

Research Article

Histopathologic diagnostic parameters of psoriasis; a clinicopathological study

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ABSTRACT

Background: Psoriasis is a common inflammatory skin disorder comprised of varied histo-morphological features involving both epidermis and dermis. Further, there are psoriasiform lesions which simulate psoriasis. Hence it is mandatory to recognise psoriasis based on histopathological parameters to aid the treatment protocol.

Methods: Sixty cases of histopathologically confirmed psoriasis vulgaris and pustular psoriasis excluding psoriasiform dermatitis, reported in the Department of Pathology, over a period of 6 years were analysed. The sections were stained with hematoxylin and eosin stains and analyzed for various morphological parameters.

Results: Out of 60 cases 88.33% were psoriasis vulgaris and 11.67% were pustular psoriasis. Age incidence was high in second and fourth decades with male predominance. The commonly involved sites were upper and lower extremities. Significant histopathological parameters were parakeratosis (100%), hyperkeratosis (100%), spongiosis (91.67%), and papillomatosis (73.33%), either hypogranulosis (55%) or agranulosis (45%), and dilated and tortuous capillaries (88.33%, 43.33% respectively) in the dermis.

Conclusions: Histopathological correlation is still the gold standard tool for the diagnosis of psoriasis. In the absence of well-formed Munro microabscess and pustules of Kogoj, other epidermal features like parakeratosis, hyperkeratosis, spongiosis, papillomatosis and absent or thinned out granular layer as well as dilated and tortuous capillaries in the dermis can be considered as confirmatory evidence of psoriasis. The reduction or complete absence of granular layer was characteristic of psoriasis and reflected the pathogenesis of defective keratinocyte proliferation.

Keywords: Psoriasis vulgaris, Agranulosis, Parakeratosis

INTRODUCTION

Psoriasis is a chronic recurrent papulosquamous disease characterized by epidermal hyperplasia. Clinically the presence of well-defined silvery white scales is characteristic of psoriasis. These scales reveal underlying smooth red membrane with bleeding points on removal of suprapapillary epithelium which is called Auspitz sign.¹

There is world wide variation in prevalence of psoriasis. Psoriasis shows a bimodal age of onset with male predominance. It is an immune mediated disorder with the underlying pathophysiology involving T cells and

their interactions with dendritic cells and cells involved in keratin production.^{2,3}

This disease is characterized by chronic, recurrent exacerbations and remissions that are emotionally and physically debilitating. Long term of psoriasis may cause psoriatic arthritis and risk for co-morbidities.⁴

The cardinal histopathological features of psoriasis are a combination of the following: acanthosis, mounds of parakeratosis in an orthokeratotic cornified layer, suprapapillary thinning, papillomatosis, inter cellular edema, scattered mitosis of basal and prickle cells and

diminished or absent granular layer, tortuous capillaries in papillary dermis and perivascular infiltration of lymphocytes. The most diagnostic features of psoriasis are presence of Munro micro abscess and neutrophilic aggregates in the upper most portion of the spinous layer to form spongiform pustules of Kogoj.^{1,2}

But all these characteristic features may not be seen in one section alone and also some of these findings can be seen in non-psoriatic conditions. Neutrophils in the keratotic layers and spongiosis can be seen in infectious conditions, namely dermatophytosis and candida infections. Irregular epidermal hyperplasia, lymphocytic exocytosis and spongiosis along with vertical orientation of dermal collagen are seen in psoriasiform dermatitis.¹

Hence this study was conducted to analyse and enlighten the most significant histopathological parameters of psoriasis.

METHODS

In this retrospective study, a total number of 60 cases, which were histopathologically diagnosed as psoriasis vulgaris and pustular psoriasis excluding psoriasiform dermatitis, reported in the department of Pathology, Sri Manakula Vinayagar Medical College, Puducherry over a period of 6 years were analysed (January 2009-December 2014).

