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Study of Clinico-Epidemiology & Dermatoscopic Patterns of Palmoplantar Keratodermas

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HIGHLIGHTS

- Acquired PPKs predominated
- Psoriasis was most common
- Palms and soles commonly involved
- Dermoscopy revealed characteristic patterns
- Pits and plugs aided diagnosis

Key Words:

Palmoplantar keratoderma
Dermoscopy
Psoriasis
Eczema
Hereditary PPK

ABSTRACT

Introduction: Palmoplantar keratoderms (PPKs) are a heterogeneous group of disorders characterized by persistent hyperkeratosis of the palms and soles. Clinical overlap among hereditary and acquired forms can make diagnosis difficult, while dermoscopy offers a useful non-invasive method for identifying characteristic morphological patterns. **Aim & Objective:** To evaluate the clinico-epidemiological profile of patients with palmoplantar keratoderms and to identify and document their dermatoscopic patterns. **Materials & Methods:** This prospective cross-sectional observational study was conducted in our Dermatology outpatient Department, from January 2024 to December 2025. Ninety-three clinically diagnosed patients were included by convenient sampling. Detailed demographic and clinical evaluation was performed, followed by dermoscopy using an IDS-1100™ dermatoscope in polarized and non-polarized modes. **Results:** The mean age was 33.48 ± 14.71 years, with maximum cases in the 21–30-year group (29.03%). Males constituted 62.4% of patients, and 52.7% were urban residents. Acquired PPK was predominant (87.10%), while hereditary PPK accounted for 12.90%. Both palms and soles were involved in 62.37%, and lesion duration was commonly 6 months to 1 year (32.26%). Palmoplantar psoriasis (33.33%) was the commonest acquired cause, followed by eczema (27.96%). Dermoscopy most commonly showed a light red-yellow background (59.1%), diffuse white scales (55.9%), regular linear vessels (18.3%), patchy glomerular vessels (17.2%), white keratin plugs (15.1%), and yellow crusts (14.0%). Pits were characteristic of punctate PPK, while keratin plugs were prominent in Verner's syndrome. **Conclusion:** Acquired PPKs, particularly psoriasis and eczema, predominated in this cohort. Dermoscopy provided useful diagnostic clues and complemented clinical evaluation in differentiating acquired and hereditary PPKs.



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INTRODUCTION

A diverse classification of conditions known as palmoplantar keratodermas (PPKs) are characterized by abnormal and persistent thickening of the stratum corneum over the palms and soles [1]. Skin on the palm and sole is different from skin elsewhere because of the presence of prominent dermatoglyphics, high density of eccrine sweat glands, absence of pilosebaceous units and specialized keratin expression. The palms and soles are able to withstand repeated friction and pressure because of these features [2]. Alterations in epithelial cell differentiation, keratinization, adhesion or barrier function may lead to an excess production of keratin and clinically observable hyperkeratosis [3]. PPK can occur as a standalone dermatosis and a feature of broader cutaneous or systemic diseases, making accurate recognition important for diagnosis and management [4].

PPKs may be classified broadly into hereditary and acquired. Palmoplantar keratodermas are genetically heterogeneous disorders occurring most commonly in infancy, childhood or adolescence, although age of presentation is subtype dependent [5]. Based on hyperkeratosis morphology and distribution the hereditary PPKs are traditionally classified into diffuse, focal or striate, and punctate or papular [6]. Diffuse PPK exhibits more uniform thickening that involves most of the palmar and plantar surfaces [7]. Pressure-bearing areas or focal forms are mainly seen in striate forms. Multiple discrete keratotic papules characterize punctate PPK [2].

The level of involvement supplies further diagnostic information. A subset of patients exhibits hyperkeratosis restricted to the palms and soles, while others display involvement of the back of the hands and feet, referred to as transgrediens [8]. Progrediens refer to the progressive worsening with age. Hereditary PPK may appear as an isolated variant or a complex or syndromic form with changes in the nails, hair, teeth, mucosa, hearing, cardiovascular system, or other organs [9]. Certain types can be associated with complications, such as cardiomyopathy or hearing loss. Having recognition of these associated findings is important because palmoplantar lesions may herald an underlying multisystem disorder [2].

