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**Original Research Article**

# Study on clinical, histopathological and dermoscopic features of palmoplantar pustulosis and palmoplantar psoriasis with pustules

**Neethu M. George[1]*, Prabhakar M. Sangolli[2], Rosamma Thomas[3], Jerry R. John[4]**

[1]Consultant Dermatologist, Marsleeva Medicity, Pala. Kerala, India
[2]Sri Siddhartha College of Medical Sciences and Research Centre, T Begur, Bangalore, Karnataka, India
[3]Pathologist and Director of Laboratory Medicine, Marsleeva Medicity, Pala, Kerala, India
[4]Department of Community Medicine, Al Azhar Medical College and Super Speciality Hospital, Kerala, India

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***Correspondence:**
Dr. Neethu M. George,
E-mail: neets.1x@gmail.com



## ABSTRACT

**Background:** Palmo-plantar pustulosis (PPP) and palmoplantar psoriasis with pustules (PPso)/Palmoplantar pustular psoriasis are entities that present with chronic cyclical eruptions of vesicles and pustules of palms and soles, which were initially considered to be similar but was defined as separate entities by the international psoriasis council in 2007. Individuals with PPP are at increased risk of psoriasis vulgaris, psoriatic arthritis, autoimmune thyroid disease and 90% of pustulosis patients can have psoriasis-like rash at some stage of the disease. Aim was to assess the clinical, histopathological and dermoscopic features of PPP and palmoplantar psoriasis with pustules.
**Methods:** A cross sectional analysis of all patients who presented to us over 1 year with vesicles and/or pustules of hands and/or feet and were diagnosed with PPP and palmoplantar psoriasis with pustules/palmoplantar pustular psoriasis, both clinically and histologically, were done. The severity was analysed using palmoplantar pustulosis area severity index (PPPASI) and the clinical, histological and dermoscopic features were noted.
**Results:** Twenty-four patients were categorized into 2 groups of 12 each, with a male predominance in both the groups. Majority (66.6%) of PPP belonged to the age group of 20-40 years whereas 83% of PPso belonged to >40 years of age. Dermoscopic findings noted in both groups were translucent yellow areas, yellow/red-brown globules, dotted regularly arranged vessels, yellow crust and globules following dermatoglyphics.
**Conclusions:** The study, though with limited sample size, highlights few clinical, histopathological and dermoscopic features which helps in differentiating the two groups.

**Keywords:** Psoriasis, Vesicles, Pustules, Dermoscopy, Palmoplantar pustulosis

## INTRODUCTION

Palmoplantar pustulosis (PPP) is a chronic disease characterized by chronic cyclical eruption of sterile vesicles which turn into vesiculopustules/pustules, scales and erythema occurring on an otherwise normal skin. Individuals with PPP are at increased risk of psoriasis vulgaris, psoriatic arthritis, and autoimmune thyroid disease.[1] PPP can be precipitated by bacterial infections like tonsillitis, sinusitis etc.[2]

Pustular psoriasis is divided into generalized and localized, and the former includes Von-Zumbusch type, impetigo herpetiformis (acute generalised pustular psoriasis of pregnancy), annular and circinate forms, juvenile and infantile pustular psoriasis, and a generalized form of acrodermatitis continua of Hallopeau (ACH) and the localized form includes PPP and ACH involving the distal phalanges and nails of the hands and feet.[3] However, PPP is a controversial entity whose association with psoriasis is debated. Primary pustules do not form part of the spectrum of PV except when pustules arise

within or at the edge of psoriasis plaques. In these cases, the term to be used is "psoriasis cum pustulatione" (psoriasis with pustules). They are considered to be different from palmoplantar pustulosis as per European consensus statement on phenotypes of pustular psoriasis.[4]

Palmoplantar pustulosis was first described in 1930 by Barber as a psoriasis subtype "localized palmoplantar pustulosis/Barber type."[5] It was later defined as a separate entity in 2007 by the international psoriasis council.[6]

PPPASI is a scoring system that has been used to determine the severity of both these conditions.[7]

