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Original Article

Clinical, pathological and dermoscopic correlation of non-infectious papulosquamous disorders (psoriasis, eczema, lichen planus and pityriasis rosea) of skin - A cross-sectional study

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Abstract

Background Dermoscope is a non-invasive diagnostic tool, allowing rapid and magnified in-vivo observation of the skin. Certain combinations and characteristic patterns of dermoscopic features of papulosquamous diseases are more predictive for their diagnosis.

Aims To study and correlate the dermoscopic features of non-infectious papulosquamous di`seases of skin and compare the findings in our study with previous studies.

Materials and Methods A cross-sectional study, including total of 240 cases, 125 males and 115 females, of all ages was done for a period of 2 years. The dermoscopic features and histopathological finding of the lesions from each patient were analysed. Descriptive and inferential statistical analysis has been carried out in the present study.

Results There was a statistically significant difference in dermoscopic patterns between psoriasis, eczema, lichen planus and pityriasis rosea groups as determined by one-way ANOVA. An analysis of variance showed the significant effect of background color, type of vessels, pattern of vessels, scale color, scale distribution and wikhams striae in the diagnosis. Dermoscopic diagnosis was of 87 (87.7%) in case of psoriasis, 48 (84.2%) in case of eczema, 56 (93.3%) in case of lichen planus and 21 (84%) in case of pityriasis rosea. Overall positive clinico-histopathological and dermoscopic correlation of 88.3% was observed.

Conclusion Clinical use of dermoscopy in inflammatory dermatosis improves diagnostic ability and improves fundamental aspects of daily practice such as improvement of morphologic knowledge for visual tele-dermatology and in addition plays a psychological placebo effect on patients suffering from common inflammatory dermatosis.

Key words
Dermoscopy, red globules, wickhams striae, psoriasis, lichen planus, eczema, pityriasis rosea.

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Introduction

Psoriasis, eczema, lichen planus and pityriaisis rosea are common inflammatory papulosquamous skin diseases and their characteristic appearance allows a clinical

diagnosis in a high proportion of patients. However, unusual presentations at times do exist and may cause difficulties in the differentiation among these entities. In those cases, histopathology contributes significantly to the accurate diagnosis.

Dermoscope has also been called 'skin surface microscope', 'epiluminence microscope' or 'episcope'.[1] It works on principal of "transillumination" of lesion and studying it with high magnification to visualize subtle features.[2] Thus forming a link between macroscopic clinical dermatology and microscopic dermatopathology.[3] This "sub-macroscopic" observation of colors and structures enhances clinical assessment by providing new diagnostic criteria for the differentiation.[3,4]

Dermoscopy, besides helping in the diagnosis, can be used to monitor treatment response. Given that plaque psoriasis and other inflammatory skin diseases may sometimes be difficult to differentiate clinically, a more detailed determination of specific dermoscopic patterns of inflammatory skin diseases could be a valuable addition for the clinical assessment.[5-12]

Findings included in the dermoscopic evaluation of papulosquamous disorders include:

a- Vascular morphology (dotted, linear, dotted + linear) **(Figure 1)**.

b- Vascular arrangement (regular, in clusters, patchy, peripheral, in rings) **(Figure 2)**.

c- Background color (dull red, i.e. intense red color, light red, i.e. fading red color, yellowish) **(Figure 3)**.

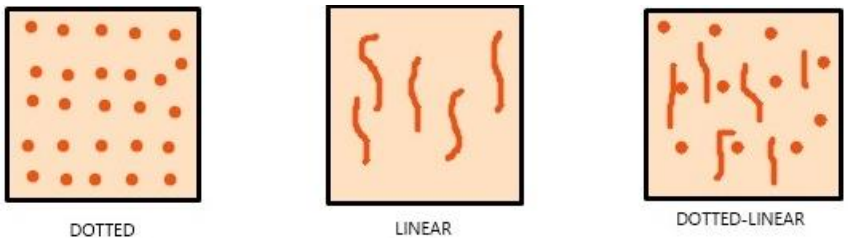

Figure 1 Types of vessels (schematic diagram showing vascular morphology).

