ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 09 | September - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

HISTOPATHOLOGICAL AND DERMOSCOPIC STUDY OF LICHEN PLANUS

Dermatology

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ABSTRACT

Background: Lichen planus (LP) is a chronic inflammatory disease that can involve the skin, mucous membranes, hair, and nails. It presents in multiple clinical variants, each associated with distinctive histopathological and dermoscopic features. Recognizing these patterns is essential for accurate diagnosis and assessment of disease activity. **Objectives:** The primary objectives of this study were to clinically assess patients with lichen planus, evaluate their histopathological findings, and identify characteristic dermoscopic patterns associated with the disease. **Methods:** This was a cross-sectional observational study conducted at the Department of Dermatology, Venereology, and Leprosy at JJM Medical College , Davangere. Thirty consenting patients with clinically diagnosed lichen planus were included based on inclusion criteria. Each patient underwent clinical examination, dermoscopic evaluation, and a skin biopsy for histopathological analysis. **Results:** Among the 30 patients studied, 10 were male and 20 were female, yielding a male-to-female ratio of 1:2. The majority of patients were between 21–40 years of age, and over half (53.34%) had a disease duration of less than 3 months. The limbs were the most commonly involved site. The most frequent variant was Classical LP, observed in 36.67% of cases. Key histopathological changes included hyperkeratosis (73.34%), hypergranulosis (70%), acanthosis (63.34%), and basal cell vacuolar degeneration (76.67%). Other findings included saw-toothed rete ridges (53.34%) and colloid bodies (23.34%). The most prominent dermal change was pigment incontinence (53.33%), followed by band-like lymphocytic infiltrates (40%). Dermoscopically, Wickham's striae were the most common feature (73.34%), with background colors including light red, brown, and gray-black. Vascular findings such as red dots and radial capillaries were noted, along with pigment dots, streaks, scaling, comedo-like openings, and peripilar casts. **Conclusion:** This study highlights that detailed clinical evaluation, supported by histopathological examination and dermoscopy, improves diagnostic accuracy in lichen planus. Dermoscopy proves particularly valuable in identifying disease activity and variant types, especially when histopathological confirmation is not feasible. Further studies with larger sample sizes are recommended to strengthen these observations.

KEYWORDS

Lichen planus; Clinical variants; Histopathology; Dermoscopy; Wickham's striae; Interface dermatitis; Pigment incontinence; Inflammatory dermatoses; Skin biopsy; Dermoscopic features

INTRODUCTION

The term "lichen planus" (LP) originates from the Greek word lichen, meaning "tree moss," and the Latin word planus, meaning "flat." Lichen Planus is a chronic, immune-mediated inflammatory disorder that can affect the skin, nails, hair, and mucous membranes [1,2].

Although the exact etiology remains unclear, LP is thought to result from a cell-mediated immune response in genetically predisposed individuals, triggered by environmental and internal factors such as hepatitis virus infection, mechanical trauma, psychological stress, and alterations in the cutaneous or systemic microbiome. Immunopathogenetically, LP is characterized by cytotoxic $CD8^{+}$ T lymphocyte–mediated damage to basal keratinocytes. These cytotoxic T cells are activated and sustained by T helper 1 (Th1) cells, the IL-23/Th17 axis, and other immune subsets, including Th9, Th17, and regulatory T cells (Tregs), all contributing to chronic inflammation and basal cell apoptosis [3].

Clinically, LP typically presents as pruritic, polygonal, flat-topped, violaceous papules and plaques, often on the flexor surfaces of the forearms [4]. A distinguishing feature is the presence of Wickham's striae, fine white reticulations on the surface of lesions. While clinical presentation is often characteristic, histopathological confirmation is advised to exclude other dermatoses with similar morphology [1,5].

Histologically, LP exhibits key diagnostic features including orthokeratosis, hyperkeratosis, wedge-shaped hypergranulosis (correlating with Wickham's striae), irregular acanthosis, and saw-toothed rete ridges. The dermoepidermal junction shows band-like lymphocytic infiltrates, vacuolar degeneration of basal keratinocytes, and Civatte bodies. In some cases, Max Joseph spaces (subepidermal clefts) may be observed [6].

Dermoscopy, a non-invasive diagnostic tool, bridges the gap between clinical and histopathological evaluation by allowing in vivo visualization of sub macroscopic skin structures. Its utility has been well established in the diagnosis of inflammatory dermatoses, especially in distinguishing lichen planus from mimickers like psoriasis [7].