The paraffin blocks of corresponding cases were retrieved and sectioned. All the slides were stained with Hematoxylin and Eosin stains and observed microscopically and the findings were recorded for various morphological parameters and their severity. Individual parameters were graded as mild, moderate and severe through visual analogue scale, and few parameters were noted as present or absent, wherever grading was not applicable.

Statistical analysis of data was performed by Spearman's correlation to evaluate the association between various histopathological parameters.

RESULTS

In a total of 60 samples, 53 (88.33%) were psoriasis vulgaris and 7 (11.67%) were pustular psoriasis. Majority of the cases of psoriasis vulgaris were found to be within age group 11-20 years and followed by 41-50 years, showing two peak incidence of age, whereas pustular psoriasis was observed in 31-40 years age group.

The study showed male predominance with Male: female ratio - 1.5:1 of psoriasis vulgaris cases (32 males, 21 females). The most common site of psoriasis was both extremities, with more involvement of lower limb (90%) than upper limb (75%).

Table 1: Histo-morphological features in the epidermis and their severity.

Epidermal changes	Absent		Present		Mild		Moderate		Severe	
	cases	%	cases	%	cases	%	cases	%	cases	%
Hyperkeratosis	0	0%	60	100%	25	41.67%	25	41.67%	10	16.67%
Parakeratosis	0	0%	60	100%	40	66.67%	18	30%	2	3.33%
Pustules of kogoj	32	53.33%	28	46.67%	26	43.33%	2	3.33%	0	0
Spongiosis	5	8.33%	55	91.67%	44	73.33%	11	18.33%	0	0
Papillomatosis	16	26.67%	44	73.33%	24	40%	15	25%	5	8.33%
Supra papillary thinning	43	71.67%	17	28.33%	17	28.33%	0	0	0	0
Mitosis	38	63.33%	22	36.67%	22	36.67%	0	0	0	0
Munro microabscess	27	45%	33	55%	32	53.33%	1	1.67%	0	0
Exocytosis of inflammatory cells	1	1.67%	59	98.33%	56	93.33%	3	5	0	0

Among the various clinical presentations of psoriasis, the erythematous type lesions were found to be more common (93.33%) in the current study.

In addition to pustular psoriasis, three cases of psoriasis vulgaris also presented with pustular lesions. Seasonal variation was observed with more numbers of cases encountered during winter season (36.66%) followed by autumn and summer seasons (25% and 21.67%).

The most prevalent features were hyperkeratosis, parakeratosis and exocytosis of inflammatory cells (Figure 1).

In association with other features, hyperkeratosis was more salient with moderate and severe grades (41.67% and 16.67%). Hyperkeratosis, parakeratosis, irregular acanthosis (100%) and exocytosis were significantly seen in all the cases (Table 1).

The dermal changes included dilated (88.33%) and tortuous (43.33%) capillaries, dermal edema (28.33%) and increased vascular proliferation (16.67%) (Table 2)

(Figure 3 and 4). Associations between various parameters of epidermal and dermal changes were studied by Spearman's correlation (Table 3 and 4).

Table 2: Histomorphological features in the dermis.

Dermis	Absent		Present	
	cases	percentage	cases	Percentage
Vascular proliferation	50	83.33%	10	16.67%
Dilated capillaries	7	11.67%	53	88.33%
Dermal edema	43	71.67%	17	28.33%
Tortuous capillaries	34	56.67%	26	43.33%

Table 3: Spearman's correlation for epidermal changes.

Epidermis	Hy.ker	Par.ker	Kogoj	Spongi	Papilla	Sup.thin	Mito	Munro	Exo.inf
Hy.ker	1	0.528	0.185	0.205	0.083	0.090	0.024	0.284	0.135
Par.ker	0.528	1	0.108	0.108	0.292	0.016	0.004	0.319	0.151
Kogoj	0.185	0.108	1	0.292	0.016	0.230	0.430	0.224	0.116
Spongi	0.205	0.108	0.292	1	0.112	0.124	0.014	0.100	0.231
Papilla	0.083	0.292	0.016	0.112	1	0.262	0.103	0.246	0.093
Sup.thin	0.090	0.016	0.230	0.124	0.262	1	0.136	0.184	0.063
Mito	0.024	0.004	0.430	0.014	0.103	0.136	1	0.227	0.099
Munro	0.284	0.319	0.224	0.100	0.246	0.184	0.227	1	0.230
Exo.inf	0.135	0.151	0.116	0.231	0.093	0.063	0.099	0.230	1

Bold numbers show the correlation coefficient with significance below 0.05 levels.

