Clinical Descriptive Study

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ABSTRACT

Background: *Nail diseases are common problems that often exhibit diagnostic challenge for many dermatologists especially when nails are primarily affected without skin involvement. Nail dermoscopy is a simple, non-invasive tool, that became a valuable diagnostic aid for evaluating nail changes associated with various dermatological diseases.* ***Objective:*** *This study aimed to highlight the key onychoscopic features of major inflammatory nail diseases and correlate these findings to the duration of the disease.* ***Patients and Method:*** *A cross sectional clinical descriptive study was performed on 105 patients with inflammatory skin diseases and clinically evident nail changes (25 with psoriasis, 25 with dermatitis, 20 with lichen planus, 15 with connective tissue diseases, 10 with autoimmune bullous dermatoses and 10 with alopecia areata). The study was conducted from October 2021 to October 2022. Demographic variables were recorded, and nail dermoscopic findings were described using a handheld polarized dermoscopy Dermlite DL100 (10x). Then the data were collected and statistically analysed.* ***Results:*** *In psoriasis, the most common onychoscopic signs were pitting (64%) and dilated capillaries at the hyponychium (64%) which showed a positive relation to early disease duration with p-value 0.05. In patients with dermatitis, the most common onychoscopic sign was dilated capillaries at the onychodermal band seen in (48%) of patients, a new dermoscopic sign; nail beading, was recorded in (24%) of patients. In patients with lichen planus, the most common sign was longitudinal ridging seen in (60%), dilated capillaries at the onychodermal band which is a newly reported sign in nail lichen planus was observed in (20%) with a significant relation to early disease duration with p-value 0.003. In Connective tissue diseases, tortuous capillaries were seen in (100%) of patients with systemic lupus erythematosus. In autoimmune bullous dermatoses, the most common signs were Beau's lines and onychomadesis seen in (100%) of patients. In Alopecia areata patients, the most common sign was scaly cuticles seen in (80%) of patients, and no significant relation to disease duration was recognized in the studied group.*

Conclusion: *Onychoscopy is a very useful non-invasive bedside tool for evaluating inflammatory nail disorders to reinforce the presumptive clinical diagnosis and helps to avoid invasive methods, in addition to guiding the management and prognosis of some nail disorders.*

Keywords: Nail disorder, Dermatitis, and Onychoscopy.

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INTRODUCTION

The nail is one of the skin appendages located on the distal phalanx of each finger and toe in human body [1]. Nail diseases comprise 10% of all dermatological disorders, 8% presented with nail infection, and 2% with inflammatory diseases [2]. The nail apparatus has six main components [3,4]: these include: the nail matrix, the nail plate, the nail bed, the cuticle, the proximal, distal and lateral nail folds, and the hyponychium [3,4].

Classification of nail disorders: the clinical presentation of different nail disorders is determined by which part of the nail apparatus has been affected. This can be divided into three main types [4];

Nail matrix damage signs included Beau's lines, pitting, longitudinal ridging, longitudinal fissuring and trachyonychia, true leukonychia, onychomadesis, koilonychia, nail plate thinning and onychauxis (nail plate hypertrophy or thickening) [4], **Nail bed damage signs:** the most common findings are: onycholysis, subungual hyperkeratosis, apparent leukonychia, and splinter haemorrhages [4], and **Nail Signs Due to Deposition of Pigment [4]:** Causes of nail pigmentation include: staining from external pigment, pigment under the nail plate and finally pigmentation within the nail plate.

Nail dermoscopy (onychoscopy and capillaroscopy) is a bedside diagnostic tool for nail diseases. It helps to support the clinical diagnosis in most of cases as it helps a better visualization of signs already seen by the naked eye [5].

The Onychoscopic examination and findings depend on the part of the nail that is involved in the inflammatory process and the inflammatory disease itself [6], while nail fold capillaroscopy is an optimal and reproducible technique used to assess patients with connective tissue diseases quantitatively and qualitatively. Some authors have chosen the third or fourth finger for examination, avoiding thumbs whose skin is characterized by lower transparency of both hands.

Onychoscopic patterns of inflammatory nail diseases:

1. Psoriasis: Nail abnormalities are present in 10_80 % of patients with psoriasis, and may be the only manifestation of the disease in about 5_10% [1,4,7]. Nail signs in psoriasis are classified as those related to nail matrix and nail bed. The n**ail matrix signs** included Pitting, which is the most common sign, which appears by dermoscopy as large, irregular and deep depressions, may be covered by white scales, Beau's lines appear as transverse indentations of the plate, onychorrhexis appears as longitudinal irregularities in the nail surface[1,6]. **Nail bed signs** presented as Onycholysis seen mainly in psoriatic finger nails, it is usually painless in psoriasis and associated with subungual hyperkeratosis [8], by onychoscopic examination appears as a shiny yellowish to orange hue, and it is usually accompanied by a little dented border, salmon patch or Oil drop sign; which is a yellow- red discoloration that is considered to be nearly specific for psoriasis [1] and by dermoscopy it appears as yellowish-white to yellowish-red spots or blotches in the nail bed [8]. Other nail bed damage signs which are less specific such as splinter haemorrhage can be seen by dermoscopy as longitudinal red lines with about 3 mm length in the distal nail plate. The hyponychium can be affected by subungual hyperkeratosis (SUH), dilated and tortuous blood vessels can be seen which are correlated with disease severity called [pseudo fibre sign], these fibre structures may represent bare capillaries (9 ,10).

2. Dermatitis: Nails can be affected in different ways in different types of dermatitis. In atopic dermatitis, showing signs related to nail matrix or nail bed damage due to the inflammatory nature of the disease, while in discoid (nummular) eczema usually involve the proximal nail fold skin, in regard to contact dermatitis both allergic and irritant types can

lead to wide spectrum of nail findings which range from eczematous changes of nail folds to more significant psoriasis like nail changes [11]. Nail signs in dermatitis include: Nail matrix signs and nail bed signs.

Nail matrix signs such as nail pitting, Beaus' lines, koilonychia, leukonychia, trachyonychia [11] and nail plate fragility[12]. It frequently affects the fingernails more than toenails of young to middle age females with dermatitis especially housewives or those putting artificial nails and doing manicure, and clinically presented as onychoschizia, onychorhexis and scaly nail plate [12]. By onychoscopy: lamellar onychoschizia, appears as horizontal splitting of several layers of the distal plate, while onychorrhexis, appears as multiple longitudinal ridges of nail plate with or without fissuring of the distal edge. And finally there is keratin degranulation, and dermoscopy shows small regular scales firmly attached to the distal part of the nail plate [13].

Nail bed signs such as onycholysis with tender red border [11,14,15], SUH, splinter haemorrhage and nail discolorations [16]. Periungual tissue damage ranging from paronychia changes to excoriations and eczematous changes [11].

3. Lichen planus: Nail abnormalities are seen in 10% _15% of patients with LP [1], there are three major forms of nail LP: Classic nail LP, 20-nail dystrophy and idiopathic atrophy of the nails [1].

The most common findings of classical nail LP included nail matrix signs in a form of diffuse nail thinning, longitudinal ridging, and distal nail splitting (onychoschizia)[6], onychorrhexis, onycholysis, atrophic or absent nail plates (anonychia)[1] and punctate or diffuse redness of lunulae. Dorsal pterygium is pathognomonic of LP [6]. Trachyonychia or 20 nails dystrophy is a sandpaper like nail changes commonly observed in LP and is a sign of proximal nail matrix damage [4], the last form of nail LP is idiopathic diffuse nail thinning and nail dystrophy [4]. Nail bed involvement is common in nail LP with non-specific findings such as onycholysis, SUH and chromonychia (discoloration of nail plate or subungual tissue) [4].

4. Connective tissue diseases (CTD): Microvascular abnormalities are the hallmarks of various CTDs; therefore, these disorders show certain characteristic morphological changes in their nail fold capillaries, which can be classified into[22]:

Scleroderma-dermatomyositis pattern (SCD-DM): this pattern is seen in both systemic sclerosis and dermatomyositis.

Non scleroderma (nonspecific pattern): This pattern is seen in capillaroscopy of SLE, it is less specific than SCD-DM pattern.

5. Autoimmune bullous dermatoses: Nails can be attacked by autoantibodies in inflammatory bullous dermatoses because all the basement membrane zone antigens and components are also normally expressed in the proximal nail fold, nail matrix, and hyponychium[18]. The most common nail signs had been reported in pemphigus vulgaris (PV) patients and include[4]: Paronychial changes, Beau's lines, onychomadesis, and onycholysis. In bullous pemphigoid (BP) group, nail signs are not common [19,20,21,22], and include paronychia changes with onychomadesis as in PV [20,21], nail scarring with atrophy or even permanent loss of nails had been reported [19-21], pterygium have been described in cicatricial pemphigoid [18,22].

6. Alopecia areata (AA): In about 10% of AA patients, especially in long-standing cases with extensive involvement, the nail matrix will be affected mainly in the form of uniform shallow pits, which is the most common abnormality, that may form transverse or longitudinal lines, red or spotted lunulae, brittle nails, koilonychia, leukonychia and melanonychia [6]. Trachyonychia with sandpaper-like roughness with opaque lanulae can be seen in addition to onycholysis and rarely, onychomadesis [6].

Aim of the study

To describe onychoscopic signs of inflammatory nail diseases, and find the relationship of these findings to the duration of the underlying dermatosis.

PATIENTS AND METHOD

Study design and setting: This study was a cross sectional clinical descriptive study conducted in the outpatient dermatology consultation unit in Al-Sadr medical city in Al Najaf-Iraq, from October 2021 to October 2022.