The objective of this study was to comprehensively evaluate patients diagnosed with lichen planus through clinical examination, histopathological analysis, and dermoscopic assessment. The study aimed to document the clinical spectrum of lichen planus presentations, identify characteristic histopathological features that support the diagnosis, and analyze dermoscopic patterns that may aid in non-invasive, early detection and differentiation from other similar dermatoses.

METHODOLOGY

This cross-sectional study titled was conducted in the Department of Dermatology, Venereology and Leprosy at JJMMC,Davangere, over a period of 18months from March 2023 to September 2024, following approval from the Institutional Ethics Committee. The study included 30 clinically diagnosed cases of lichen planus attending the dermatology outpatient department or admitted to the wards, after obtaining informed written consent. All age groups were included, while cases showing lichenoid reaction patterns other than lichen planus were excluded. Data collection involved recording demographic details such as age, sex, body mass index (BMI), and disease duration using a predesigned proforma. Each patient underwent detailed clinical examination, dermoscopic evaluation of skin lesions, and skin biopsy for histopathological examination. The analysis utilized descriptive statistics to summarize the quantitative and qualitative data, which were presented using tables, bar diagrams, and pie charts prepared in Microsoft Excel and Word. Sample size was calculated using the formula: $n = (Z\alpha/2 + Z\beta)^2PQ / D^2$, with Z set at 1.96 for a 95% confidence interval and a relative margin of error at 5%, yielding a final sample size of 30.

RESULTS

A total of 30 cases of Lichen Planus, involving both sexes, who reported to the Department of Dermatology, Venereology, and Leprosy at Dr. J. J. M Medical College and Hospital, Davangere, were included in the study. As presented in Table No. 1, the majority of patients (56.67%, n=17) were in the 21–40 years age group, indicating a higher prevalence of Lichen Planus among younger adults. This was followed by the <20 years age group, accounting for 20% (n=6) of cases. The 41–60 years group comprised 16.67% (n=5) of patients, while the >60 years group represented the lowest proportion at 6.67% (n=2). In terms of gender distribution, 66.67% (n=20) of patients were female, while 33.33% (n=10) were male, giving a male-to-female ratio of 1:2. Regarding disease duration, 53.34% (n=16) had been experiencing symptoms for less than 3 months, followed by 30% (n=9) with a

duration between 3 to 6 months. 13.34% (n=4) of patients reported a duration exceeding 9 months, and only 3.34% (n=1) had symptoms persisting for 6 to 9 months.

As illustrated in Figure 1, among the 30 patients, the most common clinical variant observed was Classical Lichen Planus, accounting for 36.67% (n=11) of cases. Hypertrophic Lichen Planus, Eruptive Lichen Planus, and Lichen Planus Pigmentosus were each noted in 13.34% (n=4) of the patients. Linear Lichen Planus was identified in 10% (n=3) of cases, while Oral Lichen Planus was present in 6.67% (n=2) of the patients. Less common variants included Actinic Lichen Planus and Lichen Planopilaris, each affecting 3.34% (n=1) of the study population.

As represented in Table No. 2, the limbs were the most commonly affected site in Classical Lichen Planus (CLP), involved in 90.9% (n=10) of cases, while the scalp and trunk were the least affected, each in 9.09% (n=1) of patients. In Eruptive Lichen Planus (ELP), 100% (n=4) of patients showed limb involvement, followed by trunk involvement in 75% (n=3). The oral cavity was affected in only 25% (n=1) of ELP cases. All patients with Hypertrophic Lichen Planus (HLP) (100%, n=4) had lesions on the limbs. Among patients with Lichen Planus Pigmentosus (LPP), the face was the most frequently affected site, observed in 80% (n=4), followed by the neck in 20% (n=1). In Linear Lichen Planus (LLP), 100% (n=3) of cases involved the limbs. Lastly, in Oral Lichen Planus (OLP), 100% (n=2) of patients had lesions confined to the oral cavity.