Note: Hy.ker-Hyperkeratosis, Par.ker-Parakeratosis, Kogoj-Pustules of Kogoj, Spongi-Spongiosis, Papillae-Papillomatosis, Sup,thin-Supra papillary thinning, Mito-Mitosis, Munro-Munro micro abscess, Exo.inf-Exocytosis of inflammatory cells.

Table 4: Spearman's correlation for dermal changes.

Dermal change	Vascular proliferation	Dilated capillaries	Dermal edema	Tortuous capillaries
Vascular proliferation	1	0.163	0.414	0.511
Dilated Capillaries	0.163	1	0.113	0.003
Dermal Edema	0.414	0.113	1	0.197
Tortuous capillaries	0.511	0.003	0.197	1

Bold numbers show the correlation coefficient with significance below 0.05 levels.

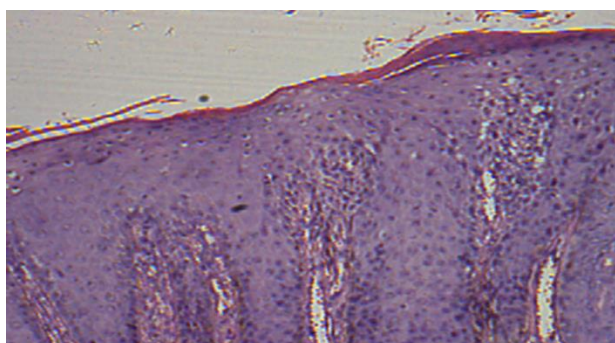


Figure 1: Agranulosis and mild hyperkeratosis (H&E, 10x).

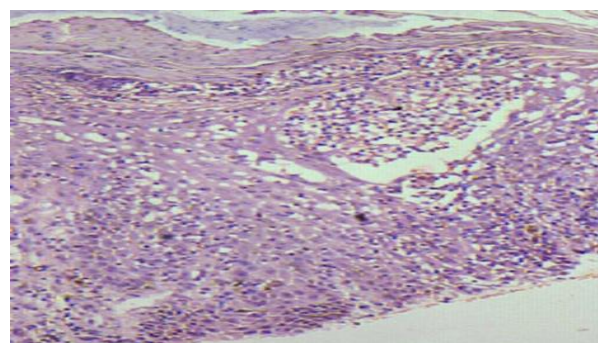


Figure 2: Munro micro-abscess and pustules of Kogoj (H&E, 10x)

In our study hypogranulosis was seen in 33 cases (55%) and there was absence of granular layer (agranulosis) in the remaining 27 cases (45%). There was no normal or increased granular layer in any of the cases. Even in cases with hypogranulosis the granular layer was either thinned out (11%) or thin and patchy (37%).

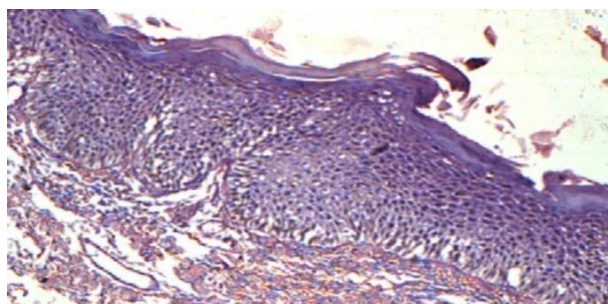


Figure 3: Agranulosis, Mild hyperkeratosis and irregular acanthosis (H&E, 10x).