Ethical consideration: This study was reviewed and get approval of the scientific council of Dermatology and Venereology – Iraqi Board for medical specializations. The study prposal was explained to all the patients or their parents before starting examination and informed consents were obtained from all of the enrolled patients or their parents.

Selection of the study sample: Convenient sampling had been obtained for this study so any patient of any age and sex who presented to the outpatient with clinically evident inflammatory skin disease with nail changes were included and the diagnosis had been accomplished by the help of a consultant dermatologist according to clinical criteria aided by specific investigations and histopathology confirmations if needed. A total number of 300 patients with a diagnosis of inflammatory dermatoses were examined then a number of 105 patients who showed significant nail changes were selected to be enrolled in this study, 25 patients with psoriasis, 25 with dermatitis, 20 with LP, 15 with CTD, 10 with autoimmune bullous dermatoses and 10 patients with AA.

Exclusion criteria include:

1- uncooperative patient.
2- History of nail trauma.
3- History of drug that may induce nail changes.
4- Patients with nail infection.
5- Smokers (excluded during capillaroscopy)
6- Patients who received systemic treatment for the last six months or topical treatment for the last one month.
7- Patients with systemic illnesses that can affect the nails were excluded from this study e.g. (thyroid, liver diseases, diabetes, hypertension etc.).

Patient's evaluation: All patients were interviewed, and history was taken from them, including personal history data (age of patient, sex, occupation, residence and special habits), present complaint history (onset, course and duration of the underlying skin disease so those who presented with ≤ 1 year duration were considered to have early disease while those with > 1 year were considered to have longer disease duration). General examination of patients was done to detect any skin disease associated with the nail disorder and regional examination of the affected nails including both clinical and dermoscopic methods and photographs of nails were taken by smartphone camera, (figure 1). Dermoscopic examination included nail plate, nail bed, hyponychium, proximal and lateral nail folds and capillaries in each nail. Investigations were done guided by the clinical examination, including serological tests in suspected cases of CTDs, skin biopsy and histopathological confirmation in bullous disorders and other inflammatory dermatoses if needed.

Onychoscopic and capillaroscopic examination:

It was done by polarized handheld dermoscopic (Dermlite DL100 3GEN San Juan Capistrano, CA USA) with a magnification power of 10 folds.

The images of the affected nails were viewed through a Samsung galaxy (S21 ultra G5) mobile device with 108- megapixel autofocus 10X zoom camera. All examinations were performed by the same investigator.

Statistical analysis

Data were analysed using Statistical package for Social Sciences (SPSS) programme version 26. Categorical variables were presented as frequencies and percentages while continuous variables were presented as mean and SD. Fisher exact test was used to assess the relationships between categorical variables. Statistical significance was regarded if P value equal or less than 0.05.

RESULTS

A total of 105 patients fullfill the required criteria were enrolled in this study, including 25 patients with psoriasis, 25 patients with dermatitis, 20 patients with LP, 15 patients with CTDs, 10 patients with Bullous diseases and 10 patients with AA.

In the present study, 25 patients with different types of psoriasis including plaque psoriasis, erythrodermic, pustular, palmoplantar, follicular and linear psoriasis were enrolled. The demographic characteristics of the patients with psoriasis were listed in (table 1). Onychoscopic findings of the study group with psoriasis were summarized in (table 2), Pitting and dilated capillaries at the hyponychium were the most frequent signs observed in 64% of patients (figure 2), pseudo fibre sign was seen in 12% of patients (figure 3), distal onycholysis with red erythematous border was seen in 32% of patients (figure 4). The relationship of dermoscopic findings with the disease duration was summarized in (table 3), Both dilated capillaries at the hyponychium and salmon patches showing significant relation to longer disease duration with (p= 0.0003, 0.04), respectively. While Beau's lines showed significant relation to early disease duration with p= 0.05.

Twenty-five patients with different types of dermatitis including atopic dermatitis, irritant and allergic contact dermatitis, discoid eczema and seborrheic dermatitis were included. The demographics of patients with dermatitis were listed in (table 4). Onychoscopic findings in the studied group with dermatitis were summarized in (table 5): Dilated capillaries at onychodermal band was the most common sign observed in 48% of patients (Figure 5-A), followed by onychoschizia seen in 44% of patients (Figure 5-B), nail beading was seen in 24% of patients (Figure 6), pitting was the least common sign seen in 12% of patients. The relationship of dermoscopic findings with the disease duration are summarized in (table 6) which showed a positive relationship between longer disease duration and SUH with a significant p=0.008, while dilated capillaries and Beau's lines were prominent in patients with early disease duration with p=0.02 for each sign.

Twenty patients with LP were included in our study, all the patients have finger nail involvement and three of them (15%) have toe nail involvement. The demographics of patients with lichen planus were listed in (table 7). The onychoscopic results of studied group with lichen planus were summarized in (table 8). Nail plate ridging which was the most common sign observed in 60% of patients (Figure 7), dorsal pterygium was evident in 20% (Figure 8), the least common signs were sandpaper trachyonychia and total nail dystrophy which were evident in only 1 patient (5%) for each sign (figure 9).

There is a positive relationship between longer disease duration and both ragged cuticle and thinning of nail plate with p=0.01 for each sign, while dilated capillaries of the onychodermal band showed positive relation with early disease duration with significant p=0.003, see (table 9).

The study group contain 15 cases of CTDs, 5 of them with systemic lupus erythematosus (SLE), 4 with scleroderma (SCD) and 6 with dermatomyositis (DM). The demographics of patients with CTDs are listed in (table 10).

Onychoscopic findings of the studied group with CTDs were summarized in (table 11): In (SLE), the most common sign was tortuous

capillaries was observed in all patients (100%) (Figure 10), while in (DM) the most common capillaroscopic signs observed in all patients (100%) were disorganization of capillaries, avascular areas (Figure 11) and ragged cuticle. Dilated giant capillaries and ramified capillaries seen in 4 (66.6%) patients (Figure 12).

In (SCD) cases, all the patients showed disorganization and loss of capillary (100%), giant capillary and haemorrhage was observed in only one patient (25%) (Figure 13). Regarding the nail fold capillary patterns observed in the study group, the scleroderma-dermatomyositis pattern (SCD-DM) was seen prominently in (DM) and (SCD) and not observed in (SLE) patients with a significant p=0.001.While the nonspecific pattern was more commonly seen in (SLE) than (DM) and (SCD) patients (60% vs. 0% and 25%, respectively with p=0.08. The normal pattern was only seen in (SLE) patients and neither observed in (DM) nor in (SCD) patients (table 12). There was a positive relationship between early disease duration and the presence of twisted capillaries with significant p=0.009, while cuticle changes (ragged and thickened cuticls) showed significant relation with longer disease duration with p=0.08, (table 13).

Onychoscopic features of Autoimmune Bullous disorders: Ten patients of different age groups and both sexes were included in this study, 4 of them were with pemphigus vulgaris (PV), 2 with pemphigus foliaceous (PF) and 4 patients with Bullous pemphigoid (BP). The demographics of patients with autoimmune bullous dermatoses are listed in (table 14).

Onychoscopic findings of the studied group with autoimmune bullous dermatoses are summarized in (table 15): The most common signs observed in (100%) of patients were Beau's lines (Figure 14) and onychomadesis (Figure 15). Paronychial changes with loss of cuticle, painful or painless swelling of the nail folds and erythema were evident in 8 patients (80%) (Figure 16).

There is a positive relationship between early disease duration and the presence of dilated capillaries at the onychodermal band with a significant p=0.008, while patients with longer disease duration showing more prominent paronychial changes with p=0.07, (table 16).

Ten patients with alopecia areata (AA) were enrolled in this study, The demographics of patients with alopecia areata were listed in (table 17). Onychoscopic findings of the studied group with alopecia areata were summarized in (table 18): The most common sign observed in the study group was scaly cuticles or thickened cuticles seen in 8 (80%) of patients and punctate or transverse leukonychia was prominent in 7 (70%) of patients (Figure 17), lateral nail folds scales were very prominent in 6 (60%) of patients (Figure 18), the least common sign was trachyonychia in 1 patient (10%) (figure 19). No significant relationship between Onychoscopic signs and disease duration was seen in the studied group, see (table 19).

DISCUSSION

Inflammatory nail disorders are common dermatological conditions. Their evaluation using onychoscopy get more attention recently to improve the clinical assessment and has the potential to enhance the clinical care and helps in expediting early management to halt the progression of the inflammatory process and its impact on the nail apparatus.

In the present study, 25 patients with psoriasis were enrolled whose demographic data showed similar results with previous two Iraqi studies by Al-Hamamy et al [23] and Al-Khafaji *et al.* [24] and in line with an Egyptian study by Yara M. *et al*. [25].

The most common dermoscopic signs observed in the current study were pitting in 64% of the cases, which is in agreement with Yara M. *et al.*[25] and Wanniang *et al*. (India 2020) [26] and dilated capillaries at the hyponychium in 64% of cases which was

supported by the study of Bhat *et al.* (India 2018) [27]. The last sign is considered representative of the Auspitz sign seen clinically on psoriatic plaques and it correlates positively with disease severity and helps to evaluate treatment response.

Subungual hyperkeratosis was seen in 52% of the cases which is in agreement with Al- Khafaji *et al.*[24], Yara M. *et al.*[25] and Wanniang *et al.*[26] Splinter haemorrhage was seen in 36% of patients in the current study in comparison with higher incidences reported by Al- Khafaji *et al.*[24], Yara M. *et al.*[25] and Wanniang *et al.*[26] Splinter haemorrhage is formed owing to the extravasation of blood along the grooves beneath the nail plate thus creating splinter shaped markings. Salmon patch was seen in 36% of cases in the current study and this agree with Yara M. *et al.*[25] and Wanniang *et al.*[26] This sign is related to parakeratosis suggesting localized nail bed psoriasis and it is considered a specific sign for nail psoriasis as reported by Polat *et al.* [28]. Distal onycholysis with red dented border was seen in 32% of the study group while it was the most common findings in the study of Al- Khafaji *et al.*[24] in 77.8% of patients and this difference might be explained by the number of the study sample.

