Dermatology Practical & Conceptual

Dermoscopic Features of Acral Palmoplantar Nevi: Age and Site Correlation in a North African Cohort

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ABSTRACT

Introduction: Palmoplantar nevi (PPN) are common and sometimes difficult to diagnose because of their unusual clinical, dermoscopic, and histological features, often mistaken for acral lentiginous melanoma.

Objective: This study aimed to investigate the different dermoscopic patterns of palmoplantar nevi and their correlation with age and location.

Methods: This was a retrospective-prospective cohort study of a sample of the Moroccan population collected over 2 years. The diagnosis was based mainly on clinical and dermoscopic evaluation, and a biopsy performed in a single patient.

Results: A total of 140 patients with 144 PPNs were included in this study. PPNs were more frequently located on the palms (64%) than on the soles (36%). The parallel furrow pattern (PFP) was the most frequent in 44% of patients, followed by the lattice pattern (17,4%), then the homogeneous pattern (16.7%), the fibrillar pattern (10,4%), the compound pattern (7%), the globular pattern (2 %), the dotted pattern (2 %), and finally, the atypical pattern (0.7%). We found a correlation between fibrillar and globular patterns with younger patients (P <0.05) lattice pattern with pressure-free regions such as the arch and palmar region. In contrast, the fibrillar pattern was associated with heels and PFP with digital location.

Conclusion: Recognition of these patterns is crucial for accurate diagnosis and to avoid unnecessary excisions.

Introduction

Acral lentiginous melanoma (ALM) is the most common subtype of melanoma among individuals with darker skin tones [1]. It presents a significant diagnostic challenge in its early stages due to its clinical similarity to palmoplantar naevi [2]. In a Moroccan study analyzing 100 cases of cutaneous melanoma from 2013 to 2022, the ALM subtype was observed in 38% of cases. The lower limb was the most affected site, accounting for 66% of cases, with the sole being the predominant location [3].

The prevalence of melanocytic palmoplantar lesions varies significantly across populations, countries, and study groups, and generally mirrors the prevalence of benign melanocytic palmoplantar lesions, ranging from 36–42% in individuals with darker phototypes to 18–23% in Caucasians [4,5]. Therefore, early screening remains the only viable strategy with the potential to enhance prognosis.

Dermoscopy is a noninvasive clinical method crucial for diagnosing and managing pigmented lesions, particularly advancing the diagnosis of melanocytic lesions on acral volar skin [6]. Most dermoscopic patterns observed in acral volar skin have been studied primarily in European and Asian populations [1,7,8]. In a North African population, an Egyptian study highlighted the value of dermoscopy in acral pigmented lesions by analyzing their characteristic features and emphasizing its role in the early diagnosis of melanoma at this anatomical site [9]. These findings highlight the need for further studies in North African populations to assess potential differences in dermoscopic patterns compared to other regions.

The classic dermoscopic patterns described for plantar nevi include the parallel furrow pattern and its variants, the fibrillar pattern and the lattice pattern [2,6]. However, few studies have examined the correlation between these patterns, their location, and age.

This study aims to describe the dermoscopic patterns of palmoplantar nevi and correlate them with age and location in a sample of the Moroccan population.

Methods

Study Design and Patients

We conducted a retrospective-prospective cohort study involving 144 palmoplantar naevi (PPN) in 140 patients diagnosed in our department. This study included all nevi located below Wallace's line, specifically on the glabrous skin of palms, soles, and the volar skin of the fingers and toes. Lesions in dorsal and subungual areas were excluded from the analysis.

Data collection was carried out using a structured data processing form and recorded in an Excel file. The following parameters were evaluated:

Clinical data: age, sex, Fitzpatrick skin type, and localization (palms, soles, fingers, toes, thenar eminence, hypothenar eminence, central area of the palms, heels, forefeet, and non-pressure areas).