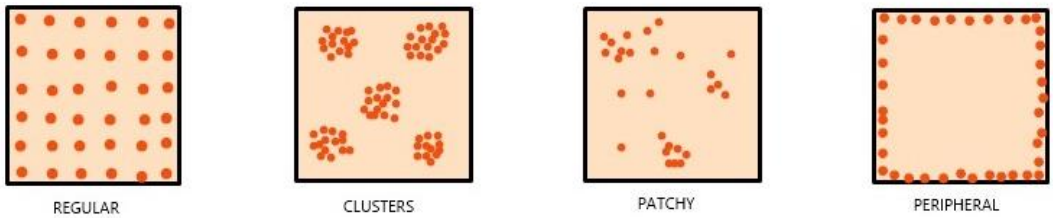

Figure 2 Pattern of vessels (schematic diagram showing vascular arrangement).

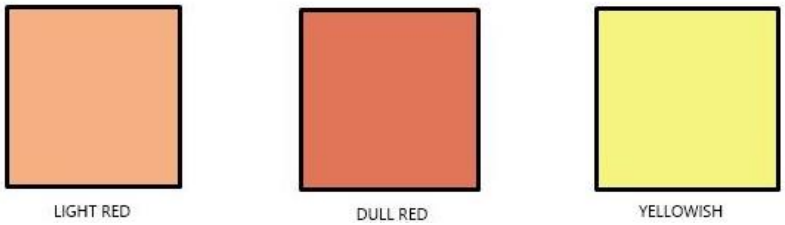

Figure 3 (Background color) schematic diagram showing background color.

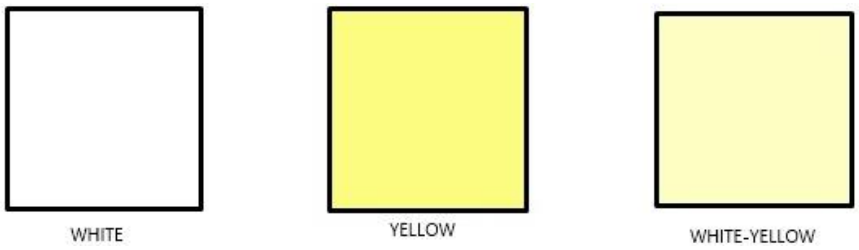

Figure 4 Scale color (schematic diagram showing scale color).

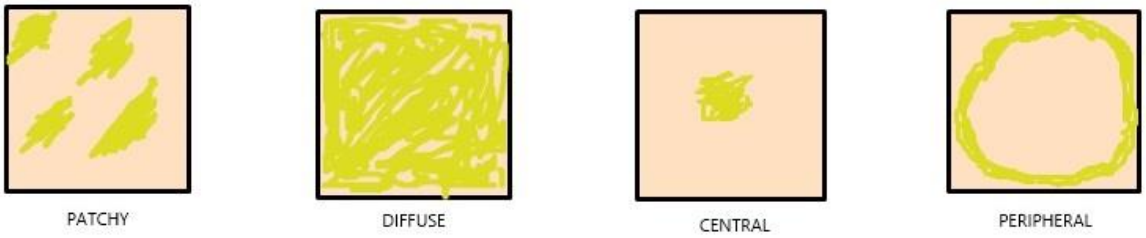

Figure 5 (Scale distribution) schematic diagram showing scale distribution

Figure 6 Wickham striae (schematic diagram showing wikham striae).

d- Scale color (white, yellow, white + yellow) **(Figure 4)**.

e- Scale distribution (patchy, peripheral, diffuse, central) **(Figure 5)**.

f- Presence of white crossing streaks (i.e. Wickham striae) **(Figure 6)**.

Materials and Methods

This was a cross-sectional study, during a course of 2 years, a total of 307 patients were screened for eligibility of participation. Of these, 67 cases were excluded because of concurrent treatment (n=52), withdrew from study participation (n=4) or lacked a definitive histopathological diagnosis (n=11) resulting in 240 cases participating in the study.