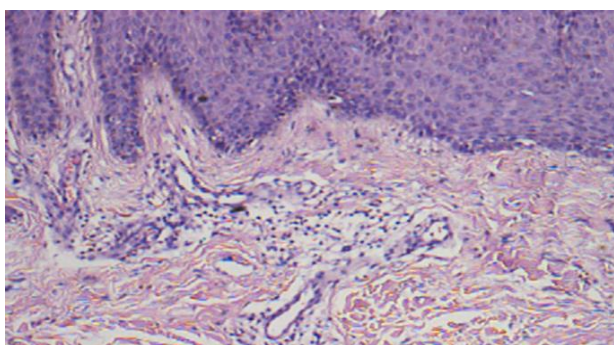


Figure 4: Dilated capillaries, dermal edema and mild chronic inflammation (H&E, 10x).

DISCUSSION

A total of 60 cases were analyzed in the current study, with 53 cases (88.33%) of psoriasis vulgaris and the remaining 7 cases (11.67%) to be pustular psoriasis. This finding correlated with a cross-sectional study done by Kassi et al, where psoriasis vulgaris was found in 60.7% ,universal psoriasis in 37.5% and generalized pustular psoriasis in 1.8% among 56 patients.⁵

Psoriasis was widely distributed in different age groups in the present study. The most common age was observed in second and fifth decades. The least found age in our study was 6 years and the highest age was 71 years. The mean age of psoriasis was found to be 39.53 ± 18.09 . In the study of Kassi K et al, the average age of psoriasis was 39.6 ± 3.3 years with extremes of 4 and 77 years.⁵ In the study by Alhumidi AA the age of onset of psoriatic disease ranged between 6 and 83 years with mean of 31.5 years and a median of 33 years.⁶

In the present study psoriasis was predominant in male patients (60%) and the male: female ratio was 1.5: 1. This

was similar to observations in previous Indian studies by Manjula VD et al and Okhanidar RP et al.^{7,8}

Only a few Indian studies analyzed the distribution of site in psoriasis. Okhanidar RP et al observed 116 psoriasis patients and found that the extensors (93%) were most common site followed by scalp (88%) and one third of the data showed face and nail involvement.⁸

Kaur I et al study revealed that mucosal involvement was uncommon in psoriasis.⁹ Alhumidi study stated that the common body site involvement was lower extremity (42%), followed by upper extremity (27%), back (22%), Abdomen (18%), genitalia (9%), scalp (8%) and nail (2%).⁶

In the current study, the commonest site was lower limb (90%), followed by upper limb (75%) and back (43.33%). Least distribution sites were genitalia (6.67%) and axillae (1.67%).

A study by Baker H reported that high humidity was beneficial and there was worsening of the skin lesions during winter in psoriasis.¹⁰ An Indian study by Bedi TR noted seasonal variation in 46% patients, half of whom felt worsening in winters.¹¹ Similarly, Kaur I et al and Zlotogorski A studies reported improvement of skin lesions in summer as compared to winter.^{9,12} In the present study 36.66% of cases presented during winter season followed by autumn and summer (25% and 21.67%).

The most common nature of psoriatic lesions in our study was erythematous plaque type (93.33%), whereas Kassi K et al and Fantani MI et al studies reported that itching was common.^{5,13}

In the current study, 3 cases of psoriasis vulgaris presented as pustular lesions with history of drug intake. This finding was similar to the study by Grace and James on drug provoked psoriasis, where they have documented that drug intake can both exacerbate the pre-existing psoriatic lesions and also can induce new psoriatic lesions.¹⁴

Very few studies have been conducted regarding histopathological changes in psoriasis. In our study, it was seen that hyperkeratosis and parakeratosis were more prominent in all cases (100%). Alternatively, supra papillary thinning (28.33%) and mitosis (36.67%) were less evident. The incidence of Munro micro abscess (55%) and pustules of Kogoj (46.67%) were more or less similar (Figure 2). We encountered that, spongiosis (91.67%) and exocytosis of inflammatory cells (98.33%) were the second most common characteristic features, followed by papillomatosis (73.33%).