Dermoscopic patterns including:

- Parallel furrow pattern, characterized by brownish linear pigmentation along the sulci of the skin surface markings [7]. Variants include dotted-line and double-line forms, with single solid lines along the sulci representing the fundamental type [8]
- Lattice-like pattern, comprising parallel pigmented lines along the sulci, intersected by perpendicular lines [7].
- Fibrillar pattern, with ensely packed, fine, pigmented lines arranged perpendicular to the skin markings [7].
- Homogenous pattern, with uniform light brown pigmentation without distinct structural features [7].
- Compound pattern, a combination of parallel furrow pattern with globular pattern, or homogeneous and globular patterns, where the dominant pattern is indistinguishable [13] characterized by dots and/or globules arranged in a non-parallel distribution [7].
- Atypical pattern, applied when none of the defined dermoscopic patterns was identified [7].

The sample was divided into age groups: <15 years old, 16 to 30 years old, 31 to 45 years old, and >45 years old.

Diagnosis

The diagnosis was based on clinical and dermoscopic evaluation. Images were captured by a single examiner using Dermlite 4 device with a smartphone in both non-polarized and polarized light modes, with and without immersion. Images were analyzed by two examiners.

Histopathological confirmation was performed in a single patient, with biopsy samples fixed in formalin, embedded in paraffin, and stained with hematoxylin-eosin. An immunohistochemical study was subsequently performed.

Statistical Analysis

Statistical analysis was conducted using SPSS 20.0 software. Descriptive and analytical comparisons of dermoscopic findings were conducted, with fisher's exact test used to determine statistical significance ($P<0.05$).

Results

Patient Analysis

The study included 144 PPN in 140 patients. Half of the patients had phototype IV skin, followed by phototype III (39%), phototype V (10%), and phototype VI (1%).

The average age of the patients was 29.8 years, ranging from 1 to 74 years. The distribution by age group showed that 22% of patients were 0 to15 years old, 31% were 16 to 30 years old, 29% for were 31 to 45 years old, and 18% were older than 45 years.

Clinical and Dermoscopic Features of Nevi

PPN were more frequently located on the palms (64%) than on the soles (36%). The most common anatomical sites were the fingers, followed by non-pressure areas of the soles, the thenar region, the central part of the palms, the hypothenar region, the heels, the forefeet, and the toes (Figure 1). The parallel furrow pattern (PFP) (Figure 2) was the most frequent, observed in 44% of patients. The lattice-like pattern (Figure 3) was the second most common, accounting for 17.4% of cases, followed closely by the homogeneous pattern (16.7%) (Figure 4). The fibrillar pattern (Figure 5) was observed in 10.4% of cases, while the compound pattern (Figure 6) appeared in 7%. Less prequent patterns included the globular pattern (2%), the dotted pattern (2%) (Figure 7), and the atypical pattern (0.7%), which was observed in a single patient. This patient presented with a pigmented lesion exhibiting a parallel ridge and furrow pattern at the periphery and a blue-gray veil at the center;

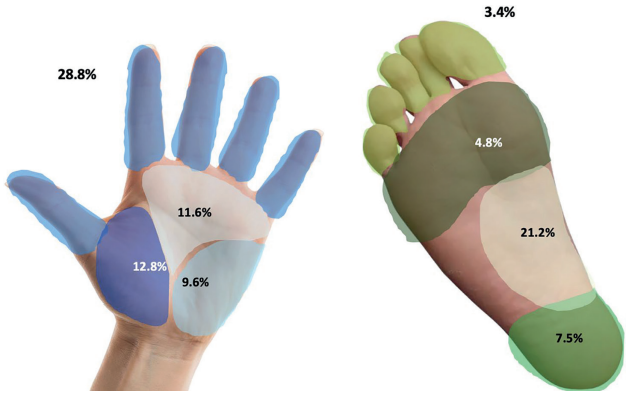

Figure 1. Distribution of palmar and plantar acral nevi.