Pseudo fibre sign which is a recently described dermoscopic sign was seen in the current study in 12% which is similar to the result reported by Al- Khafaji *et al.*[24], Yorulmaz and Artuz [29] who described pseudo fibre sign for the first time as a sign of more severe psoriasis. They explained that it is related to nail bed damage and these fibre structures were merely bare capillaries. Beau's lines were the least common sign in the current study seen in 12% of the cases, Wanniang *et al.*[26] found it in 22% of cases. Regarding the relationship of psoriatic nail dermoscopic findings and disease duration in the current study, dilated hyponychial capillaries and salmon patches showed a significant relation to longer disease duration While Beau's lines showed a positive relation to early disease duration. Wanniang *et al.*[26] found a strong positive correlation between the duration of psoriasis and the duration of nail involvement, but he didn't correlate with dermoscopic signs, so the current study is the first study to correlate onychoscopic signs with the duration of the disease.

There had been few studies on the nail changes in dermatitis. In the current study, the aim was to describe the onychoscopic signs in different types of dermatitis including atopic dermatitis, discoid eczema, seborrheic dermatitis and allergic contact dermatitis, so 25 patients were enrolled in the present study, their demographic data were in line with a recent study by Abu ElHamd *et al.* (Egypt 2021) [30] and Chung BY *et al.* (Korea 2019) [11].

An important and very prominent finding in the current study is the involvement of dominant hand fingernails in 92% of the study sample and most of them were housewives, and this can be explained by their frequent exposure to wet work, irritants and higher incidence of traumatic injuries to their fingernails. The most common observed onychoscopic sign in the current study was dilated capillaries at the onychodermal band in 48% of patients which is a novel dermoscopic sign that had never been reported previously. The exact pathophysiology of this sign is unknown as the role of microcirculatory changes in chronic inflammatory diseases like AD is not fully understood, but in 2012 Genovese *et al.* [31] reported that the most important proangiogenic factors including vascular endothelial growth factor (VEGF-A) and fibroblast growth factor-beta (FGF-β) were detected in high levels in skin tissue of atopic dermatitis patients and correlated with disease activity. This is very consistent with the current study results which showed significant positive relationship between dilated capillaries at onychodermal band and early disease duration with clinical changes of acute dermatitis, p=0.02.

The nail matrix signs, were more prominent than nail bed signs in the present study, especially in patients with AD and ACD, those with discoid eczema showed more periungual tissue changes while seborrheic dermatitis patients showed no significant nail changes. Brittle nails due to nail matrix injury presented as second dermoscopic signs, onychoschizia in 44% of patients and onychorrhexis in 40% of patients, while the least common signs were pitting and trachyonychia seen in 12% of patients for each sign, these findings were relatively similar to Chung BY *et al.* (Korea 2019) [11] and El-Hamd *et al.* (Egypt 2021)[30]. Anew novel dermoscopic sign observed in the present study was nail beading seen in 24% of patients, beads on the nail plate appearing as ridges running lengthwise, and seem to drip down the nail plate like wax. In the current study, this sign was evident in 6 female patients, with history of severe contact dermatitis of the hands due to frequent exposure to many natural or artificial irritants and allergens including application of artificial nails known as acrylic nails. In fact, the prevalence of contact allergies from nail cosmetic products and procedures continues to increase. The most common allergens and irritants in nail cosmetic products are methyl methacrylate and hydroxyethyl methacrylate, in those patients, the nail changes were ranged from nail fragility and paronychial changes to more severe dystrophic nail signs that might be misdiagnosed as psoriasis [32].

The most common nail bed signs by dermoscopy were: onycholysis with slightly dented and less erythematous border was seen in 36%, SUH in 32% of patients which showed a significant relationship with longer disease duration with p=0.008 while Beau's lines were evident in 16% of patients with early disease duration with significant p=0.02.

Nail lichen planus is a progressive disease affecting the nail matrix and nail bed in its evolutionary stages which may lead to extensive damage, therefore, early diagnosis is of the utmost importance to halt disease progression through timely management. A group of 20 patients were enrolled in the current study, their demographic data were similar to result by Al-Khafaji *et al* (Iraq 2019)[24], SHARMA *et al.* (India2021)[33] and Yara M. *et al* (Egypt2022)[25].

The most common onychoscopic signs in the current study were longitudinal ridging and nail plate thinning which are signs of nail matrix injury seen in 60% and 50% of patients; respectively, and this is in line with Al- Khafaji *et al.*[24], SHARMA *et al.*[33] and Yara M. *et al.*[25] A new onychoscopic sign in the current study was ragged cuticle seen in 50% of patients who presented with longer disease duration and this suggests a progressive disease affecting the perionychium as a part of the nail unit affected by LP [34,35]. Onychoscopic findings related to nail bed affection were onycholysis, splinter haemorrhage and SUH, with an incidence of (30%, 30% and 25%; respectively), which were in line with Yara M. *et al.*[25] and SHARMA *et al.*[33]

In the current study, dorsal pterygium was seen in 20% of cases which is in line with Al-Khafaji *et al*[24]. and Yara M. *et al.*[25]. This sign is the result of irreversible damage to part of the matrix, whenever it seen, it is a pathognomonic sign of nail LP [33,36]. Another nail matrix damage sign was seen in this study is trachyonychia which refers to rough nails, was seen in one patient (5%), while higher incidences were reported by SHARMA *et al.*[33] and Al- Khafaji *et al.*[24], these differences in the results is probably attributed to the variations in sample size, number of nails affected for each patient and the time when the patients seeking medical consultation which represents the significance of disease duration. A newly recognized onychoscopic sign, which is dilated capillaries at the onychodermal band, was seen in 20% of the studied patients, and it had been reported for the first time by Al- Khafaji *et al*[24], who found it in 27.3% of the cases and this is in

agreement with the current study results. The etiopathogenesis of this sign is related to the role of microcirculatory changes in chronic inflammatory diseases like AD and cutaneous LP due to higher tissue expression of VEGF, which is a cytokine secreted in inflammatory conditions by many types of cells including keratinocytes and macrophages, had a significant role in the pathogenesis and the vascular changes seen in LP [4, 31]. In the current study, this novel sign showed positive relationship with early disease duration with p=0.003, while nail plate thinning and ragged cuticles showed a significant p=0.01 in relation to longer disease duration.

Regarding Autoimmune bullous dermatoses: In this study 10 patients were enrolled, 4 patients were diagnosed with PV, two patients with PF and 4 patients with BP, their demographics were similar to previous studies by Baghad and Chiheb (Morocco 2019)[37] and Shan Cao *et al.* (China 2022)[22]. The most common onychoscopic signs in the present study were Beau's lines and onychomadesis seen in 100% of the patients followed by paronychial changes were seen in 80% of patients and this agree with Baghad and Chiheb and Shan Cao *et al*. The Beau's lines get their importance as their distance from the proximal nail fold is give an idea of the time of disease onset, and their number indicates the number of previous outbreaks[37]. Paronychial changes are often a warning symptom of a relapse of the disease and it usually associated with more severe disease at initial presentation or during flare [22]. In the present study, this sign showed a significant positive relationship in patients with longer disease duration who presented with acute exacerbations with p=0.07. A novel onychoscopic sign seen in the current study and reported for the first time was dilated capillaries at the onychodermal band seen in 30% of cases, with significant positive relationship to early disease duration p=0.008, and can be explained by the hypothesis of VEGF role in inflammatory dermatoses and the resultant enlargement of capillaries in the nail bed which is not evident to the naked eyes and can be visualized easily with dermoscopy.

In Connective tissue diseases: In the current study, 15 patients were enrolled, 5 with systemic lupus erythematosus, 4 with scleroderma and 6 patients with dermatomyositis, their demographic data were compared with two previous Iraqi studies by Al-Hamamy *et al.* [17] and Al- Khafaji *et al.* [24] who showed relatively similar results apart from differences in sample size.

Regarding the capillaroscopic signs for each group: In **SLE** group, the most common signs, in descending order, were tortuous capillaries seen in all patients (100%), cuticle thickening in (80%) of patients and focal microhaemorrhages were seen in (60%), these findings were in line with Al- Khafaji *et al.*[24], while lower incidences reported by Al-Hamamy *et al.* [17].

In **SCD** group of this study, the most common signs seen in (100%) of patients were capillary disorganization and avascular areas, followed by (50%) for both ramified capillaries and cuticle hypertrophy, the least common signs were giant capillaries and haemorrhage seen in (25%) of patients, these findings were completely identical to Al- Khafaji *et al*[24]. study results.

In **DM** group in the current study, the most common signs seen in all patients (100%) were disorganization, avascular areas and ragged thickened cuticles which were in line with Al-Hamamy *et al.* [17], Giant capillaries and capillary haemorrhage which are important capillaroscopic signs in active stage of the disease were seen in (66.6%) in the current study which were similar to the findings recorded by Al-Hamamy *et al.*[23] and Al-Khafaji *et al*[24]. The hallmark of microvascular damage in DM is the presence of ramified capillaries [38], which is seen in (66.6%) of our patients. Analysis of the NFC patterns in the

current study showed that SCD-DM pattern was observed significantly in patients with DM & SCD 100% and 75%; respectively, more than in SLE patients who showed 0% for this pattern, and this was consistent with the results of Al-Hamamy *et al.*[17]

On the other hand, most of SLE patients 60% had the non-specific pattern and 40% had a normal NFC, which is similar to Sundaray *et al.*[39], while in the study of Al-Hamamy *et al.*[17], normal pattern showed higher incidence than the non-specific pattern in SLE patients, the possible explanation for the previous variations in the frequency of NFC patterns between studies may be due to varying sample size, the duration of the diseases and the use of different equipment with different magnification in each study. From the present study results, cuticle changes (ragged and hypertrophic) were seen in 91.7% of patients with longer disease duration with a significant p=0.08 while ramified capillaries which are mainly seen in DM and related to active dynamic changes, showed a significant positive relation to early disease duration with p=0.009.