A total of 240 cases, 125 males and 115 females, of all ages were included in our study. Sample size was decided in consultation with a statistician in view of power of study.

All infectious papulosquamous disorders like secondary syphillis, tinea corporis, tinea pedis, scabies, candidiasis and cases who were on topical or systemic treatment (cyclosporine, biologics, methotrexate, retinoids, corticosteroids) for duration less than 1 and 6 months, respectively, before recruitment were excluded.

Patient demographics were recorded and a brief clinical history was taken. The dermoscopic features of the lesions from each patient were analysed. The histopathological findings of each disease were evaluated.

Dermoscopic images were captured using a digital dermoscopy system, Digital Dermatoscope DermaIndia TLS Ultracam with triple light source with 50X zoom was used. Patterns, colors and structures of each disease were recorded and the necessary pictures were saved.

Dermoscopy image capturing was performed by a single practitioner to avoid diversification during the procedure. Dermoscopic evaluation was performed by two independent dermoscopists (P.A, P.L), who were unaware of the histopathological diagnosis. Selection of the dermoscopic variables included in the evaluation process were based on the available literature data and expertise. Variables included in the dermoscopic evaluation were: (a) vascular morphology (dotted, linear, dotted + linear); (b) vascular arrangement (regular, in clusters, patchy, peripheral, in rings); (c) background color (dull red, i.e. intense red colur, light red, i.e. fading red color, yellowish); (d) scale colour (white, yellow, white + yellow); (e) scale distribution (patchy, peripheral, diffuse, central); and (f) presence of white crossing streaks (i.e. Wickham striae).

Results

Out of 240 cases 98 (40.83%) were psoriasis, 57 (23.75%) were of eczema, 60 (25%) lichen planus and 25 (10.42%) were pityriasis rosea. Out of 240 patients, 125 (52.08%) were male and 115 (47.92%) were female. Out of 125 male patients, 54 (43.2%) were psoriasis, 29 (23.2%) were eczema, 30 (24%) were lichen planus and 12 (9.6%) were pityriasis rosea.

Out of 115 female patients, 44 (38.26%) were psoriasis, 28 (24.35%) were eczema, 30 (26.09%) were lichen planus and 13 (11.3%) were pityriasis rosea.

Most common clinical features observed in psoriasis were erythematous plaques with white scales. In eczema cases there were erythematous scaly plaques however in lichen planus cases violaceus flat topped papules and plaques were noted. In pityriais rosea scaly plaque with collarette of scales were seen.

Most common histopathological features observed in psoriasis cases were parakeratosis, psoriasiform hyperplasia, suprapapillary thinning, hypogranulosis and munro-microabscesses. In eczema cases were spongiosis, acanthosis, lymphocytic exocytosis and mixed infiltrate. In lichen planus cases were irregular acanthosis with saw toothed rete-ridges, hypergranulosis, vacuolar degeneration of basal cells and band like dermal infiltrate. In pityriais rosea were parakeratosis, mild to moderate acanthosis, perivascular inflammation and chronic inflammatory cell infiltrate.

In our study we observed that clinical diagnosis was possible in 77 (78.51%) cases in psoriasis, 42 (73.68%) in eczema, 47 (78.33%) in lichen planus and 18 (72%) cases in pityriasis rosea.

Dermoscopic diagnosis was 87 (87.77%) in case of psoriasis, 48 (84.21%) in case of eczema, 56 (93.33%) in case of lichen planus and 21 (84%) in case of pityriasis rosea.

In our study we observed a positive clinico-histopathological and dermoscopic correlation of 87.77% in case of psoriasis, 84.21% in eczema, 93.33% in lichen planus and 84% in case of pityriasis rosea.

Overall positive clinico-histopathological and dermoscopic correlation of 88.33% was observed.

Table 1 Dermoscopic features observed in papulosquamous disorders in our study.