As represented in Figure 2, the most common epidermal change observed among the 30 cases was basal cell vacuolar degeneration (BCVD), seen in 76.67% of patients, followed by hyperkeratosis in 73.34%, hypergranulosis in 70%, acanthosis in 63.34%, and saw-toothed rete ridges (STRR) in 53.34% of cases. Colloid bodies were present in 23.34% of cases, while less frequent findings included orthokeratosis (20%), hypogranulosis (13.34%), and parakeratosis (10%). In classical lichen planus (CLP), the predominant histopathological changes were hyperkeratosis (90.9%), acanthosis (72.73%), and hypergranulosis (63.64%), followed by orthokeratosis and BCVD (45.45% each), with STRR and colloid bodies each observed in 27.27%. In eruptive LP (ELP), acanthosis and BCVD were present in 100% of cases, hyperkeratosis and hypergranulosis in 50%, and orthokeratosis and hypogranulosis in 25%. All cases of hypertrophic LP (HLP) showed hyperkeratosis, hypergranulosis, and acanthosis (100%), with BCVD in 75%, and STRR and colloid bodies in 50%; hypogranulosis was the least common, seen in 25%. In linear LP (LLP), BCVD was present in all cases (100%), followed by hyperkeratosis and acanthosis (66.78%), and hypergranulosis, hypogranulosis, and parakeratosis each in 33.34%. In lichen planus pigmentosus (LPP), acanthosis, BCVD, and STRR were seen in 50% of cases, while orthokeratosis and hypergranulosis were present in 25%. The single case of actinic LP showed hyperkeratosis, parakeratosis, hypergranulosis, and BCVD. In oral LP (OLP), colloid bodies were seen in 100% of cases, followed by parakeratosis, hypergranulosis, hypogranulosis, acanthosis, and STRR, each found in 25%. Lichen planopilaris (LP pilaris) showed hyperkeratosis, hypergranulosis, and BCVD.

As depicted in Figure 3, the most common dermal change in Classical Lichen Planus (CLP) was pigment incontinence, observed in 54.54% (n=6) of cases, followed by perivascular band-like lymphocytic infiltrates in 27.27% (n=3). Less common features included Max Joseph spaces in 18.18% (n=2), and periadnexal and perifollicular infiltrates, each seen in 9.09% (n=1). In Eruptive LP (ELP), 75% (n=3) of patients showed both pigment incontinence and perivascular infiltrates. In Hypertrophic LP (HLP), pigment incontinence and perivascular lymphocytic infiltrates were present in 50% (n=2), while Max Joseph spaces and periadnexal infiltrates were seen in 25% (n=1). All cases of Linear LP (LLP) (100%, n=3) showed pigment incontinence. In Lichen Planus Pigmentosus (LPP), 100% (n=4) of cases showed pigment incontinence, followed by melanophages in 75% (n=3), and perivascular, periadnexal, and perifollicular inflammatory infiltrates in 25% (n=1) each. The sole case of Actinic LP (ALP) demonstrated pigment incontinence, while Lichen Planopilaris (LP pilaris) showed perifollicular inflammatory infiltrates. In Oral LP (OLP), 50% (n=1) of cases exhibited pigment incontinence.

As represented in Table No. 3, the most common dermoscopic feature among the 30 Lichen Planus cases was Wickham's striae, observed in 73.34% (n=22). The most frequent pattern was reticular/network (45.45%, n=10), followed by starburst (22.72%, n=5), branched/arboriform (18.18%, n=4), rounded (9.09%, n=2), and annular (4.54%, n=1). Background colour was noted in 86.67% (n=26) of patients, with light red being most common (38.46%, n=10), followed by brown and gray-black (each 30.76%, n=8). Vessel patterns were present in 16.67% (n=5), most commonly radial capillaries (80%, n=4), and less frequently red dots (20%, n=1). Pigment patterns were observed in 33.34% (n=10), predominantly pigment dots (70%, n=7), followed by pigment streaks (30%, n=3). Scales were seen in 40% (n=12). Among clinical variants, Classical LP (n=11) showed Wickham's striae in 81.81% of cases, most commonly starburst and reticular patterns. Eruptive LP (n=4) had Wickham's striae in 50%, with light red background and radial capillaries. Hypertrophic LP (n=4) exhibited 100% Wickham's striae with branched patterns and brown background; all showed scales. Linear LP (n=3) consistently showed reticular Wickham's striae and gray-black background. In Actinic LP, a reticular pattern was noted over brown background. Lichen Planopilaris showed perifollicular scaling (peripilar casts), while Lichen Planus Pigmentosus (n=4) displayed pigment dots in 75%. Oral LP (n=2) showed reticular Wickham's striae over light red background, with red dots and pigment streaks.

Clinico-pathological correlation revealed that among 19 cases with violaceous hue, 36.84% (n=7) showed hypergranulosis with band-like infiltrate—explaining the Tyndall effect. In LPP, 50% showed basal cell vacuolar degeneration indicating active lesions, and in Lichen Planopilaris, perifollicular infiltration indicated disease activity. Histopathological-dermoscopic correlation showed that 68.18% (n=15) of the 22 cases with Wickham's striae had wedge-shaped hypergranulosis, and all 7 cases with gray-blue dots showed pigment incontinence. One patient with violaceous plaques over the scalp and comedo-like openings on dermoscopy had histopathology consistent with infundibular hypergranulosis and orthokeratosis. All five cases with vessel patterns (red dots and radial capillaries) showed dilated vessels with perivascular lymphocytic infiltrates, indicative of active inflammation.