Not many studies are available on the dermoscopic findings of nails in Alopecia areata patients, these nail abnormalities are strongly associated with longer disease duration and more extensive involvement and therefore it will affect the prognosis of the disease [40]. In the current study, 50 patients with clinically diagnosed AA were examined but only 10 patients who showed significant dermoscopic nail changes had been enrolled, their demographic data were in line with previous studies by Hanan *et al.* 2021[41] and Habibullah Aktas and Mehmet Unal 2022[42]. The most common abnormalities seen by dermoscopy were scaly cuticles in 80% of patients, leukonychia in 70% and lateral nail folds scales in 60% of patients, which were in line with Hanan *et al.* Other signs in the present study were pitting (60%), distal onycholysis seen in (50%) while much lower incidences were recorded by Hanan *et al.* and this may be due to differences in patient selection as they included patients who were on treatment which will reduce the inflammatory and autoimmune mechanism in AA. Melanonychia was seen in 20% of patients in the current study. The least common nail abnormality was trachyonychia with sandpaper-like roughness and opaque lanulae which was seen in 10% of patients. Regarding relation to disease duration, no statistically significant correlation was observed and this might be explained by small sample size of the present study.

CONCLUSION

In conclusion, studies in the field of dermoscopy of inflammatory nail disorders are limited but are still ongoing while we are writing these lines, due to the fact that onychoscopy is a safe and preferable bedside tool in examining many inflammatory skin diseases affecting the nails.

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FIGURES LEGENDS:

Figure 1. (A) Dermlite DL100 device with power 10 magnification lens. (B) Samsung Galaxy S21 phone used for photographic photos in this study.

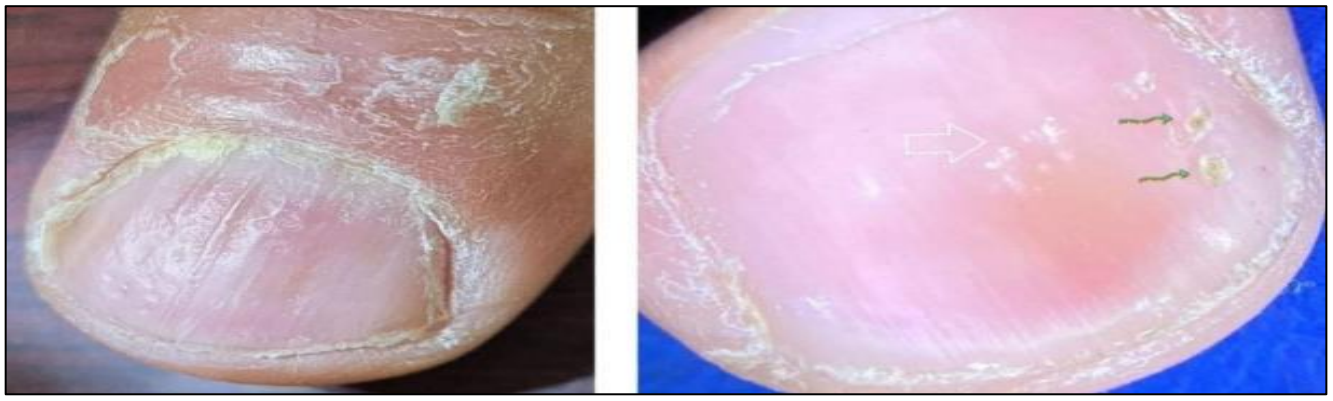

Figure 2. Clinical and onychoscopic photos in a patient with psosrisis showing finger nail pitting which are deep, irregular in size and distribution (green arrow) and the (white arrow) marks leukonychia.

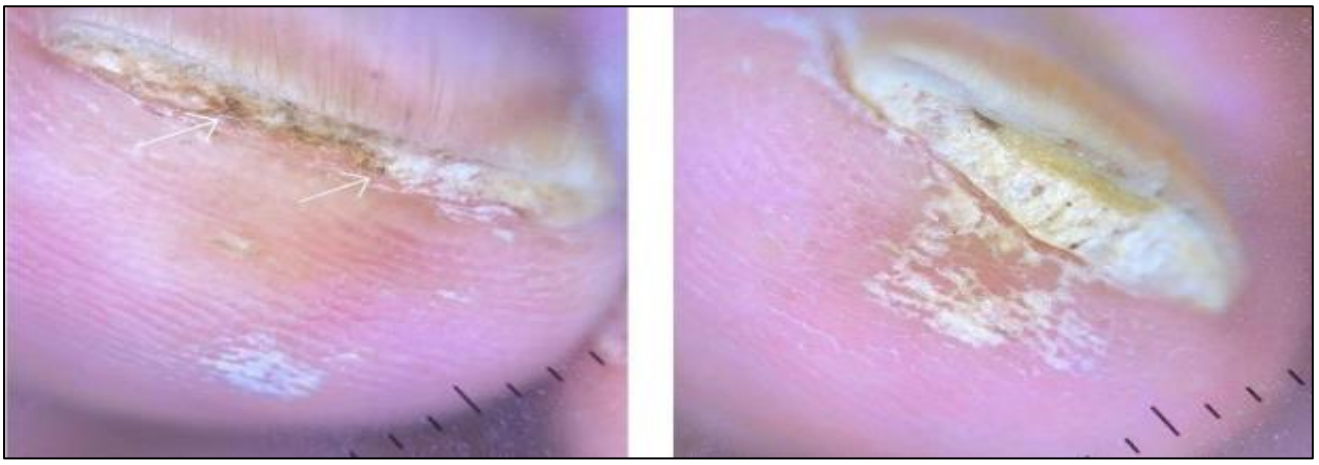

Figure 3. Onychoscopic photos in a patient with psosrisis showing compact subungual hyperkeratosis to the right and the left side photo shows pseudo fibre sign (white arrows).

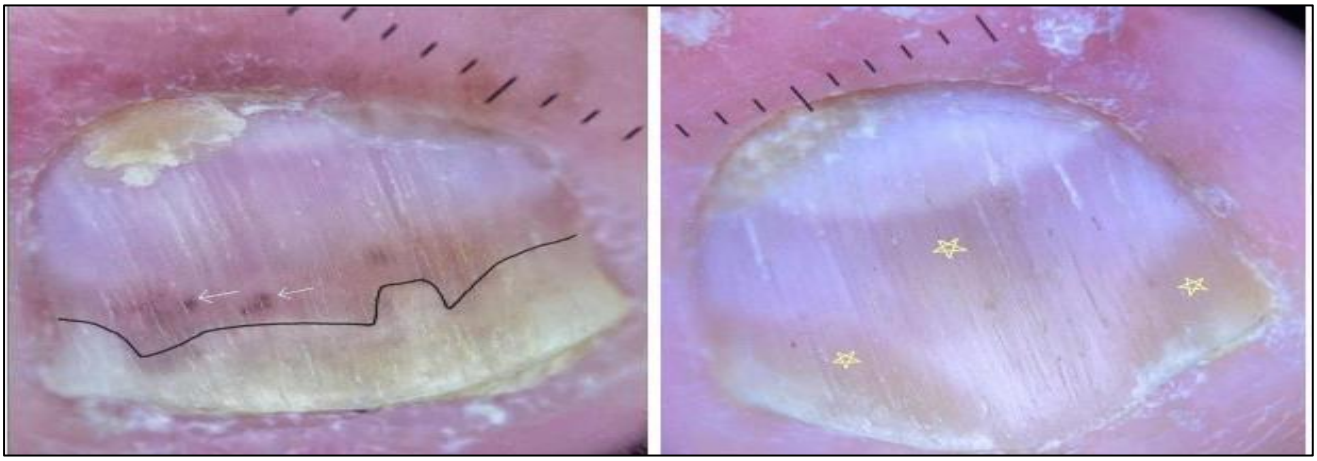

Figure 4. Onychoscopic photos in a patient with psosrisis showing salmon patches (yellow stars) in the right photo, the left one shows splinter hemorrhage (white arrows) and mildly dented margin of the onycholysis area with surrounding red-orange border.