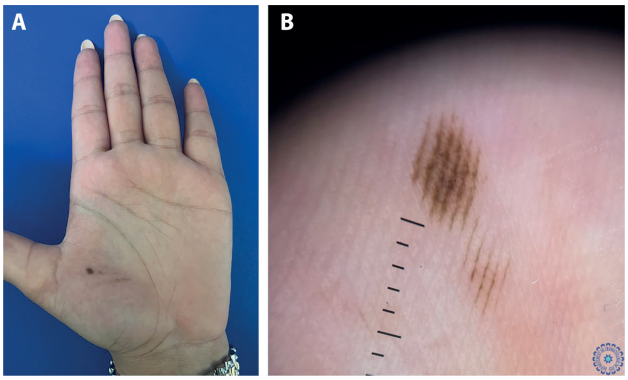

Figure 2. (A) Melanocytic nevus on the palm. (B) Dermoscopy: parallel furrow pattern.

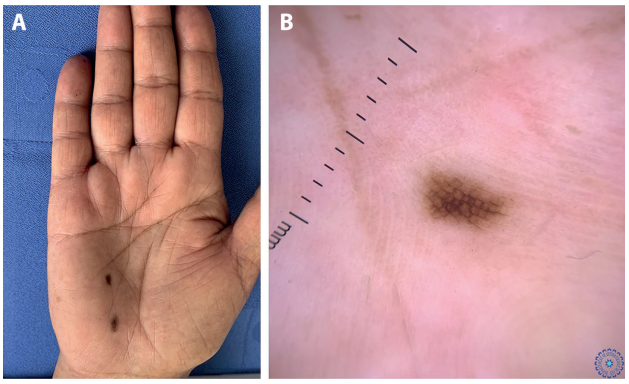

Figure 3. (A) Melanocytic nevus on the palm. (B) Dermoscopy: lattice pattern.

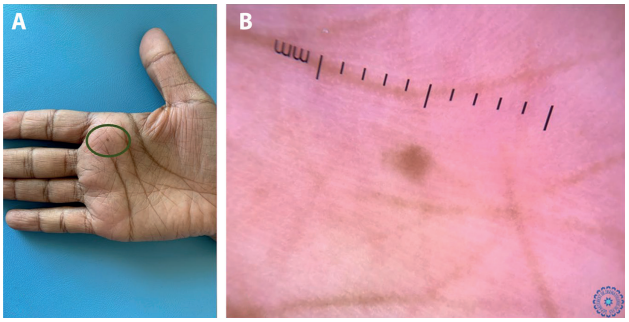

Figure 4. (A) Melanocytic nevus on the palm. (B) Dermoscopy: homogenous pattern.

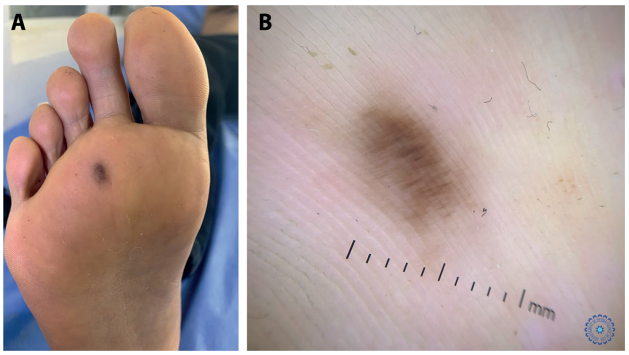

Figure 5. (A) Melanocytic nevus on the palm. (B) Dermoscopy: fibrillar pattern.

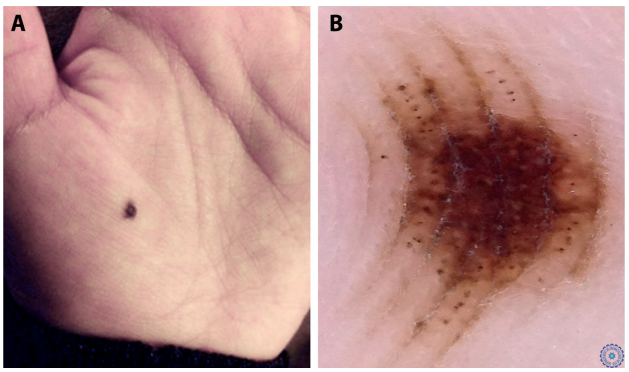

Figure 6. (A) Melanocytic nevus on the palm. (B) Dermoscopy: compound pattern, parallel furrow pattern.