DISCUSSION

In the present study, the majority of patients were within the 21–40 years age group, a finding consistent with studies by Nasreen et al [8] and Parihar et al [9]. This age predominance may reflect the heightened immune reactivity and environmental exposures typically seen in young adults. Conversely, Rampal et al [10] reported a higher prevalence in the 40–60 years age group, likely influenced by the higher proportion of Oral LP cases in their cohort, which are more frequently observed in older adults due to delayed presentation or chronicity.

We observed a clear female predominance in our study with a male-to-female ratio of 1:2, aligning with findings from Garg et al [11] and Rampal et al [10], and contrasting with Raghavendra et al [12] who reported a slight male predominance. Although LP is often reported as having no strong sex predilection, mucosal and pigment variants tend to show a female bias, possibly influenced by hormonal, genetic, or behavioral factors [13].

Regarding disease duration, <3 months was the most common in the present study, correlating with Raghavendra et al [12]. In contrast, studies by Horatti et al [14] and Rampal et al [10] found longer durations, likely due to inclusion of more chronic variants such as Oral LP, which can remain asymptomatic or untreated for extended periods.

Among clinical variants, Classical LP was the most frequent (36.67%), followed by Hypertrophic LP, Eruptive LP, and Lichen Planus Pigmentosus (13.34% each). Less frequent forms included Linear LP, Actinic LP, LP pilaris, and Oral LP. These findings are consistent with those of Reddy PK et al [15], Garg et al [11], and Rampal et al [10], although Tickoo et al [16] reported a higher incidence of Classical LP (58.9%), possibly reflecting population or geographic differences.

Anatomically, the limbs were the most commonly involved site (60%), followed by the trunk, face and neck, oral cavity, and scalp. These distributions align with reports by Wankhade et al [17], Horatti et al [14], Parihar et al [9], and Tickoo et al [16]. It is worth noting that LPP and Lichen Planopilaris had preferential involvement of the face, neck, and scalp, correlating with follicular targeting and melanin-rich sites in these variants.

Histopathologically, the most common epidermal changes included

hyperkeratosis (73.34%), hypergranulosis (70%), acanthosis (63.34%), basal cell vacuolar degeneration (BCVD, 76.67%), and saw-toothed rete ridges (53.34%). These changes are consistent with previous reports by Rampal et al [10], Maheshwari et al [18], Chauhan R et al [19], and Kumar UM et al [20]. The presence of BCVD supports the concept of LP as an interface dermatitis driven by $CD8^{+}$ T-cell–mediated keratinocyte apoptosis, while wedge-shaped hypergranulosis correlates histologically with Wickham's striae, a classical dermoscopic and clinical hallmark.

Dermal findings were dominated by pigment incontinence (53.33%) and band-like lymphocytic infiltrates (40%), with Max Joseph spaces observed in 10% of cases. The predominance of perivascular inflammation reflects active interface changes, while perifollicular infiltrates seen in Lichen Planopilaris and the co-localized case of Alopecia Areata with LP further highlight the follicular tropism of certain LP variants. These dermal changes are consistent with findings from Maheshwari et al [18] and Chauhan R et al [19].

Dermoscopic evaluation revealed Wickham's striae as the most frequent feature (73.34%), appearing against light red, brown, or gray-black backgrounds. These findings mirror those of Lallas A et al [21], Praneet et al [22], Meena et al [23], and Reddy PK et al [15]. Radial capillaries and red dots were the main vascular patterns, indicating active inflammation and corroborated by the histological presence of dilated perivascular vessels with lymphocytic infiltrates. Pigment dots and streaks were also observed, particularly in LPP, and scaling was noted in 40% of cases. Notably, peripilar casts were seen in LP pilaris, and comedo-like openings in a case with co-localized Alopecia Areata, which histologically demonstrated infundibular hypergranulosis with orthokeratosis.

Clinico-pathological correlation revealed that 68.18% of the 22 cases with Wickham's striae on dermoscopy also demonstrated wedge-shaped hypergranulosis histologically. All 7 cases showing gray-blue dots on dermoscopy had corresponding pigment incontinence, reinforcing the dermoscopic-histologic link. Furthermore, all five cases displaying vascular features (radial capillaries or red dots) had histological evidence of dilated vessels and perivascular lymphocytic infiltration, confirming the presence of active inflammatory processes.