Among the dermal changes dilated (88.33%) and tortuous (43.33%) capillaries were more prominent in psoriasis as compared to dermal edema (28.33%) and increased

vascular proliferation (16.67%). These dermal changes were similarly noted in Christophers EE study.¹⁵

The dermal inflammation was seen in all the cases either as chronic (33.34%) or mixed pattern (66.66%). This was similar to the observation by Kassi K et al, who have studied 11 cases and documented presence of lymphocytes, polymorphs, histiocytes and plasma cells in the dermis.⁵

A study comprised of 56 cases which was conducted by Kassi K et al concluded that, hyperkeratosis and agranulosis were exclusive epidermal features of psoriasis (100%), followed by supra papillary thinning (90.9%) and Munro microabscess (72.2%). In their study lymphocytic infiltrate (100%), dilated capillaries (63.6%) and tortuosity (36.6%) were the commonly observed dermal changes.⁵ But the current study showed mixed inflammatory infiltrate as common type of dermal infiltration (66.67%).

The study by Mehta S et al made a comparison of psoriasis with psoriasiform dermatitis. Out of 100 cases, the study concluded that supra papillary thinning and absence of granular layer were the statistically significant features of psoriasis in contrast to vertical orientation of collagen bundles and lymphocytic exocytosis which were the common histological features of psoriasiform dermatitis.¹⁶ Whereas, in the current study hyperkeratosis, parakeratosis, exocytosis of inflammatory cells, spongiosis and dilated capillaries were the significant features of psoriasis along with hypogranulosis and agranulosis. However, supra papillary thinning was not significantly seen in the current study.

Study conducted by Alhumidi AA focused on evaluating clinical, epidemiologic and histopathologic parameters on psoriatic patients, found that common features were acanthosis (75%) named as regular psoriasiform epidermal hyperplasia, Munro microabscess (70%), papillary dermal edema and dilated blood vessels (62%) and agranulosis (40%).⁶ Of these changes, similar results with dilated blood vessels (63.6%) and agranulosis (45%) were seen in the present study.

Granular layer of epidermis in psoriasis in the present study was appreciated as a characteristic finding with prominent agranulosis or hypogranulosis, whereas simulating lesions such as lichen simplex chronicus and subacutespongiosis dermatitis showed either normal or increased granular layer in epidermis.

This finding of paucity in granular layer is consistent with the pathogenesis of psoriasis where the abnormal regulation of T cells interacting with keratinocytes causes defective keratinocyte proliferation.¹⁷⁻¹⁹

The defective keratinocytes further activate synthesis and release of cytokines. This becomes a vicious cycle and

ultimately results in epidermal hyperplasia. Because of the rapid keratinocyte proliferation, there is aberrant retention of intact nuclei in the terminally differentiated keratinocytes resulting in parakeratosis and paucity of granular layer, which can vary from hypogranulosis to agranulosis.²⁰⁻²²

This mechanism of defective keratinocyte proliferation also explains the presence of parakeratosis and irregular acanthosis in all the cases of psoriasis encountered in our study.

CONCLUSION

There are various histopathological parameters to distinguish psoriasis which should be used in combination and not as isolated or unique feature.

The commonest age group observed in psoriasis were second and fourth decades and there was male predominance. Distributions of site in psoriasis were common in both upper (75%) and lower (90%) extremities. In various clinical presentations of psoriasis, erythematous type (93.33%) was more common. Psoriasis vulgaris also had pustular clinical presentation in three patients with history of drug intake. Psoriasis showed a marked seasonal variation and was encountered more during winter season (36.66%).

Significant histopathological parameters of psoriasis in the epidermis were parakeratosis (100%), hyperkeratosis (100%), irregular acanthosis (100%), spongiosis (91.67%) and papillomatosis (73.33%). In all the cases there was either hypogranulosis (55%) or agranulosis (45%). The reduction or complete absence of granular layer was characteristic of psoriasis and reflected the pathogenesis of defective keratinocyte proliferation. The characteristic dermal changes included dilated and tortuous capillaries (88.33% and 43.33%).

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