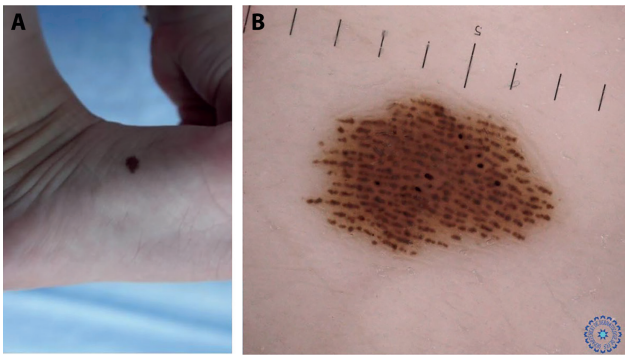

Figure 7. (A) Melanocytic nevus on the palm. (B) Dermoscopy: dotted pattern (peas-in-a-pod pattern).

histopathological examination confirmed the diagnosis of an acral nevus.

Analytical Study

A significant correlation was found between dermoscopic patterns and age. The fibrillar and compound patterns were more prevalent among younger individuals (Table 1). Additionally, specific dermoscopic patterns were associated with particular anatomical sites. The lattice-like pattern was most commonly observed in non-weight-bearing areas such as the foot arch and the palmar region, whereas the fibrillar pattern was more frequently found on the plantar surface, particularly on the heels. The PFP was predominantly associated with the digital location (Table 2).

Discussion

In Morocco, skin melanoma ranked as the 25th most common cancer, with 248 new cases in 2020, accounting for 0.42% of all new cancer cases, and 114 deaths (0.32%) [11]. Among melanoma subtypes, ALM was identified as one of the most frequent in a Moroccan study [3]. The prognosis for ALM is generally poor, primarily due to delayed diagnosis at advanced stages [12]. Therefore, early and accurate diagnosis, along with appropriate treatment, are crucial to improving patient outcomes.

Dermoscopy, a noninvasive imaging technique, has proved highly effective in differenciating early acral melanoma from acral nevi [12]. Most acquired acral nevi are junctional or compound nevi with a dominant junctional component, typically appearing as a brown-black macule, creating diagnostic challenges for clinicians [12]. Palmoplantar skin has distinct anatomical and histological characteristics, featuring a thick, compact cornified layer and dermatoglyphics composed of parallel ridges and furrows forming unique loops, whorls, and arches[1,9]. Consequently, the interpretation of dermoscopic patterns in this specific anatomical site is relatively easy to assess [9].

Saida et al. were the first to describe specific dermoscopic patterns of acral nevi in the Asian population and proposed a three-step algorithm for managing acquired acral melanocytic lesions [1,2,7,12]. The prevalence of acral nevi in the Japanese population is estimated to be 7–9% [7], but this prevalence remains unknown in Morocco. Given the frequency of acral melanomas, recognizing dermoscopic patterns of pigmented lesions in palmoplantar skin is essential to early detection.

The primary objective of this study was to examine the dermoscopic characteristics of melanocytic acral nevi in the Moroccan population. In our sample, the parallel furrow pattern was the most common, observed in 44% of cases, which aligns with the literature reports. The prevalence of this pattern in other reports ranges from between 42% and 59%, depending on the population studied [7,13-15]. The second most frequent pattern in our series was the lattice-like pattern, detected in 17.4% of lesions, a finding consistent with Egyptian and Italian studies [13,9,14]. The reported prevalence of this pattern varies from 7% to 22% [7], but it was found to be uncommon in two Turkish studies [6,15].

In our study, the homogeneous pattern (16.7%) was more frequently observed than the fibrillar pattern (10.4%), a result that aligns with Egyptian and Latin American studies [9,14], but contrasts with Italian and Turkish studies, where the fibrillar pattern was more presominant [13,15]. Interestingly, the homogeneous pattern appeared to be more frequent in our population compared to Japan [1]. The remaining dermoscopic patterns were observed less frequently, a finding consistent with studies from various countries [1,13,9,14,15]. (Table 3).