Considerable genetic heterogeneity underlies hereditary PPK [10]. Mutations affecting keratins, desmosomal proteins, gap-junction proteins, proteases, protease inhibitors and other molecules involved in epidermal differentiation and mechanical stability, have been implicated in different forms [11]. Advances in molecular genetics have shown that different genetic abnormalities can result in similar clinical phenotypes, while a single genetic defect can lead to different manifestations [12]. Consequently, clinical phenotyping remains important, even when molecular testing is available [6]. According to the abbreviation, the investigator tries to look for age at inception, progression, family history, consanguinity, morphology and distribution of lesions, appendageal changes, and extracutaneous abnormalities [4].

Acquired palmoplantar keratoderma is another important group which may develop secondary to inflammatory dermatoses, infections, drug, systemic disease, nutritional abnormalities, chemicals, and malignancy [7]. Nodular prurigo, papular urticaria, palmoplantar eczema, and lichen planus may lead to prominent palmoplantar itchiness and scabbing [13]. Acquired PPK can therefore resemble hereditary keratoderma clinically [14]. Differentiation between the two groups is crucial as they differ substantially with respect to investigations, prognosis, treatment, need for systemic evaluation and genetic counselling [15]. In acquired cases, we must pay particular attention to the occupational history, drug exposure, associated systemic disease, and development time relationship with lesions. The history of the patient's drug use is also important for the diagnosis of PPK [16].

The painful fissures, tenderness, hyperhidrosis, maceration, malodour, recurrent infections and functional limitations affecting walking, gripping, writing and other activities of daily living may occur. Quality of life is reduced accordingly [17]. The clinico-epidemiological assessment should document age at onset, duration, family history, site of occurrence, morphology, associated cutaneous or systemic findings, occupation, environmental exposures, and precipitating factors. Such evaluation can help determine severity of the disease, characterize local patterns, find hereditary or occupational associations, set management priorities, and improve overall patient care in the studied population [18].

Dermoscopy is a useful non-invasive diagnostic technique that allows magnified visualization of epidermal and superficial dermal structures not clearly appreciated with the naked eye. Dermoscopy of palmoplantar conditions, despite a lot of clinical overlap between hyperkeratotic conditions, may show differences in background colour, patterns of scaling, keratotic structures, fissures, dermatoglyphics, dots, globules, and vascular morphology. These findings can help limit the differential diagnosis and complement your clinical examination. Research on hyperkeratotic palmoplantar lesions has shown that dermoscopy can distinguish between psoriasis, eczema, dermatophytosis and acquired keratoderma; may be a useful link between clinical morphology and histopathology [19].

The lack of dermoscopic data and the significant clinical overlap of palmoplantar keratodermas necessitate a systematic clinico-epidemiological and dermoscopy assessment. If we correlate clinical morphology with dermoscopic patterns, it could lead to accurate diagnosis and classification and differ the similar disorders. Moreover, we could recognize the associated manifestations with the help of this correlation. The combined strategy can facilitate the right investigations, advise patients, plan therapy, and manage properly in the long run improving the diagnostic accuracy and overall clinical outcomes [19].

The aim of the study is to evaluate the clinico-epidemiological profile & dermoscopic patterns of palmoplantar keratodermas. The objectives are to assess the clinical and epidemiological

characteristics of patients with palmoplantar keratodermas and to identify and document the various dermatoscopic patterns observed in these patients, thereby improving the characterization and diagnostic understanding of this diverse group of disorders.