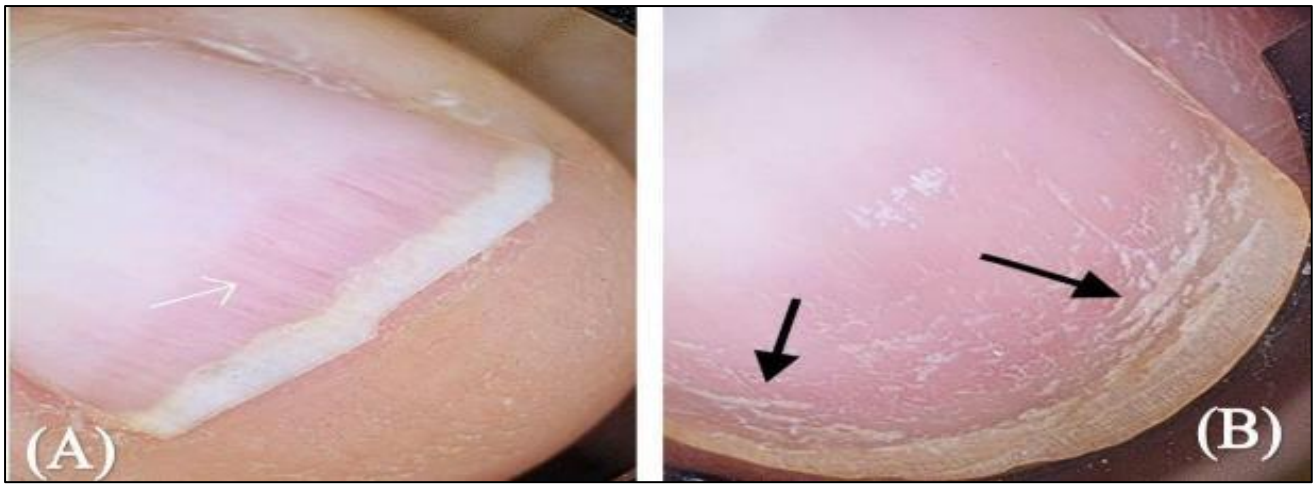

Figure 5. (A) onychoscopy photos in a patient with dermatitis showing dilated capillaries at onychodermal band (white arrow), (B) onychoschizia presented as transverse nail plate peeling (black arrows) in young lady with history of recent removal of her acrylic nails.

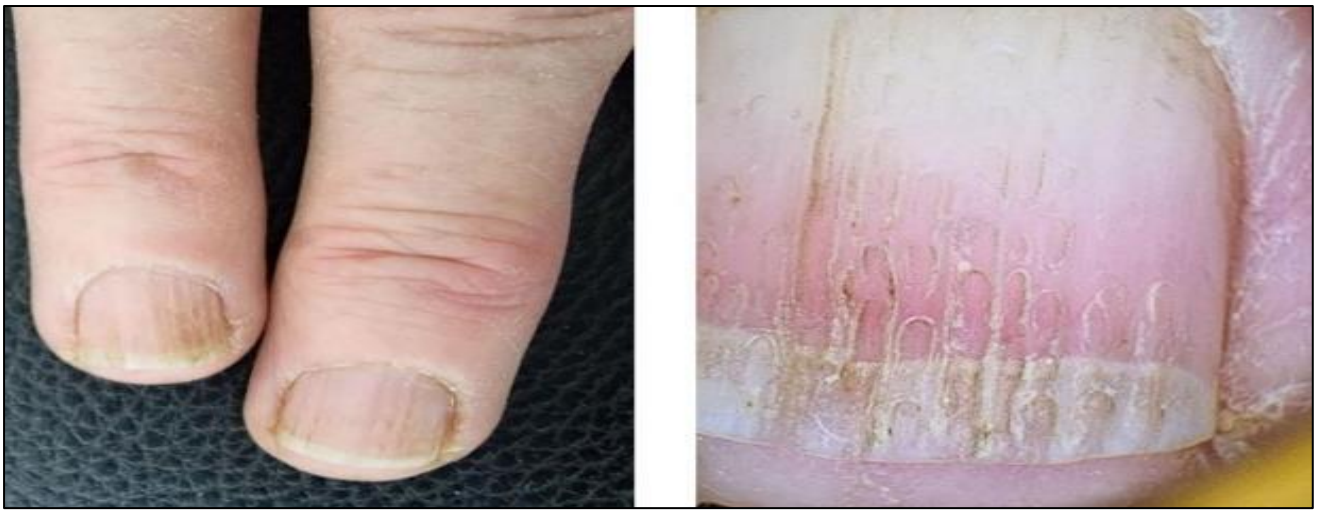

Figure 6. Clinical and onychoscopic photos of nail beading in a patient with dermatitis showing nail plate scaling and superficial wax like drops.

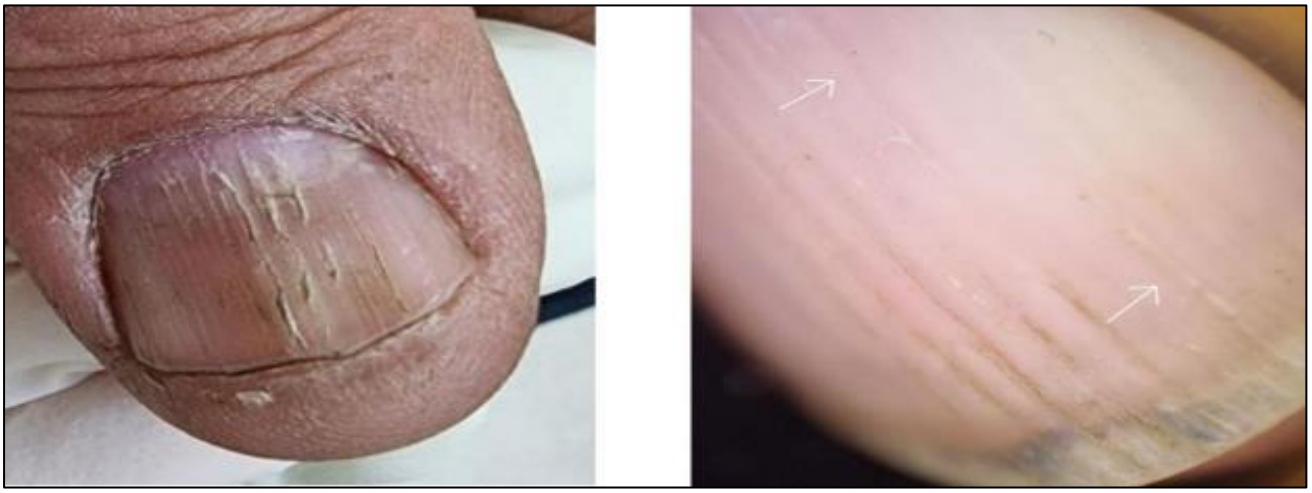

Figure 7. Clinical and onychoscopy of finger nail in a patient with lichen planus shows longitudinal ridging of nail (white arrows).

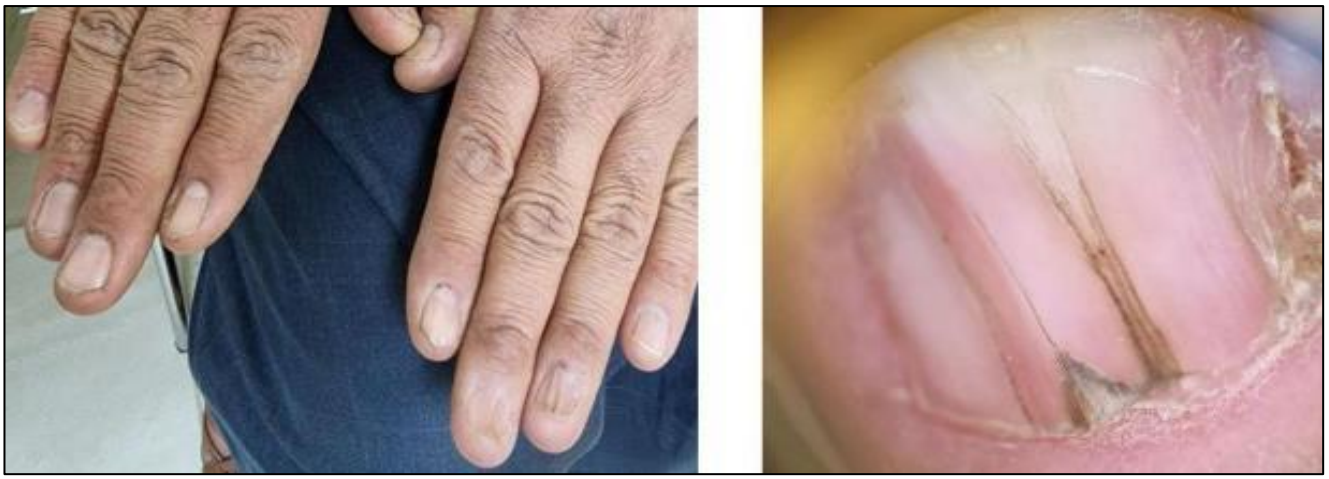

Figure 8. Clinical and onychoscopic photos of dorsal pterygium in patient with long standing LP.

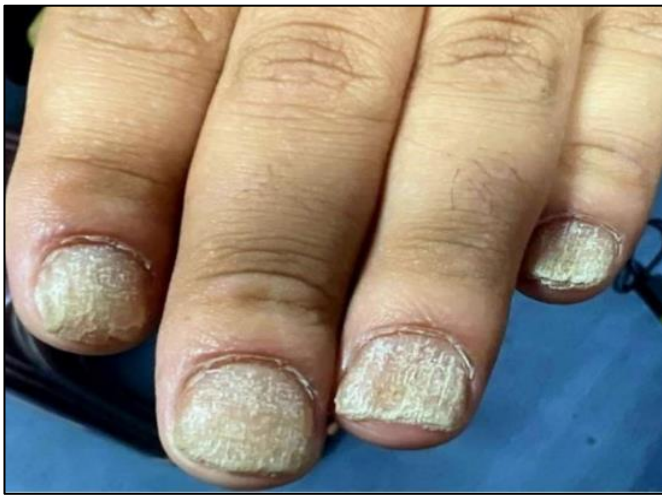

Figure 9. Clinical photo of trachyonychia with sandpapered nails in long standing LP.