Dermoscopic features	*Papulosquamous disorders*			
	Psoriasis (n=98)	*Eczema (n=57)*	*Lichen planus (n=60)*	*Pityriasis rosea (n=25)*
Background color				
Light red	57	9	7	3
Dull red	40	35	39	4
Yellowish	1	13	14	18
Type of vessels				
Dotted	98	53	17	25
Linear	0	0	5	0
dotted+linear	0	4	38	0
Pattern of vessels				
Regular	89	16	0	3
Clusters	4	5	0	2
Patchy	5	36	17	20
Peripheral	0	0	43	0
Scale color				
White	70	14	3	0
Yellow	0	11	4	2
White+yellow	4	25	0	19
Scale distribution				
Patchy	14	40	3	0
Diffuse	46	9	0	2
Central	13	2	5	1
Peripheral	3	0	0	18
Wickham striae	0	0	60	0

Table 2 Clinicopathological and dermoscopic correlation of skin lesions.

Papulosquamous disease	*Histopathological diagnosis*	*Clinical diagnosis*	*Dermoscopic diagnosis*	*Two or more clinical differential diagnosis*	*Positive histopathological and dermoscopic correlation*
Psoriasis	98	77(78.51%)	87(87.77%)	21(21.42%)	87(87.77%)
Eczema	57	42(73.68%)	48(84.21%)	15(26.31%)	48(84.21%)
Lichen planus	60	47(78.33%)	56(93.33%)	13(21.66%)	56(93.33%)
Pityriasis rosea	25	18(72%)	21(84%)	7(28%)	21(84%)
Total	240	184(76.66%)	212 (88.33%)	56(23.33%)	212 (88.33%)

Table 3 Summary of ANOVA of papulosquamous diseases.
Degrees of freedom-(3,236)

	Psoriasis Mean, S.D.	*Eczema Mean, S.D*	*Lichen planus Mean, S.D.*	*Pityriasis rosea Mean, S.D*	*F ratio*	*P value*
Age	35.163, 17.476	35.193,15.576	36.250, 16.886	14.840, 8.040	12.245	<0.001
Sex	1.449, 0.500	1.491, 0.504	1.500, 0.504	1.520, 0.510	0.218	0.884
Background color	1.429, 0.518	2.070, 0.623	2.117, 0.585	2.600, 0.707	37.754	<0.001
Type of vessels	1.000, 0.000	1.140, 0.515	2.350, 0.899	1.000, 0.000	97.465	<0.001
Pattern of vessels	1.143, 0.476	2.351, 0.896	3.717, 0.454	2.680, 0.690	220.815	<0.001
Scale color	0.837, 0.621	1.947, 1.093	0.183, 0.537	0.920, 0.493	57.732	<0.001
Scale distribution	1.602, 1.072	1.123, 0.629	0.300, 0.850	3.160, 1.519	53.356	<0.001
Wikham striae	0.000, 0.000	0.000, 0.000	1.000, 0.000	0.000, 0.000	65535.000	<0.001

In our study 240 patients of papulosquamous disorders were assigned into four groups, psoriasis, eczema, lichen planus and pityriasis rosea. A one way ANOVA within groups was conducted to compare the effect of each dermoscopic variable on the diagnosis of each disease. There was a statistically significant difference between groups as determined by one-way ANOVA.

An analysis of variance showed that the effect of background color on the diagnosis of papulosquamous disorders was significant, $F_{3,236}$=37.754, p<0.001. Similarly ANOVA showed significant results of the effect of type of vessels $F_{3,236}$=97.465, p<0.001, pattern of vessels $F_{3,236}$=220.815, p<0.001, scale color $F_{3,236}$=57.732, p<0.001, scale distribution $F_{3,236}$= 53.356, p <0.001 and Wikhams striae $F_{3,236}$= 65535.000, p <0.001 respectively.