MATERIAL & METHODS

This study was conducted at our Dermatology outpatient Department between the period of Jan 2024 to Dec 2025. A total of 93 patients clinically diagnosed with palmoplantar keratodermas were included using convenient sampling. Patients who did not wish to participate were excluded. A thorough account was taken of the demographic and clinical histories, the general, systemic, and cutaneous examinations. We used IDS-1100™ dermatoscope with polarized & non-polarized mode to perform dermatoscopy of the lesions and take representative photographs. Approval for the project was obtained from the Institutional Ethic Committee and written consent was taken from all.

RESULTS

Patients aged 21–30 years recorded the most frequent case of palmoplantar keratoderma (29.03%). Subsequently, it was also recorded more frequently among the age group of 31–40 years (26.88%). The average age was 33.48 ± 14.71 years and there was gradual decline in the number of patients in the older age groups with only 3.23% aged >60 years. Of the study population, 62.4% were males while 37.6% were females, showing a distinct male predominance.

The results show that the PPK population studied is mostly made up of younger to middle aged, which is also male at a greater number. The 52.7% of patients with palmoplantar keratoderma were from urban areas while 47.3% were from rural areas according to residency profile. It means that the study population was slightly more on the urban side. Nevertheless, the insignificant difference between the two groups indicates that PPK is represented in both urban and rural areas. Residence did not show a significant imbalance which means that the patients were reasonably comparable on this front (**Table 1**).

The occupational profile indicated that the largest proportion of patients with palmoplantar keratoderma were students (34.41%), followed by housewives (22.58%). The manual labour and agricultural work, each accounting for 15.05 percent of cases. One or more office/desk work accounted for 8.60 percent of cases. Only construction workers and other jobs were 1.08% and 3.23% upto October 2023. In general, PPK was seen to be more prevalent among students and people engaged in household or physically heavy work (**Figure 1**).

According to the clinical classification of cases, 87.10% were acquired palmoplantar keratoderma and hereditary palmoplantar keratoderma made up only 12.90%. The predominance of acquired cases indicates that secondary or non genetic forms were much more common in our population. The relatively low

frequency of hereditary PPK suggests that inherited forms represented only a small fraction of the total disease burden. The results indicate that acquired PPK was the most important clinical type of the evaluated patients **Table 2**. As indicated, majority patients, that is 62.37% had both palms and soles involvement and thus, palmoplantar involvement was the most common. Thirty point eleven percent of patients had isolated palmar involvement while, seven point fifty-three percent had lesions limited to the soles. Thus, both anatomic sites involvement was clearly more frequent than disease at only one. The results suggest that palmoplantar keratoderma usually affects the palm and sole together (**Figure 2**).

Among all patients, the delay between the onset of lesions to consult the doctor showed that the maximum number of patients developed their lesions 6 months to 1-year prior (32.26%). Long-standing, more than 5-year lesions were present in 17.20% of patients, indicating a significant number of patients having chronic disease. 11.83% had a duration of lesser than 6 months while 12.90% did not remember the duration. The palmoplantar keratoderma in the studied population mainly had a persistent or chronic clinical course (**Table 3**).

The data indicate that among the causes of acquired palmoplantar keratoderma, the most frequent diagnosis was palmoplantar psoriasis (33.33%); eczema (27.96%). Tinea manuum was responsible for 8.60% of cases, while Reiter's disease, pityriasis rubra pilaris, lichen planus, warts, secondary syphilis, and Hansen's disease were infrequent causes. Among all the hereditary types, punctate PPK was the most common type (6.45%), followed by striate PPK, linear and striate PPK and Vörner's syndrome (2.15% each). The results indicate that acquired PPK, especially psoriasis and eczema, were far more prevalent than hereditary types. The latter were a smaller proportion (**Table 4**). Dermoscopy revealed that the most common background pattern in 59.1% of cases was light red with yellow followed by 55.9% diffuse whitish scaling. The most common type of vascular pattern was regular linear vessels by 18.3%. Patchy glomerular vessels was 17.2%. The most common additional findings were white keratin plugs (15.1%) and yellow crusts (14.0%). As a whole, PPK displayed different dermoscopy pattern like background colour, scales, vascular pattern and keratinization **Figure 3 (a-d)**.