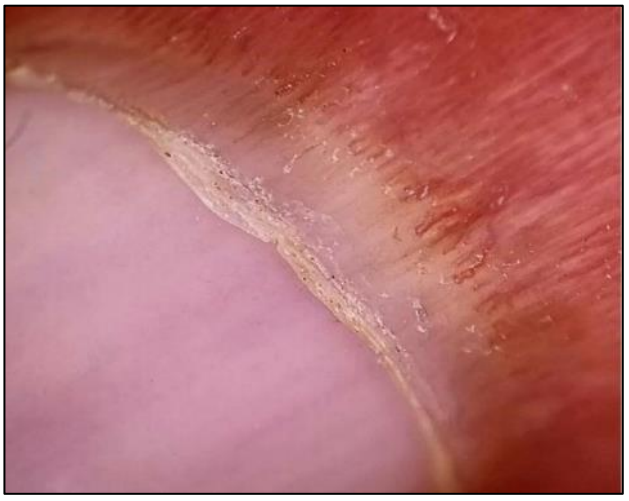

Figure 10. Capillaroscopic photo of patients with SLE showing tortuous capillaries.

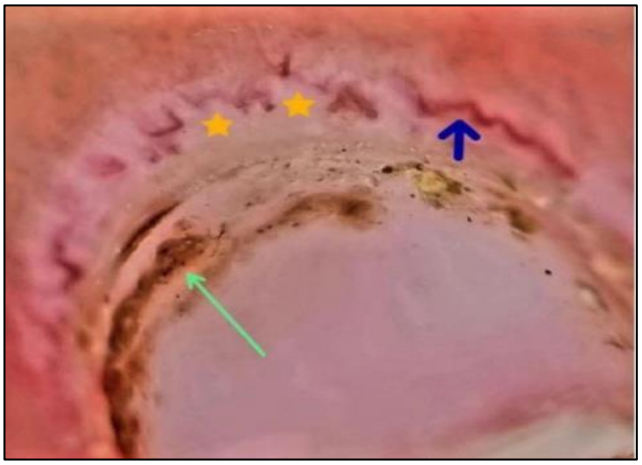

Figure 11. Abnormal nailfold capillaroscopy in Dermatomyositis, showing giant capillary (blue arrow), avascular area (yellow stars) and thickened ragged cuticle (green arrow).

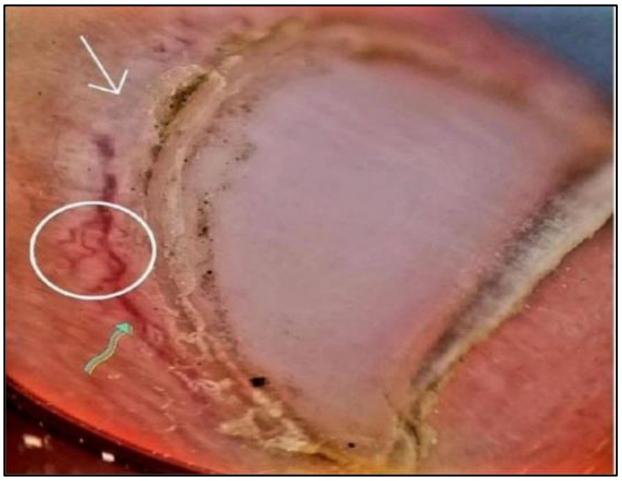

Figure 12. Abnormal nailfold capillaroscopy in newly diagnosed juvenile Dermatomyositis showing giant capillary (green arrow), ramified capillary (circle mark) and avascular area (white arrow).

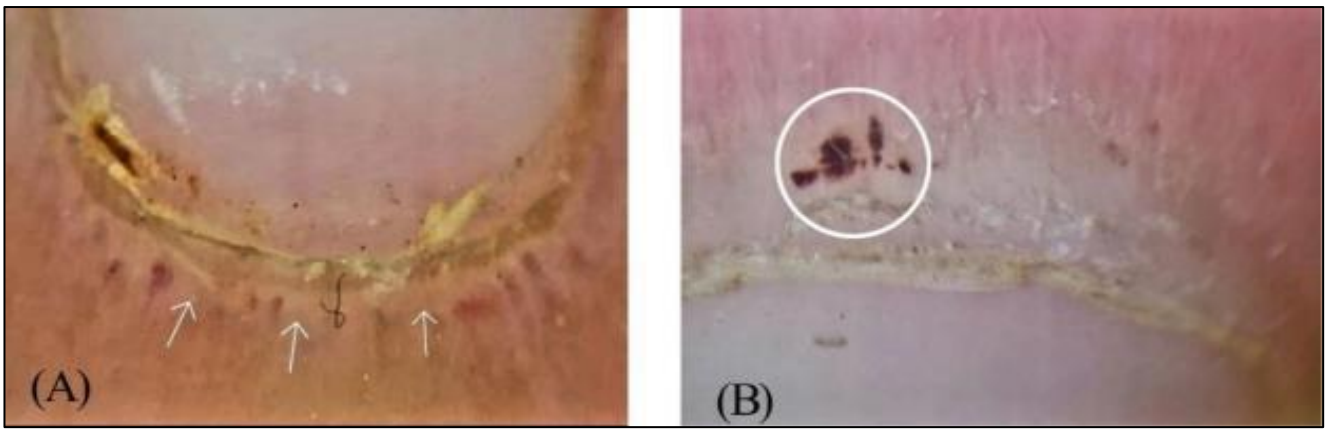

Figure 13. Abnormal nailfold capillaroscopy in scleroderma. (A) disorganization of capillaries with avascular areas (white arrows) in SCD of 5 years duration. (B) focal capillary hemorrhage (circle mark) and normal capillary morphology in SCD of 6 months duration.

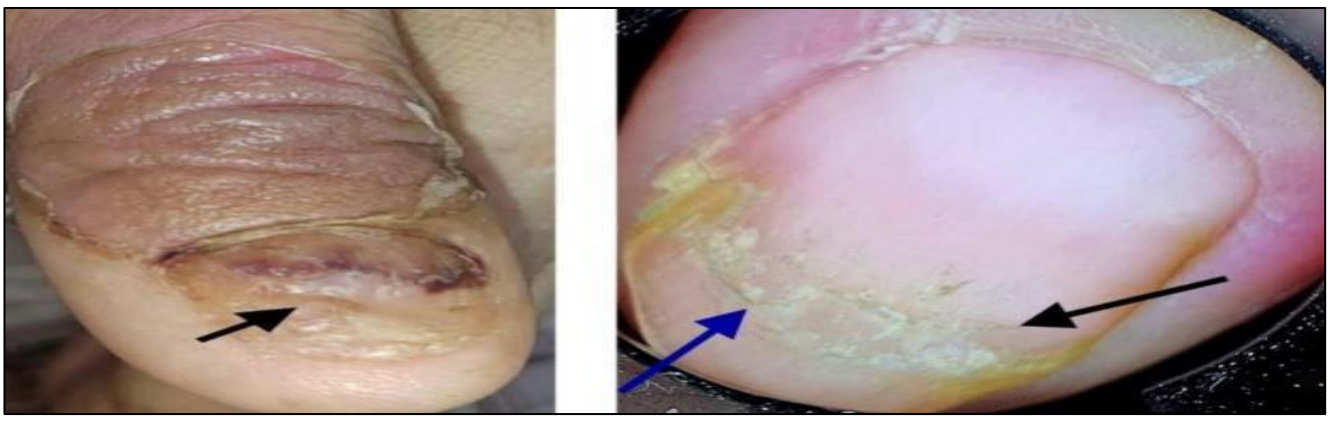

Figure 14. Clinical and onychoscopic photos of patient with pemphigus vulgaris of 6 months duration showing beau's line (black arrow) with ruptured bullae on the skin proximal to the nail, and onychomadesis (blue arrow).

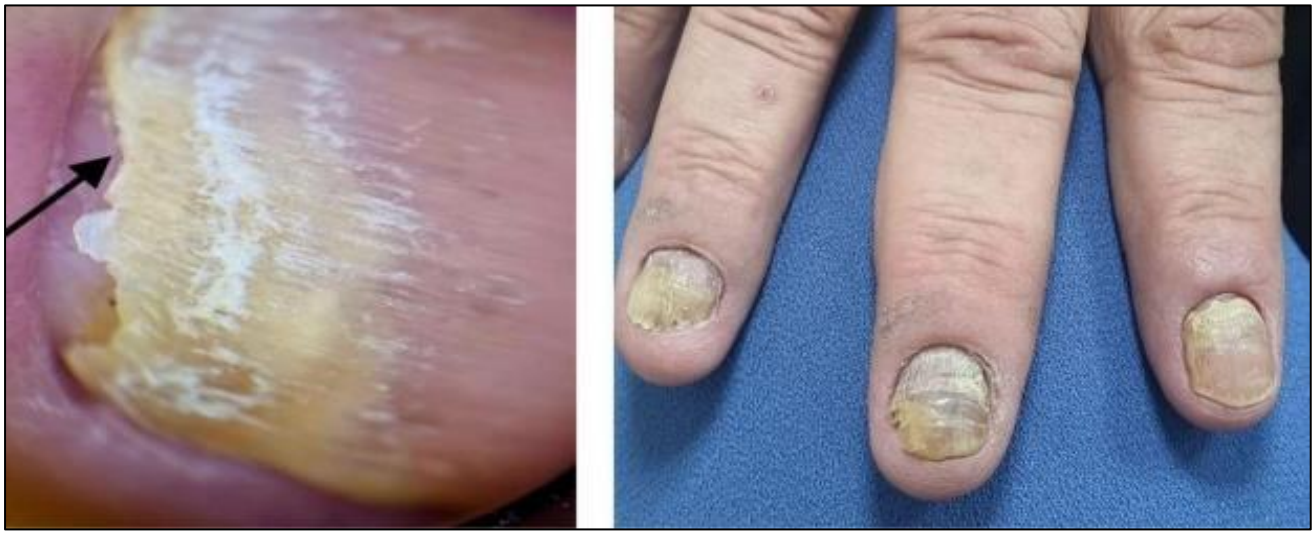

Figure 15. Clinical and onychoscopic photos in bullous pemphigoid of more than 1year duration, showing onychomadesis (black arrow).