Discussion

In our study we observed significant differences in the dermoscopic patterns of papulosquamous diseases which may assist the clinical diagnosis and obviate the need for invasive procedure like skin biopsy. There was a statistically significant difference in dermoscopic patterns between psoriasis, eczema, lichen planus and pityriasis rosea groups as determined by one-way ANOVA. An analysis of variance showed that the effect of background color on the diagnosis of papulosquamous disorders was significant, $F_{3,236}$=37.754, p <0.001. Similarly ANOVA showed significant results of the effect of type of vessels $F_{3,236}$=97.465, p<0.001, pattern of vessels $F_{3,236}$ = 220.815, p<0.001, scale color $F_{3,236}$ = 57.732, p<0.001, scale distribution $F_{3,236}$=53.356, p<0.001 and Wikham striae $F_{3,236}$=65535.000, p<0.001 respectively.

Dotted vessels are a well-recognized criterion for the diagnosis of psoriasis[16-20] and were seen in all our cases of psoriasis (100%). On histopathology, red dots corresponded with the loops of vertically arranged dilated capillaries within the elongated dermal papillae.

However, our and previous studies showed that dotted vessels are not limited to psoriasis but occur at variable frequency in several other inflammatory lesions.[19,20,40]

Accordingly, dotted vessels as the only dermoscopic criterion was insufficient to distinguish between these different entities accurately. Besides the vascular morphology, the vascular arrangement and specific dermoscopic clues have been judged to be of equal importance in the differential diagnosis of inflammatory skin lesions.[19] This is further supported by our study, which revealed significant differences with respect to the distribution of vessels as additional criteria among psoriasis, eczema, lichen planus and pityriasis rosea.

In detail, the combination of regularly distributed dotted vessels over a light red background associated with diffuse white scales was highly predictive of psoriasis and allowed a correct diagnosis in 88.77% cases. Scale removal reveals the characteristic vascular pattern of psoriasis possibly together with tiny red blood drops, which can be characterised as the dermoscopic "Auspitz sign".[41] Likewise, yellow scales, a patchy arrangement of vessels on yellow background colour favoured the diagnosis of eczema.

Yellow crusts have very recently been described as dermoscopic finding in cases of eczema.[33] This, along with our findings, suggests that white vs. yellow scales along with regular vs. patchy distribution of dotted vessels may represent a valuable clue in the differential diagnosis of psoriasis and eczema. On the other

hand, although red globular rings (i.e. red globules arranged in irregular circles or rings) as described previously by F. Vazquez-Lopez et al[18] represented a highly specific feature for psoriasis. But in our study, this pattern was seenin only a minority of cases in our series. Therefore, the value of this pattern in the diagnosis of psoriasis remains to be elucidated further.

Our study furthermore confirms preliminary observations on the dermoscopic patterns of lichen planus and pityriasis rosea.[18,20,36] As such, pityriasis rosea was typified by peripheral scaling (so-called collarette scales) around a diffuse and structureless yellowish centre; although dotted vessels were seen in all our cases of pityriasis rosea, they were generally much less evident and fewer in number compared with psoriasis or eczema.

By contrast, Wickham striae were seen exclusively in lichen planus and observed in all our cases; thus our findings highlight the importance of Wickham striae in the diagnosis of lichen planus. Pigmentary incontinence was observed in lichen planus cases in late stages. Other findings like comedo like openings, corn pearls and milium like cysts were seen in very few cases. Vessels of mixed morphology (dotted+linear), usually distributed at the periphery of the lesion, represented additional dermoscopic findings of the disease.

In our study we observed that clinical diagnosis was possible in 77 (78.51%) cases in psoriasis, 42(73.68%) cases in eczema, 47 (78.33%) cases in lichen planus and 18 (72%) cases in pityriasisrosea.

Dermoscopic diagnosis was 87 (87.77%) in case of psoriasis, 48 (84.21%) in case of eczema, 56 (93.33%) in case of lichen planus and 21 (84%) in case of pityriasis rosea. Overall positive clinico-histopathological and dermoscopic correlation of 88.33% was observed.

Thus in our study we found that dermoscopy was beneficial in diagnosing these papulosquamous diseases consistently and thus can avoid skin biopsy in clinically difficult cases. Our study showed similar results as previous studies by A. Lallas, A. Kyrgidis et al. and F. Vazquez-Lopez, Jose Antonio et al.