Most common background pattern on both palms (38.5%) and soles (42.9%) of light red with yellow in palmoplantar eczema. Most occurred in patchy white with yellow scales, while dot-patchy vessels were more frequent on soles (35.7%) than palms (11.5%). The soles were the only parts that showed yellow crusts (14.3%). Orange dots were rare. In conclusion, there was no meaningful difference in dermoscopic patterns (**Table 5**). In hereditary PPKs, all subtypes had a light red background in 50% cases. Diffuse white scales were predominant with 100% in striate PPK and Vörner's syndrome. There were dotted irregular, glomerular patchy, and linear regular vessels found in different

subtypes. White keratin plugs were most notable in Verner's syndrome (100%), while depressions/pits were mostly observed

in punctate PPK (66.7%). Dermoscopic patterns differed between hereditary PPK subtypes but none of the variations were statistically significant (all $p > 0.05$) **Figure 4 (a-d).**

Table 1: Residence profile of patients

S. No.	Residence	No. of Patients	Percentage
1.	Urban	49	52.7
2.	Rural	44	47.3
	Total	93	100

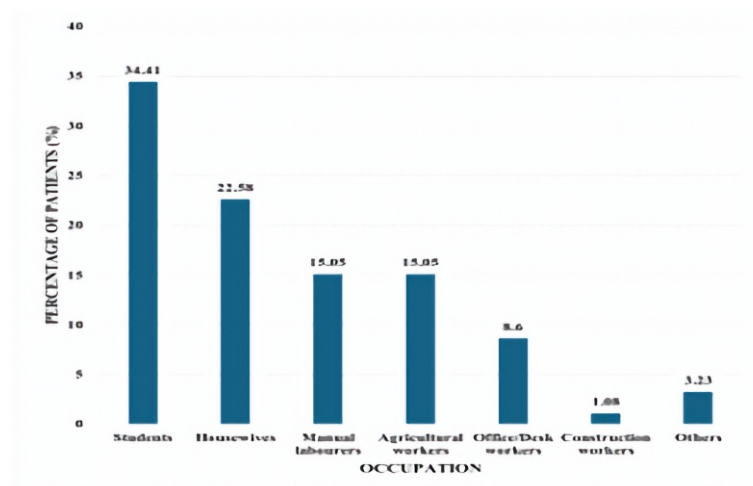


Figure 1: Occupation profile of patients

Table 2: Clinical classification

S. No.	Type of PPK	No. of patients	Percentage
1.	Acquired	81	87.10
2.	Hereditary	12	12.90
	Total	93	100

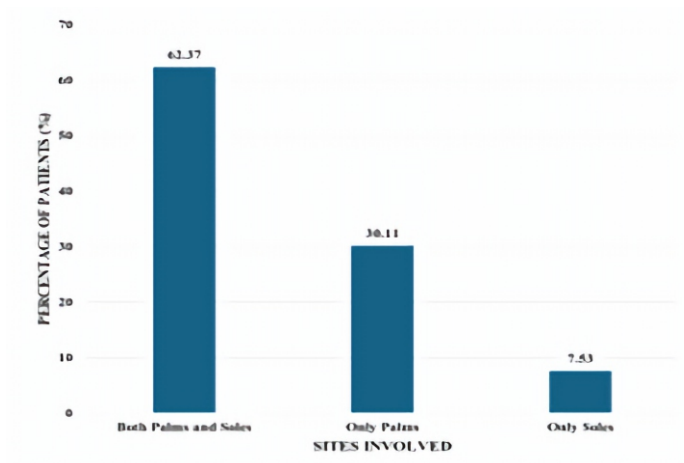


Figure 2: Sites involved

Table 3: Duration of lesions

S. No.	Duration	No. of Patients	Percentage
1.	6 months – 1 year	30	32.26
2.	1–5 years	24	25.81
3.	>5 years	16	17.2
4.	Unknown/not recalled	12	12.9
5.	<6 months	11	11.83
	Total	93	100