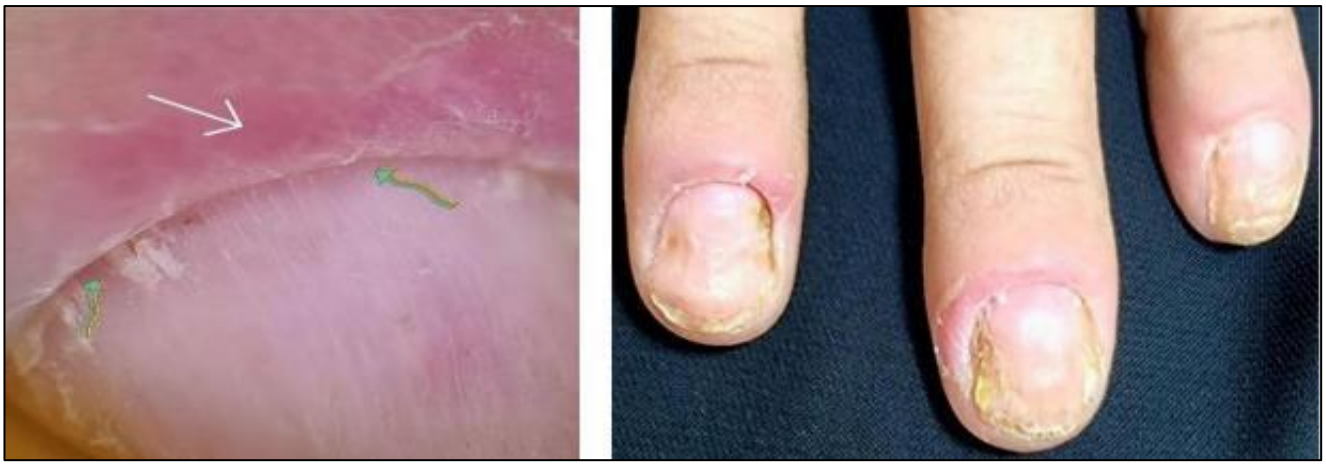

Figure 16. Clinical and onychoscopic photos in pemphigus foliaceous of 3years duration showing paronychial changes with proximal nailfold swelling and erythema (white arrow) and loss of cuticle (green arrows).

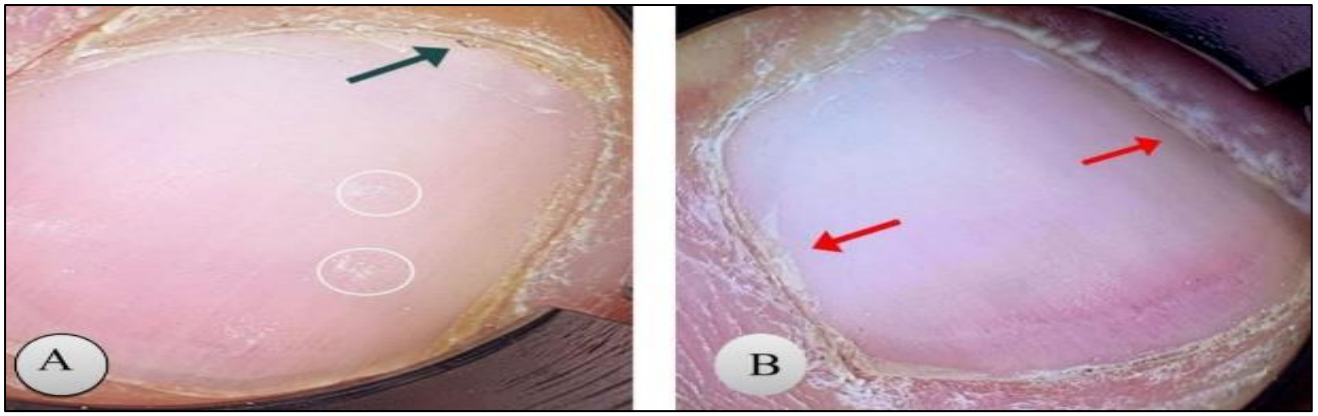

Figure 17. Onychoscopic photos of patient with alopecia areata. (A): showing thick scaly cuticle (black arrow), and punctate leukonychia (circle marks). (B): lateral folds scales (red arrows).

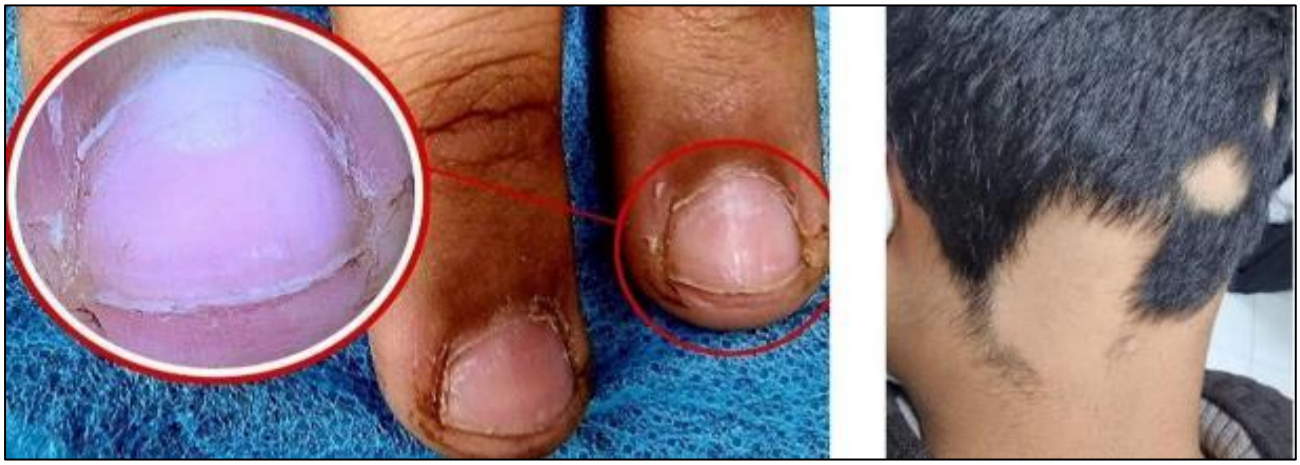

Figure 18. Clinical photos of patient with alopecia areata of 2years duration. Inset (red circle) showing the dermoscopic changes of lateral folds scales and leukonychia.

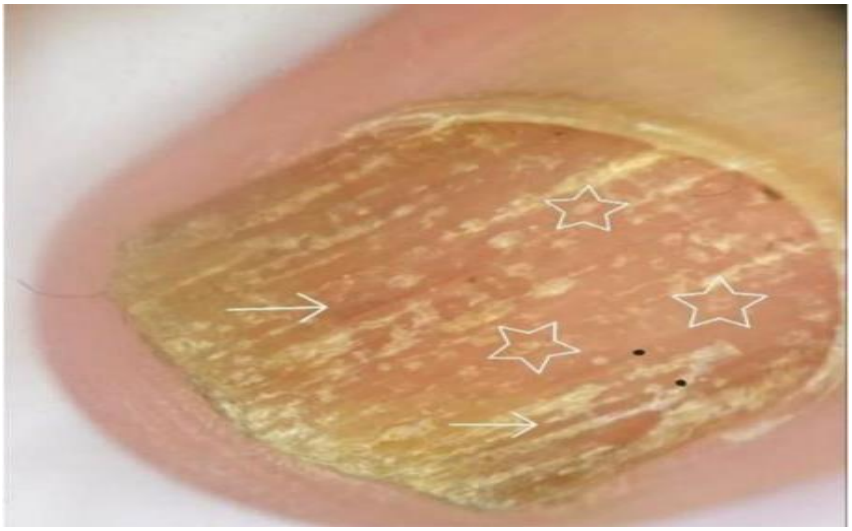

Figure 19. Onychoscopic photo of a child with alopecia areata of 3years duration showing sandpaper trachyonychia with longitudinal ridging (arrows) and regular geometric pitting (stars mark).

Table 1. Demographic features of patients with psoriasis.

Demographics of the study group	Results
Number of patients	25
Age (range and mean)	(1 – 70) years ±SD (40.3 ±19.3) years.
Sex (M:F ratio)	♂ 1.5 :1 ♀
Duration of disease (range and mean)	(3 -400 months), ±SD (98.16 ±113.38). 44% with early disease duration ≤ 1 year. 56% with > 1year duration.
Number and mean of affected fingers and toes	Fingernails (2-10) nails ±SD (7.8±2.9). Toenails (3-10) nails ±SD (3.2±3.4).
Family history of psoriasis	+ve in 68%.
Dominant hands	76% +ve.

Table 2. Onychoscopic findings of the studied group with nail psoriasis.

Dermoscopic findings	No. Total 25	Percentage %
Pitting	16	64%
Dilated capillaries at hyponychium	16	64%
SUH	13	52%
Leukonychia	11	44%
Periungual scales	11	44%
Splinter haemorrhage	9	36%
Salmon patch	9	36%
Distal onycholysis	8	32%
Thick cuticle	6	24%
Pseudo fibre	3	12%
Beau's lines	3	12%

Table 3. Relationship between dermoscopic signs and disease duration in patients with psoriasis of nail.

Dermoscopic signs	Duration ≤ 1 year No. 11	Duration >1year No. 14	Total	P_value
Pitting	7	9	16	0.7
Dilated capillaries at hyponychium	2	14	16	0.0003*
SUH	5	8	13	0.99
Leukonychia	5	6	11	0.7
Periungual scales	2	9	11	0.09
Splinter haemorrhage	2	7	9	0.2
Salmon patch	1	8	9	0.04*
Distal onycholysis	4	4	8	0.7
Thick cuticle	2	4	6	0.9
Pseudo fibre	0	3	3	0.3
Beau's lines	3	0	3	0.05*

*** Fischer's exact test is used.**

Table 4. Demographic features of patients with dermatitis.