Saida et al. [7] raised an important question regarding the variation in dermoscopic patterns of acral nevi—whether these differences arise from **ethnic factors** or **variability in interpretation**, given that a single nevus can exhibit multiple patterns, with the dominant one typically being reported. However, based on these findings, it is believed that ethnic differences play a more significant role, as our results closely resemble those from Egyptian and Latin American studies.

The second objective of our study was to explore the correlation between the dermoscopic patterns of acral nevi observed in our sample with age and location. Our analysis revealed a statistically significant association between pattern types and age, with fibrillar and compound patterns being more frequent in younger individuals. The compound pattern refers to a combination of two superimposed patterns, where the dominant pattern is unclear, but globules are consistently present. This pattern was commonly observed in patients under age 15. Our findings align with those of Mingawa et al., who reported that fibrillar and peas-in-a-pod patterns were more prevalent in younger individuals [16]. However, their study also reported an association between age and atypical patterns, which were more frequently observed in older patients. In contrast, in our study, an atypical

Table 1. Correlation between age and dermoscopic patterns of nevi.

Age	PFP	Fibrillar	Lattice	Homogenous	Compound	Dotted	Globular	Atypical'
< 15 y	12	8	5	2	6	1	1	0
16–30 y	23	2	8	7	2	0	1	0
31–45 y	20	3	5	8	1	1	1	0
> 45 y	8	2	7	7	1	1	0	1
P value	.173	**.004**	.504	.056	**.026**	.679	.853	.406

Abbreviations: PFP: parallel furrow pattern; y: years.

Table 2. Correlation between nevus location and dermoscopic patterns.

	PFP	Fibrillar	Lattice	Homogenous	Compound	Dotted	Globular	Atypical
Palms								
Thenar eminence	10	1	4	1	2	0	1	0
Hypothenar eminence	5	1	5	1	1	0	0	0
Fingers	**22**	3	5	6	1	0	1	0
Central area	7	0	3	4	3	0	1	0
Soles								
Heels	0	**6**	0	2	2	1	0	0
Forefeet	1	**4**	0	1	1	0	0	0
Toes	3	0	0	2	0	0	0	0
Non-pression	15	0	**8**	7	0	2	0	1
p-value	**.031**	**<.001**	**.049**	.539	.233	.477	.409	.475

Abbreviations: PFP: parallel furrow pattern.

Table 3. Comparison of dermoscopic features of acral nevi across various countries.

	Our Study Morocco, N (%)	Emiroglu et al [3](Turkey), N (%)	Ozdemir et al [13] (Turkey), N (%)	Elwan et al [10] (Egypt), N (%)	Barquet et al [11] (Uruguay), N (%)	Altamura et al [12] (Italy), N (%)	Saida et al [1] (Japan), N (%)
Parallel furrow	63 (44)	87 (41)	110 (59)	148 (66)	81 (51)	304 (42)	40 (42)
Lattice	25 (17.4)	15 (7)	12 (6)	20 (9)	21 (13)	108 (15)	13 (13)
Fibrillar	15 (10.4)	22 (11)	23 (12)	14 (6)	11 (7)	78 (11)	20 (21)
Parallel ridge	NE	4 (2)	NE	5 (2)	NE	NE	NE
Globular	3 (2)	24 (11)	4 (2)	4 (2)	15 (10)	15 (2)	5 (5)
Reticular	NE	2 (1)	8 (4)	4 (2)	NE	39 (5)	3 (3)
Homogeneous	24 (16.7)	12 (6)	12 (6)	17 (8)	20 (13)	67 (9)	8 (2)
Globular streak-like	NE	16 (8)	10 (5)	NE	6 (4)	NE	NE
Nontypical	1 (0.7)	8 (4)	6 (3)	12 (5)	4 (3)	99 (14)	14 (14)
Compound	10 (7)	NE	NE	NE	NE	NE	NE

pattern was noted in only one patient, whose biopsy confirmed a benign acral nevus diagnosis.