Table 4: Causes of acquired ppk

S. No.	Diagnosis	No. of patients	Percentage
Acquired palmoplantar keratoderms (n=81)			
1.	Palmoplantar psoriasis	31	33.33
2.	Eczema	26	27.96
3.	Tinea manuum	8	8.60
4.	Reiter's disease	4	4.30
5.	Pityriasis rubra pilaris	3	3.23
6.	Lichen planus	3	3.23
7.	Warts	3	3.23
8.	Secondary syphilis	2	2.15
9.	Hansen's disease	1	1.08
Hereditary palmoplantar keratoderms (n=12)			
1.	Punctate PPK	6	6.45
2.	Striate PPK	2	2.15
3.	Linear & Striate PPK	2	2.15
4.	Vorner's syndrome	2	2.15
Total		93	100

Table 5: Dermatoscopic Patterns in Eczema Palmoplantar eczema: Palms n=26, Soles n=14

S. No.	Dermoscopy finding	Palms n=26 (%)	Soles n=14 (%)	p-value
Background Patterns				
1.	Light red + yellow	10 (38.5)	6 (42.9)	0.97
2.	Yellow	7 (26.9)	4 (28.6)	
3.	Light red	6 (23.1)	3 (21.4)	
4.	Dull red	3 (11.5)	1 (7.1)	
Scales Patterns				
1.	Diffuse white + yellow	1 (3.8)	2 (14.3)	0.78
2.	Patchy white + yellow	6 (23.1)	4 (28.6)	
3.	Patchy white	4 (15.4)	1 (7.1)	
4.	Patchy yellow	3 (11.5)	2 (14.3)	
5.	Diffuse white	3 (11.5)	2 (14.3)	
6.	Diffuse yellow	2 (7.7)	3 (21.4)	
7.	Peripheral white	1 (3.8)	0 (0.0)	
Vascular Patterns				
1.	Dot - Patchy	3 (11.5)	5 (35.7)	0.91
2.	Dot - Undifferentiated	2 (7.7)	2 (14.3)	
3.	Glomerular - Regular	2 (7.7)	1 (7.1)	
4.	Glomerular - Patchy	1 (3.8)	2 (14.3)	
5.	Linear - Regular	1 (3.8)	1 (7.1)	
6.	Linear - Undifferentiated	1 (3.8)	0 (0.0)	
7.	Linear - Patchy	1 (3.8)	1 (7.1)	
8.	Dot - Regular	1 (3.8)	1 (7.1)	
9.	Dot - Irregular	0 (0.0)	1 (7.1)	
10.	Glomerular - Undifferentiated	0 (0.0)	1 (7.1)	
Other Features				
1.	Yellow crusts	0 (0.0)	2 (14.3)	0.22
2.	Hemorrhagic crust	0 (0.0)	1 (7.1)	0.75
3.	Yellowish orange areas	0 (0.0)	1 (7.1)	0.75
4.	Orange dots	1 (3.8)	0 (0.0)	1.00

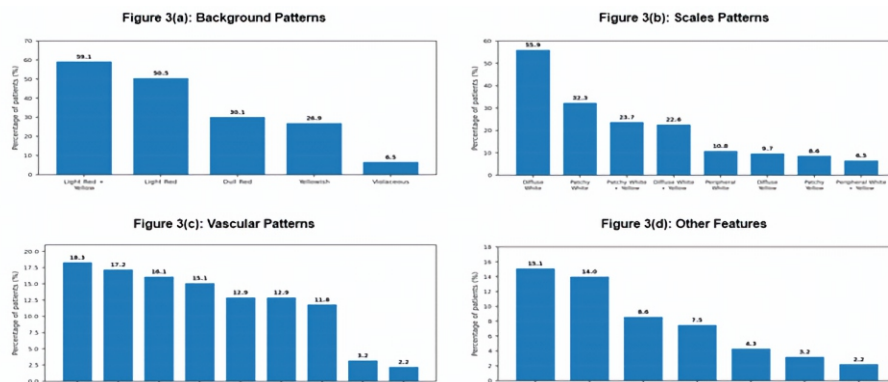


Figure 3 (a-d): Dermoscopic Analysis of Palmoplantar Keratoderms (n=93)