Differentiation can be difficult between the two. Although in palmoplantar pustulosis, clinical lesions of psoriasis may develop in the course of the disease, their absence in the acute clinical setting is one common feature distinguishing between the two.[8] Also, histopathologically, in palmoplantar pustulosis, there is acanthosis, parakeratosis, and infiltration of inflammatory cells, as seen in psoriasis. It has been suggested that the acrosyringium plays a central role in the inflammatory process of palmoplantar pustulosis.[6] "Vesicles without spongiosis", "micro-abscesses on the edges of vesicles", "vesicles reaching the horny layer without spongiosis" and "vesicles including some monocytes and neutrophils" are some specific histopathological features in PPP.[9] In pustular psoriasis, there is confluent parakeratosis, supra-papillary thinning, hypogranulosis, regular acanthosis, presence of neutrophils in the stratum corneum and spinosum, spongiosis and dermal oedema.[10]

The dermoscopic findings pustular psoriasis include regular red dots and micropustules on erythematous background.[11]

Both palmoplantar psoriasis and PPP pose a therapeutic challenge. The lack of proper penetration of topical agents over thick skin of palms and soles leads to reduced efficacy and need for a systemic therapy in most cases.

Literature on dermoscopy of PPP is limited and there are no studies comparing the dermoscopy of PPP with Palmoplantar psoriasis with pustules.

## METHODS

The study is a cross-sectional study done over a period of 1 year from January 2022 to December 2022, after obtaining ethical clearance from the institution. All patients, after obtaining informed consent, who presented to dermatology OPD of Marsleeva Medicity, Palai, with vesicles and/or pustules of hands and/or feet and were diagnosed with PPP and palmoplantar psoriasis with pustules, both clinically and histologically, and who had not taken any topical or systemic medications in the past 6 weeks were considered for this study. Punch biopsy was taken from a vesiculo-pustular area in the lesion. After obtaining the biopsy results, the sample was divided into groups of PPP and PPso taking into consideration both clinical and histopathological features. Clinically, both the groups present with vesicles and pustules of palms and soles. Histopathologically they will be considered PPP if they show "vesicles without spongiosis", "microabscesses on the edges of vesicles" and "vesicles reaching the horny layer without spongiosis." Palmoplantar psoriasis with pustules will be considered if lesions occur during the clinical course of the disease in a known psoriasis vulgaris patient (clinically) and histopathologically, if there is parakeratosis, hyperkeratosis, elongation of the rete ridges, reduced stratum granulosum, supra-papillary thinning, prominent neutrophilic infiltrate in the papillary dermis with spongiosis and development of superficial micro-abscesses.

Histopathology showing any doubtful features of pompholyx or eczema or special stains showing positivity to fungus were excluded.

Demographic and clinical pattern were assessed using a questionnaire. Other skin, nails and comorbid conditions were assessed. Dermoscopic images of multiple area was taken using a DermLite DL3 manual dermoscope equipped with iPhone13 along with a clinical image and analysed for background colour, scaling, vascular structures, pigment structures, dots, globules and clods.

Disease severity was measured using the PPPASI.[11] The severity was statistically analysed for any association with clinical/histopathological and dermoscopic findings using chi square test.

## RESULTS

A cross-sectional study on 24 patients (15 men/9 women; average age of presentation 43.37 years range: 5-69 years] was done in the study. They were categorised into 2 groups of PPP and PPso, depending on their clinical and biopsy findings. Table 1 highlights the demographic pattern between the 2 groups (Table 1).

**Table 1: Demographic pattern between two groups.**

| Findings | Palmoplantar pustulosis | Palmoplantar psoriasis with pustules |
|---|---|---|
| **Male: female ratio** | 2:1 | 7:5 |
| **Mean age of presentation (in years)** | 34 | 52.75 |
| **Average disease duration (in months)** | 14.3 | 24.4 |
| **Mean age of onset (in years)** | 33.75 | 50.8 |
| **Age distribution (in years)** | 5 to 69 | 28 to 69 |

Twelve patients of mean age 34 years diagnosed with PPP. Six, one and five patients belonged to vesicular, pustular and vesiculo-pustular phase respectively. Twelve patients of mean age 52.75 years, diagnosed with PPso were also compared with the former group. Nine were localized and three were of generalized psoriasis with palmoplantar vesiculo-pustular lesions.