Limitations We included only patients from certain region in southern India. Given that distribution studies stress the significance of geographical and ethnic background in the clinical presentation of papulosquamous diseases, our results are limited to this population.

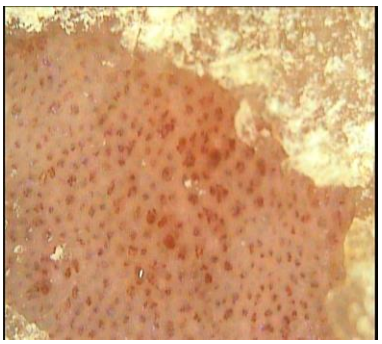

Figure 7 Dermoscopic image of plaque psoriasis showing light red background, regular dotted vessels and diffuse white scales.

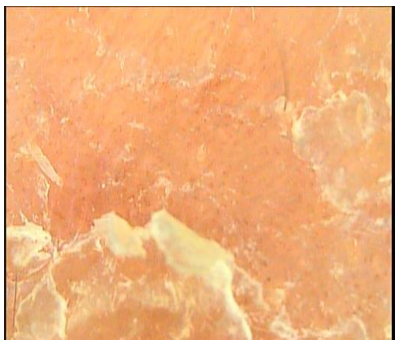

Figure 8 Dermoscopic image of eczema showing dull red background and patchy yellow scales.

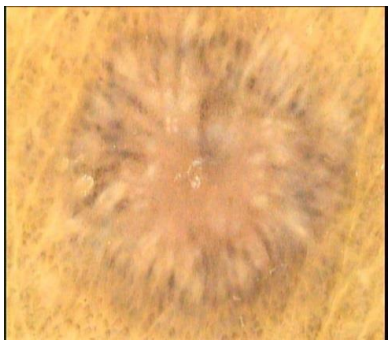

Figure 9 Dermoscopic image of Lichen planus showing Wickham striae.

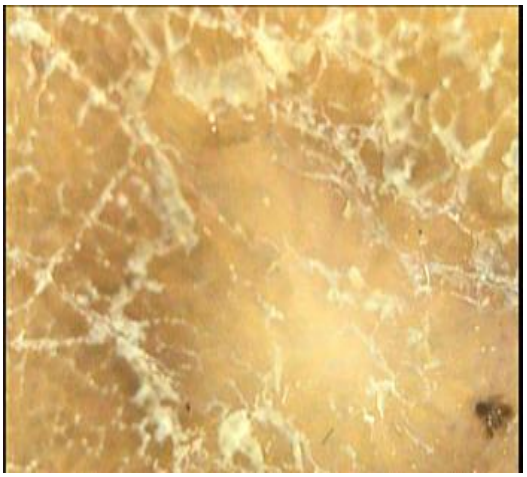

Figure 10 Dermoscopic image of Pityriasis rosea showing a yellowish background and collarete like peripheral white scales.

Conclusion

Papulosquamous diseases are common inflammatory skin diseases, but little is currently known about their dermoscopic features. Vascular structures, scale color and distribution, color variegation and specific features are the main criteria to be considered when applying dermoscopy in general dermatology.[10,15] These papulosquamous diseases exhibit a characteristic dermoscopic pattern. A certain combination of dermoscopic features is more predictive of the diagnosis of these diseases. It improves diagnostic accuracy in several clinical scenarios, such as the differential diagnosis of erythrosquamous skin diseases. Dermoscopic findings should always be interpreted within the clinical context of the patient and integrated with all relevant information from history and macroscopic examination.[46-49] After observing different dermoscopic findings in psoriasis, eczema, lichen planus and pityriasis rosea we were able to diagnose these diseases dermoscopically with consistent findings without the need for invasive skin biopsy.[50-52] Our observations clearly showed that simultaneous evaluation of both vascular and non-vascular findings improves surface microscopy of inflammatory dermatosis.