CONCLUSION

Lichen planus is a clinically recognizable condition in most cases; however, in diagnostically challenging scenarios, a comprehensive correlation between clinical features, histopathology, and dermoscopy is essential to avoid misdiagnosis and ensure optimal therapeutic outcomes. Although the sample size in the present study was limited, the findings support the utility of dermoscopy as a valuable, non-invasive adjunctive tool, particularly in settings where histopathological confirmation is not feasible. Dermoscopic features not only aid in diagnosis but also in assessing disease activity. Larger, multicentric studies are warranted to further validate and refine the clinical, histopathological, and dermoscopic correlations in lichen planus.

Table No. 1 – Demographic and Clinical Profile of Patients (N=30)

Parameter	Category	Frequency (n)	Percent (%)
Age Group	<20 years	6	20.00
	21–40 years	17	56.67
	41–60 years	5	16.67
	>60 years	2	6.67
Gender	Male	10	33.33
	Female	20	66.67
Duration of Illness	<3 months	16	53.34
	3 months–6 months	9	30.00
	6 months–9 months	1	3.34
	>9 months	4	13.34

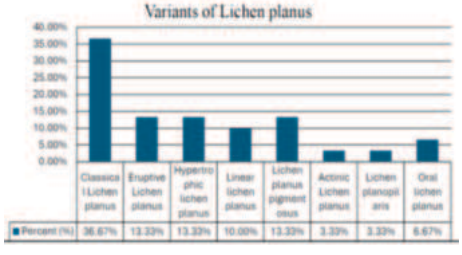

Figure 1: Variants of Lichen planus

Table No. 2 – Location with Diagnosis

Diagnosis	Oral Cavity	Face	Neck	Limbs	Scalp	Trunk
Classical Lichen Planus (n=11)	1 (9.1%)	4 (80%)	1 (20%)	10 (90.9%)	1 (9.09%)	1 (9.09%)
Eruptive Lichen Planus (n=4)	–	1	1	4 (100%)	–	–
Hypertrophic Lichen Planus (n=4)	–	–	–	4 (100%)	–	–
Linear Lichen Planus (n=3)	–	–	–	3 (100%)	–	–
Lichen Planus Pigmentosus (n=4)	–	1	1	1	–	3 (75%)
Actinic Lichen Planus (n=1)	–	–	–	–	–	–
Lichen Planopilaris (n=1)	–	–	–	–	1 (100%)	–
Oral Lichen Planus (n=2)	2 (100%)	–	–	–	–	–

Figure 2: Graph showing Epidermal Changes

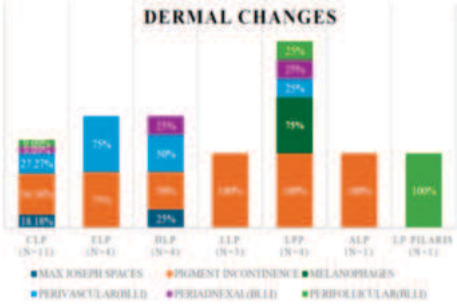

Figure 3: Graph showing Dermal Changes

Table No. 3 – Dermoscopic Features by Diagnosis

Feature	CLP (n=11)	ELP (n=4)	HLP (n=4)	LLP (n=3)	LPP (n=4)	ALP (n=1)	LP pilaris (n=1)	OLP (n=2)
Wickham's Striae	9	2	4	3	0	1	0	1
Starburst	4 (44.45%)	1 (50 %)	–	–	–	–	–	–
Reticular/ Network	3 (33.34%)	1 (25 %)	–	–	2 (6.67 %)	1 (100 %)	–	1 (100 %)
Branched/ Arboriform	1 (11.12%)	–	2 (50 %)	1 (33.34%)	–	–	–	–
Rounded	1 (11.12%)	–	–	–	1 (50 %)	–	–	–
Annular	–	–	–	–	1 (25 %)	–	–	–
Background Colour	9	4	4	3	1	1	0	2
Brown	3 (33.34 %)	1 (25 %)	–	–	3 (75 %)	–	–	1 (100 %)

Light Red	4 (44. 45%)	–	3 (75 %)	2 (100 %)	–	–	–	–
Gray Black	2 (22. 23%)	1 (25 %)	–	–	3 (100 %)	1 (100 %)	–	–
Vessel Pattern	3	1	0	0	0	0	0	1
Red Dots	1 (100 %)	–	–	–	–	–	–	–
Red Globules	–	–	–	–	–	–	–	–
Radial Capillaries	3 (100 %)	–	–	–	–	–	–	1 (100 %)
Pigment Pattern	3	1	2	0	3	0	0	1
Dots	3 (100 %)	1 (50 %)	–	–	3 (100 %)	–	–	–
Streaks	1 (100 %)	1 (50 %)	–	–	1 (100 %)	–	–	–

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