Majority (66.6%) of PPP belonged to the age group of 20-40 years whereas 83% of PPso belonged to >40 years of age. Smoking was seen in 58% of patients in both the groups. Depending on site of involvement, 3 cases of PPP demonstrated involvement of palm alone and 9 cases with sole involvement alone; whereas in PPso, 6 cases had combined involvement of palm and sole, 5 cases with involvement of sole alone and 1 case with involvement of palm alone. Plaque-type rash was noted in 9 cases of PPP and 5 cases of PPso, annular morphology was noted in 3 cases of PPP and 4 cases of PPso; Lakes of pus were noted in 3 cases of PPso.

Extra palmoplantar involvement of either psoriasiform rash/nail changes of psoriasis were noted in 66.6% of PPso patients and 41.6 % of PPP patients. Nail involvements were noted in 25% of PPP and 41.6% of PPso. The nail changes noted in PPP were pitting, splinter hemorrhages and onycholysis and those in PPso were pitting, subungual compact hyperkeratosis, salmon spots and onycholysis.

Dermoscopic findings noted were translucent yellow areas, yellow globules, red-brown globules, dotted regularly arranged vessels, cotton wool like white areas (pustules), well defined white globules (pustules), yellow crust, white halo surrounding yellow globules and globules following dermatoglyphics (Figure 1-5).

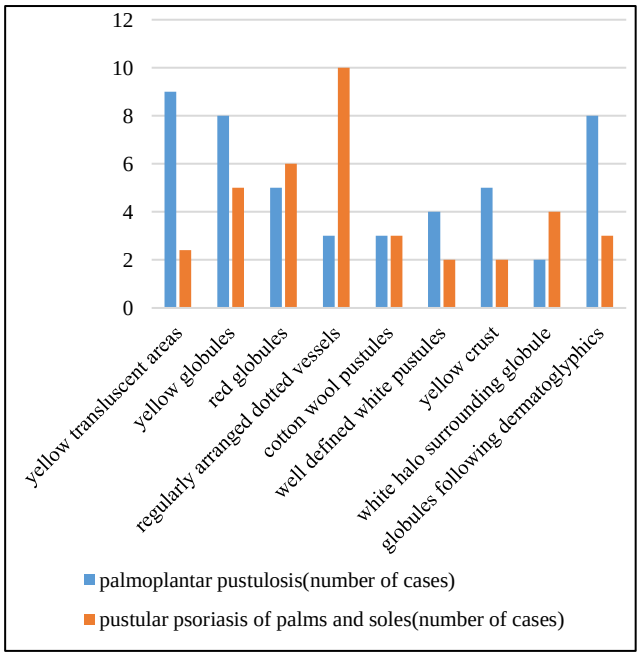


**Figure 1: Dermoscopic patterns between the 2 groups.**

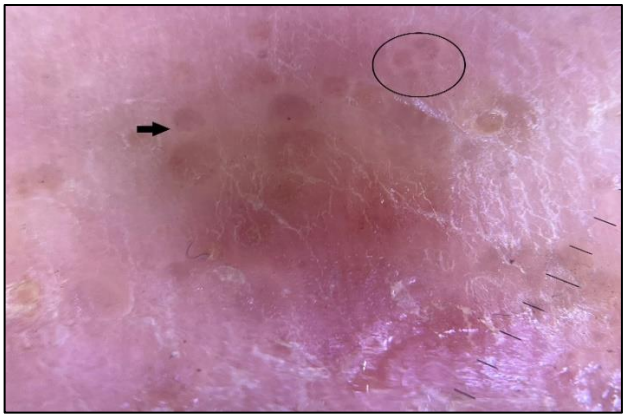

**Figure 2: Dermoscopy image (Dermlite DL3) (10X) (contact, polarised) with erythematous background, flower like arrangement of globules (black circle) and white halo around globules (black arrow).**