In conclusion, dermoscopy is a valuable tool for improving the accuracy of differentiation of non-pigmented scaly lesions.[15] It provides a quick, simple and non-invasive aid. The major benefit from improved dermoscopic differentiation of these common scaly lesions is a reduction in the need for a skin biopsy. Besides its diagnostic purposes, dermoscopy might provide a useful tool for the evaluation of treatment outcome in patients with psoriasis such as early detection of treatment response or unwarranted side-effects of long-term topical treatment.[17] It adds new easily recognizable images for visual tele-dermatology. It has a positive psychological placebo effect on patients suffering from common dermatosis. The definitions of dermoscopic findings of inflammatory scaly diseases warrant further studies and to make the dermoscopic criteria standardized for inflammatory skin diseases worldwide.

Table 4 Comparison of our study with previous studies

Sr.no	*Study [Year]*	*Population*	*Results*
1.	F. Vazquez-Lopez, Jose Antonio et al [2003]	25 patients of Lichen planus and 20 patients of Plaque psoriasis	Lichen planus- wikham striae (92%), yellow brown dots (20%), grey-blue dots (20%), comedo like openings (16%), corn pearls (12%) and milium like cysts in about 1%. Psoriasis- red dot pattern (80%) with only (12%) showing red globules.
2.	F. Vazquez-Lopez and J. Kreusch et al [2004]	414 consecutive patients, 60 patients of psoriasis and 25 patients of lichen planus	Lichen planus- homogenous red lines (72%), mixed pattern of vascular findings (20%), Psoriasis- Homogenous red globules pattern (100%), Red globules-rings (10%).

Sr.no	*Study [Year]*	*Population*	*Results*
3.	F. Vazquez-Lopez and A. A. Marghoob et al [2004]	20 patients with chronic psoriasis, who were on steroids and calcipotriene	Baseline study-only red globules in all the patients with no evidence of linear telangiectasia. End of study - red globules (all patients), linear telangiectasia (5out of 20). Steroid overuse-4 of 5 patients with linear telangiectasia and in 3 patients in the other 15.
4.	Yan Pal, Alex J. Chamberlain et al [2008]	300 patients, 150 were basal cell carcinoma, 100 were psoriasis and 50 patients had intra-epidermal carcinomas	Psoriasis- Red dots (100%), red globules (32%). Intra-epidermal carcinoma -a clustered vascular pattern, glomerular vessels and hyperkeratosis. Basal cell carcinoma- scattered vascular pattern, arborizing micro vessels, telangiectasia and atypical vessels, a milky-pink background and brown dots/globules.
5.	Francesco Lacarrubba and Beatrice Nardone et al [2008]	32 subjects of psoriasis	Presence of pinpoint-like capillaries linearly arranged along the furrows of dermatoglyphics. Palmar lesions only (22 cases), plantar involvement (7cases), palmar/plantar localization (3).
6.	A. Lallas, A. Kyrgidis et al [2012]	83 patients of psoriasis, 41 of dermatitis, 25 of lichen planus and 20 of pityriasis rosea.	Dotted vessels in psoriasis were most commonly arranged in regular distribution (88%) and were associated with white scales (70%). Vessels in dermatitis appeared more commonly in a patchy distribution (59%) and in association with yellow scales (61%). In pityriasis rosea, dotted vessels were mostly associated with a yellowish background colour (65%) and a peripheral arrangement of scales (70%). White crossing lines (Wickham striae) were seen exclusively in lichen palnus (96%).
7.	Our study [2015]	240 patients 98 of psoriasis, 57 of eczema, 60 of lichen palnus and 25 of pityriasis rosea.	Dotted vessels in psoriasis were most commonly arranged in regular distribution (90.81%) and were associated with white scales (71.43%). Vessels in eczema appeared more commonly in a patchy distribution (63.15%) and in association with yellow scales (19.3%). In pityriasis rosea, dotted vessels were mostly associated with a yellowish background colour (72%) and a peripheral arrangement of scales (72%). White crossing lines (Wickham striae) were seen exclusively in lichen palnus (100%).

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