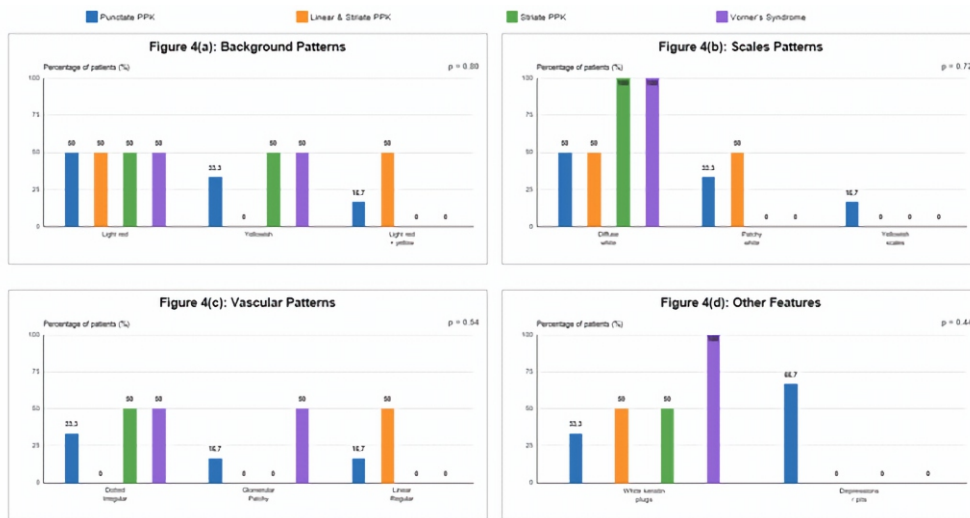


Figure 4 (a-d): Dermatoscopic Patterns in Hereditary PPKs (n=12)

DISCUSSION

In 93 Patients; Clinico Epidemiological and Dermatoscopic Study of Palmoplantar Keratoderms (PPKs). The average age was 33.48 ± 14.71 years, with the most people (29.0%) from the 21–30-year age category. The second-highest was 31–40 years (26.9%). Rajeendran et al. [20] reported a similar age range of 4–75 years with a mean age of 39.5 years. The study included males predominantly accounting for 62.4 % of patients. This is similar to that of Rajeendran et al. [20]. According to Sen et al. [21], the majority of patients living in rural areas was 52.7% and 47.3% in urban areas. The biggest occupational class was students (34.41%) followed by housewife (22.58%). Nair et al. [22] also reported a sizeable representation of housewife, labourer and student. Eighty-seven point ten percent of cases of PPKs were acquired. Twelve point ninety percent of cases of PPKs were hereditary. This is similar to the study by Rajeendran et al. [20] on the acquired and hereditary PPKs in Indian patients. In the study, Sen et al. [21] found that palmoplantar involvement occurred in 63% of the patients. Similarly, in our study involvement of both palms and soles occurred in 62.37% of the patients. The most common duration was of 6 months to 1 year in 32.26% cases. Followed by 1–5 years duration in 25.81% of cases. These results were similar to study of Nair et al. [22] as the disease had a chronic course. Among acquired palmoplantar keratoderms, the commonest diagnosis made was palmoplantar psoriasis (33.33%), followed by eczema (27.96%) and tinea manuum (8.60%). Patients were also found to have palmoplantar psoriasis in 40% and chronic hand-foot eczema in 31% of cases. The most common background pattern seen by dermoscopy was a light red-yellow background (59.1%) and diffuse white scaling was the most common scale pattern (55.9%). The most common vascular findings were regular linear vessels (18.3%), patchy glomerular vessels (17.2%) and regular dotted vessels (16.1%). The additional properties included white keratin plugs (15.1%),

were generally comparable with those of Rajeendran et al. [20], who reported a light red-yellow background, white scaling and dotted, linear or glomerular vessels. No significant differences between background, scaling, vascular or ancillary features of palmar and plantar sites were noted.