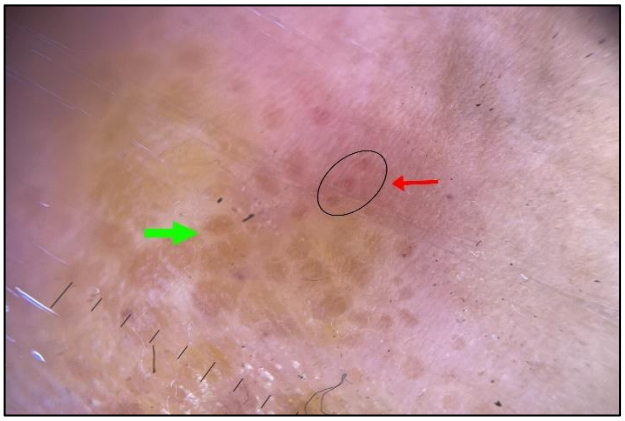

**Figure 3: Dermoscopy image (Dermlite DL3) (10X) (contact, polarised) with yellow-white background, discrete and coalesced globules with white halo in the periphery and flower like configuration of yellow globules (green arrow), yellow globules arranged along dermatoglyphics (red arrow).**

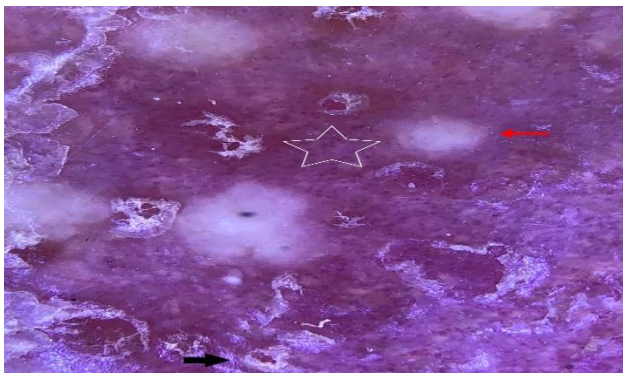

**Figure 4: Dermoscopy image (Dermlite DL3) (10X) (contact, polarised) with background erythema showing regularly arranged dotted vessels, cotton wool-like ill defined white globules (red arrow), annular scale/collarette of scale (black arrow).**

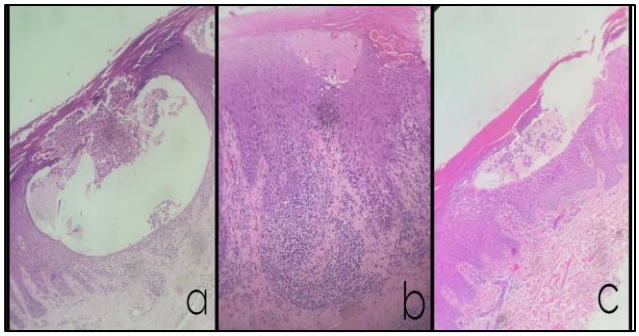


**Figure 5 (A-C): H and E; 10x. images showing different shapes of vesicle: vesicle in PPP within epidermis with inverted kidney shape with neutrophil collected on top; spongiotic fluid filled oval shaped vesicle beneath stratum corneum and spongiotic banana-shaped vesicle with neutrophils within blister fluid in PPso.**

Comparing the histopathology of both groups, there were acanthosis, parakeratosis and hypogranulosis in both the groups. Neutrophilic exocytosis in periphery were noted more in PPP, with a p=0.0001 (Fischer exact=12.221) (Chi=12.221) stating significance. The layer of vesicle was intra-granular, subcorneal or intracorneal. Vesicle shape was either banana shaped (horizontal oval with tapering edges in-line with epidermis), inverted kidney with neutrophil collection on top (horizontally placed

kidney shape with pyloric area facing up, and neutrophilic collection in the pyloric area) or oval (horizontally placed oval with rounded ends) (Figure 5) (Table 2).

PPASI were categorised into <5,5-15 and >15. The duration of the disease was found to be statistically significant to PPASI category by Fischer exact (15.769), with a p=0.015.