A recent European study, conducted across 21 dermatology centers in 14 countries, analyzed 542 atypical melanocytic palmoplantar lesions, including 113 melanomas and 429 atypical nevi. The study revealed a trend toward using cameras for documenting benign atypical melanocytic palmoplantar lesions, whereas videodermatoscopes were primarily used for malignant cases [17]. The authors concluded that, in patients over age 50 years, an atypical melanocytic palmoplantar lesion exceeding 8 mm on the heel, plantar arch, or fingers carries a high risk of melanoma, regardless of sex. Furthermore, for patients over age 65.3 years with a palpable lesion larger than 17 mm, immediate wide-margin

excision is recommended. Conversely, in patients under age 49, a flat lesion measuring less than 7 mm on the palmar or plantar surfaces is likely benign [17].

Similarly, Emiroglu et al. [6] found a significant association between age and dermoscopic patterns, reporting that atypical patterns were seen in 28.6% of the elderly patients (>60 years old). In the pediatric population (0–15 years old), parallel furrow (dotted variants) and globulo-streak-like patterns were predominant. The higher presence of globules in children suggests ongoing nevus growth. Zalaudek et al. [10] Similarly demonstrated that the globular pattern was most frequent in younger individuals when studying acquired melanocytic nevi on the trunk and extremities, excluding the palms and soles. Our findings also align with a Turkish study on the dermoscopic features of acral nevi in children and adolescents [10]. In this study, dotted variants of the parallel furrow pattern were more common in children aged 0–12 years (58.2%) compared to adolescents aged 13–18 years (41.7%). Additionally, compound patterns, particularly the parallel furrow + crista dotted pattern, were significantly more prevalent in the younger group (22.1% and 16.3%, respectively) compared to the older group (11.4% and 6%, respectively). The fibrillar pattern was most frequently observed in congenital acral melanocytic nevi.

Regarding the anatomic location, we observed that the lattice-like pattern was predominantly found in non-weight-bearing areas such as the foot arch and the palmar region, whereas the fibrillar pattern was more frequent on the plantar surface, particularly on the heels ($P< 0.001$). These results are consistent with findings of Emiroglu et al. [6] and Miyazaki et al. [18] Miyazaki reported that the fibrillar pattern results from an oblique arrangement of melanin pigment within the inclined cornified layer, which is thought to be induced by mechanical pressure from body weight [18]. However, our findings differ from those of Elwan et al., who did not observe the fibrillar pattern on the soles, but reported its presence on the palms in eight cases. They attributed this to the occupational habits of their patients, primarily housewives and farmers, who wore flat shoes and engaged in manual labor. They proposed that the fibrillar pattern on the hands may arise from lateral shear forces on the stratum corneum overlying the nevi due to repetitive manual work.

According to a multicenter study analyzing the characteristics of benign and malignant atypical melanocytic palmoplantar lesions (aMPPL), early-stage melanomas (EMs) and palmoplantar atypical melanocytic lesions were most frequently located on the heel (40.3% of EM/aMPPL cases) and fingers (33% of EM/aMPPL cases), areas characterized by chronic trauma and friction [19].

We also observed that the PFP was significantly associated with digital locations, a result also reported by Savas Erdoğan et al. [10] and González-Ramírez et al. [20] However, González-Ramírez et al. found no statistically significant difference ($P>0.05$) in the classification of lesions on the soles. In contrast, Altamura et al. observed that lattice-like, atypical, fibrillar, and homogeneous patterns were most frequent on the soles, while transition patterns, comprising features characteristic of both volar and non-glabrous skin, were more commonly observed in lesions located on the fingers [13].

Despite its valuable findings, our study has some limitations. First, it was conducted at a single center with a limited sample size, and all the participants belonged to a single ethnic group. Additionally, we lacked long-term follow-up data, preventing us from assessing the evolution of dermoscopic patterns over time.

Conclusion

Dermoscopy is a highly useful tool for distinguishing acral nevi from ALM. The interpretation of dermoscopic patterns should take into consideration the anatomical location on the plantar surface as well as the patient's age.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki.

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