Demographics of the study group	Results
Number of patients	25
Age (range and mean)	(4-70 year) with a mean ±SD (39.4±22.6).
Sex (M:F ratio)	♂ 1: 2.1 ♀
Duration of disease (range and mean)	(4 months -96 months) with a mean ±SD (32.7 ±27.9 months).
Number and mean of affected fingers and toes	Fingernails (3-10) nails ±SD (8.5±2.1). Toenails (1-10) nails ±SD (8.9±4.2).
Skin lesions	44% with allergic contact dermatitis 36% with atopic dermatitis 12% with discoid eczema 8% with seborrheic dermatitis.
Dominant hands	92% +ve.

Table 5. Onychoscopic findings of the studied group with dermatitis.

Dermoscopic findings	No. Total 25	Percentage %
Dilated capillaries at onychodermal band	12	48%
Onychoschizia	11	44%
Onychorrhexis	10	40%
Leukonychia	10	40%
Loss of cuticles	9	36%
Onycholysis	9	36%
SUH	8	32%
Scaly nail folds	7	28%
Nail beading	6	24%
Splinter haemorrhage	6	24%
Koilonychia	6	24%
Beau's lines	4	16%
Pitting	3	12%
Trachyonychia	3	12%

Table 6. Relationship between dermoscopic signs and disease duration in patients with dermatitis of nail.

Dermoscopic signs	Duration ≤ 1 year No. 10	Duration >1year No. 15	Total	P_value
Dilated capillaries at onychodermal band	8	4	12	0.02*
Onychoschizia	5	6	11	0.7
Onychorrhexis	2	8	10	0.2
Leukonychia	3	7	10	0.8
Loss of cuticles	2	7	9	0.2
Onycholysis	4	5	9	0.9
SUH	0	8	8	0.008*
Scaly nail folds	2	5	7	0.7
Nail beading	2	4	6	0.9
Splinter haemorrhage	2	4	6	0.9
Koilonychia	2	4	6	0.9
Beau's lines	4	0	4	0.02*
Pitting	0	3	3	0.3
Trachyonychia	0	3	3	0.3

*** Fischer's exact test is used.**

Table 7. Demographic features of patients with lichen planus.

Demographics of the study group	Results
Number of patients	20
Age (range and mean)	(25-65 years) with a mean ±SD (46.4±13.1).
Sex (M:F ratio)	♂ 1:1.2 ♀
Duration of disease (range and mean)	(2–96 months) with a mean ±SD (43.49 ±33.58 months).
Number and mean of affected fingers and toes	Fingernails (3-10) ±SD (6.9±2.7)). Toenails (2-10) ±SD (0.9±2.4).
Dominant hands	45% +ve.

Table 8. Onychoscopic findings of the studied group with lichen planus of the nails.

Dermoscopic findings	No. Total 20	Percentage %
Longitudinal ridging	12	60%
Ragged cuticle	10	50%
Nail plate thinning	10	50%
Red and white lines	8	40%
Onycholysis	6	30%
Splinter haemorrhage	6	30%
SUH	5	25%
Dorsal pterygium	4	20%
Dilated capillaries at onychodermal band	4	20%
Trachyonychia	1	5%
Nail Dystrophy	1	5%

Table 9. Relationship between dermoscopic signs and disease duration in patients with lichen planus of nail.

Dermoscopic signs	Duration ≤ 1 year No. 6	Duration >1year No. 14	Total	P_value
Longitudinal ridging	6	6	12	0.04*
Ragged cuticle	0	10	10	0.01*
Nail plate thinning	0	10	10	0.01*
Red and white lines	4	4	8	0.2
Onycholysis	0	6	6	0.1
Splinter haemorrhage	2	4	6	0.9
SUH	0	5	5	0.3
Dorsal pterygium	0	4	4	0.3
Dilated capillaries at onychodermal band	4	0	4	0.003*
Trachyonychia	0	1	1	0.5
Nail dystrophy	0	1	1	0.5

*** Fischer's exact test is used.**

Table 10. Demographic features of patients with Connective tissue disease.

Demographics of the study group	Results
Number of patients	15 (5 SLE, 6 DM, 4 SCD)
Age (range and mean)	SLE (30-50 years) ±SD (38.4±7.9). DM (2-55 years) ±SD (23±21.3) SCD (13-40 years) ±SD (24±11.7).
Sex (M:F ratio)	♂ 1:6 ♀
Duration of disease (range and mean)	SLE (12-96 months) ±SD (48±30.6). DM (3-48 months) ±SD (28.5±15.4). SCD (6-72 months) ±SD (49.5±29.5).
Number and mean of affected fingers and toes	Fingernails (4-10) ±SD (8.5±2.4). Toenails were not affected.
Dominant hands	no significant involvement.

Table 11. Capillaroscopic findings of the studied group with connective tissue diseases.

Dermoscopic findings	SLE % No.5	SCD % No.4	DM % No.6
Giant capillaries	0 (0%)	1(25%)	4 (66.6%)
Disorganization	0 (0%)	4 (100%)	6 (100%)
Haemorrhage	3 (60%)	1 (25%)	4 (66.6%)
Avascular areas	0 (0%)	4 (100%)	6 (100%)
Tortuous capillaries	5 (100%)	0 (0%)	2 (33.3%)
Ramified capillaries	0 (0%)	2 (50%)	4 (66.6%)
Twisted capillaries	1 (20%)	1 (25%)	2 (33.3%)
Cuticle hypertrophy	4 (80%)	2 (50%)	6 (100%)

Table 12. Nailfold capillary patterns in connective tissue diseases.

Nail capillary pattern	SLE	SCD	DM	P- value
SCD- DM	0 (0%)	3 (75%)	6 (100%)	0.001*
Non specific	3 (60%)	1 (25%)	0 (0%)	0.08 *
Normal	2 (40%)	0 (0%)	0 (0%)	0.2

***Fischer's exact test is used.**

Table 13. Relationship between capillaroscopic signs and disease duration in patients with connective tissue diseases.

Dermoscopic signs	Duration ≤ 1 year No. 3	Duration >1year No. 12	Total	P_value
Giant capillaries	2	3	5	0.2
Disorganization	2	8	10	0.9
Haemorrhage	3	5	8	0.2
Avascular areas	2	8	6	0.9
Tortuous capillaries	1	6	7	0.9
Ramified capillaries	2	4	6	0.5
Twisted capillaries	3	1	4	0.009*
Cuticle hypertrophy	1	11	12	0.08*
SCD-DM pattern	2	7	9	0.9
Non-specific pattern	2	2	4	0.2
Normal pattern	1	1	2	0.4

* Fischer's exact test is used.

Table14. Demographic features of patients with autoimmune bullous dermatoses.

Demographics of the study group	Results
Number of patients	10
Age (range and mean)	(33-90 years) with a mean ±SD (52.1±19.4).
Sex (M:F ratio)	♂ 1:4 ♀
Duration of disease (range and mean)	(1-96 months) with a mean ±SD (36.28±30.1).
Number and mean of affected fingers and toes	Fingernails (2-10) mean ±SD (6.6±2.9). Toenails (0-10) mean ±SD (5.8±4.5).
Dominant hands	80% +ve .

Table 15. Onychoscopic findings of the studied group with autoimmune bullous dermatoses.

Dermoscopic findings	No. Total 10	Percentage %
Beau's lines	10	100%
Onychomadesis	10	100%
Paronychial changes	8	80%
Onychoschizia	6	60%
Nail plate thickening	5	50%
Dilated capillaries at onychodermal band	3	30%

Table 16. Relationship between dermoscopic signs and disease duration in patients with autoimmune bullous dermatoses.

Dermoscopic signs	Duration ≤ 1 year No. 3	Duration >1year No. 7	Total	P_value
Beau's lines	3	7	10	0.9
Onychomadesis	3	7	10	0.9
Paronychial changes	1	7	8	0.07*
Onychoschizia	1	5	6	0.5
Nail plate thickening	0	5	5	0.2
Dilated capillaries at onychodermal band	3	0	3	0.008*

*** Fischer exact test is used.**

Table 17. Demographic features of patients with alopecia areata.

Demographics of the study group	Results
Number of patients	10
Age (range and mean)	(4-34 years) with a mean SD (16.8±11.5).
Sex (M:F ratio)	♂ 1:1 ♀
Duration of disease (range and mean)	(6-120 months) with a mean ±SD (34.8±35.1).
Number and mean of affected fingers and toes	Fingernails (2-10) mean ±SD (4.8±2.2) Toenails were not affected.
Dominant hands	30% +ve .

Table 18. Onychoscopic findings of the studied group with alopecia areata.

Dermoscopic findings	No. Total 10	Percentage %
Scaly cuticle	8	80%
Leukonychia	7	70%
Lateral fold scales	6	60%
Pitting	6	60%
Distal onycholysis	5	50%
Longitudinal ridging	3	30%
Melanonychia	2	20%
Trachyonychia	1	10%

Table 19. Relationship between dermoscopic signs and disease duration in patients with alopecia areata.

Dermoscopic signs	Duration ≤ 1 year No. 4	Duration >1year No. 6	Total	P_value
Scaly cuticle	3	5	8	0.9
Leukonychia	3	4	7	0.8
Lateral fold scales	2	4	6	0.9
Pitting	2	4	6	0.9
Distal onycholysis	2	3	5	0.7
Longitudinal ridging	0	3	3	0.2
Melanonychia	2	0	2	0.1
Trachyonychia	0	1	1	0.9

***Fischer's exact test is used.**