**Table 2: Dermoscopic and histopathological findings obtained as per the study in both the conditions.**

| Histopathological findings | Palmoplantar pustulosis | Palmoplantar psoriasis with pustules/ palmoplantar pustular psoriasis | P value | Significance | Chi square, df |
|---|---|---|---|---|---|
| **Yellow translucent areas** | 9 | 7 | 0.386 | Not significant | 0.750, 1 |
| **Red globules** | 5 | 6 | 0.682 | Not significant | 0.168, 1 |
| **Yellow globules** | 8 | 5 | 0.219 | Not significant | 1.510, 1 |
| **Regularly arranged dotted vessels** | 3 | 10 | 0.004 | Significant | 8.224, 1 |
| **White halo surrounding globules** | 2 | 4 | 0.346 | Not significant | 0.889, 1 |
| **Globules following dermatoglyphics** | 8 | 3 | 0.041 | Significant | 4.196, 1 |
| **Annular scales** | 5 | 4 | 0.673 | Not significant | 0.178, 1 |
| **Acanthosis** | 7 | 12 | 0.012 | significant | 8.263, 1 |
| **Parakeratosis** | 9 | 12 | 0.217 | Not significant | 1.524, 1 |
| **Neutrophilic exocytosis in periphery of vesicle** | 9 | 1 | 0.0001 | Significant | 12.221, 1 |
| **Hypogranulosis** | 7 | 12 | 0.004 | significant | 4.042, 1 |
| **Intragranular vesicle** | 9 | 3 | 0.039 | significant | 6.279, 1 |
| **Subcorneal vesicle** | 3 | 7 | 0.214 | Not significant | 1.543, 1 |
| **Intra corneal vesicle** | 0 | 2 | 0.478 | Not significant | 2.955, 1 |
| **Banana shaped vesicle** | 1 | 4 | 0.317 | Not significant | 2.403, 1 |
| **Inverted kidney shaped vesicle with neutrophil collection on top** | 9 | 1 | 0.003 | Significant | 12.221, 1 |
| **Oval vesicle** | 2 | 7 | 0.089 | Not significant | 4.641, 1 |
| **Collection of neutrophils moving towards vesicle at base of vesicle intra-epidermally** | 9 | 2 | 0.012 | Significant | 8.791, 1 |

## DISCUSSION

The mean age group of the PPP in our cohort was found to be lower than that found in other studies.[12] There was a male predominance in both the groups, unlike other studies.[12,13]

The patients with PPP had lower age group compared to those with PPso., the youngest of PPP having 7 years. The age of onset of PPP is usually between the fourth and the fifth decades.[14]

The thenar or hypothenar eminences and the central palm are common sites of involvement in PPP.[15] Eriksson et al noted 69% of PPP had involvement of both palm and sole unlike our study which had either palm or sole involvement in all cases of PPP.[16]

Nail involvement was noticed in 14% to 33% in various studies.[12,13] Recently, Hiraiwa et al published a retrospective review of nail changes in PPP which included onycholysis (50%), followed by pitting (42.9%) and destruction of the nail (39.3%), scale, subungual hyperkeratosis, subungual pustulation, indention, transverse and longitudinal ridging, curvature abnormalities, discoloration, splinter haemorrhage, and thickening of the nail.[17]

Dermoscopically we observed regularly arranged dotted vessels beneath the scaling more in psoriasis compared to PPP. Flower like arrangement of yellow globules were noted in both. Flower like configuration was proposed to histopathologically corresponded with spongiotic vesicles formation and the white linear structures represent partially preserved areas of keratinocytes.[18] Annular scales/collarette of scales were noted in both the conditions. Similar scaling has been previously described by Adya et al.[19]

Histopathologially, while neutrophilic vesicles hugging the main vesicle is one important differentiating feature in PPP, it could be the gradual exocytosis from within the vesicle because of neutrophilic chemo-attractants which leads to formation of micro-vesicles in periphery. The shape of vesicle “inverted kidney with neutrophil collection on top’ was similar to that described by Krieg et al.[20]

The study however has limited sample size as a limitation and more such studies on larger population have to be conducted to substantiate the results.

## CONCLUSION

Some findings of the present study including male predominance, mean age group are novel findings of our study in a cohort of Indian patients. Only a limited number of studies exist in the literature comparing the two entities. Based on the increasing evidence and the data presented here, PPP appears to be a distinct entity from PPso. More studies on larger sample have to be done to substantiate the findings obtained above.

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