In palmoplantar psoriasis, we observed a predominance of light red-yellow background and diffuse white scales. In comparison, in eczema there was a more common light red-yellow or yellow background, patchy white-yellow scaling and patchy dotted vessels. Similar dermatoscopic patterns of psoriasis and eczema were reported by Rajeendran et al. Among hereditary PPKs, punctate [20]. PPK had depressions or pits in 66.7%. Diffuse white scales were prominent in striate PPK and Verner's syndrome while white keratin plugs were seen in all Verner's syndrome cases. Notably, dermatoscopic background features, scaling, vascular and other features were statistically similar between palms and soles. The notable characteristics exhibited by hereditary subtypes are capable of supplying important diagnostic clues though the differences were not statistically significant between them. A dermoscopy is likely to provide hints that aid in clinicodermoscopic correlation for the differential diagnosis of the PPKs that are acquired and hereditary.

CONCLUSION

The current study shows that palmoplantar keratoderms belong to a heterogeneous group. Furthermore, the acquired forms predominate in this group especially palmo-plantar psoriasis and eczema. Dermoscopy was a useful non-invasive aid in the identification of the character background colour, scaling, vascular and other features in different PPKs. While the dermatoscopic parameters obtained from palmar and plantar sites did not show a significant difference, the dermatoscopic findings obtained in pitted punctate PPK and Verner's syndrome showed useful diagnostic clues. Accordingly, the diagnostic characterization useful of dermoscopy and careful clinico-epidemiology assessment can help in its differentiation.

LIMITATIONS & FUTURE PERSPECTIVES

The study's limitations include a single-centre setting, a relatively small sample size, and a short study duration, which may limit the broader applicability of the results. Future studies should incorporate multi-centre designs with larger populations to enhance validity, assess long-term outcomes, and investigate advanced diagnostic & management approaches. Such efforts will improve overall patient care & help minimize complications.

CLINICAL SIGNIFICANCE

The clinical significance of this study lies in its potential to bridge the gap between research findings and practical health-care applications. It emphasizes the importance of translating scientific observations into meaningful improvements in patient care, diagnosis, and treatment outcomes. By highlighting real world relevance, the study contributes to evidence based medical practice and supports informed clinical decision making. Ultimately, the findings aim to enhance patient quality of life, optimize therapeutic strategies, and promote better disease management in clinical settings.

ABBREVIATIONS

PPK: Palmoplantar Keratoderma

IDS: Illuco Dermatoscope System

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AUTHOR CONTRIBUTIONS

All authors significantly contributed to the study conception and design, data acquisition, or data analysis and interpretation. They participated in drafting the manuscript or critically revising it for important intellectual content, consented to its submission to the current journal, provided final approval for the version to be published, and accepted responsibility for all aspects of the work. Additionally, all authors meet the authorship criteria outlined by the International Committee of Medical Journal Editors (ICMJE) guidelines

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CONFLICT OF INTEREST

Authors declared that there is no conflict of interest.

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ETHICAL APPROVAL & CONSENT TO PARTICIPATE

All necessary consent & approval was obtained by authors.

CONSENT FOR PUBLICATION

All necessary consent for publication was obtained by authors.

DATA AVAILABILITY

All data generated and analyzed are included within this research article. The datasets utilized and/or analyzed in this study can be obtained from the corresponding author upon a reasonable request.

USE OF ARTIFICIAL INTELLIGENCE (AI) & LARGE LANGUAGE MODEL (LLM)

The authors confirm that no AI & LLM tools were used in the writing or editing of the manuscript, and no images were altered or manipulated using AI & LLM.

AUTHOR'S NOTE

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