

Serum Lipid Profile in Patients with Lichen Planus

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ABSTRACT

Background: Lichen planus (LP) is a chronic inflammatory disease that involves the skin, mucous membrane, and adnexa. Dyslipidemia, a well-known cardiovascular risk factor found to be increased in patients with LP. This study evaluated the serum lipid profile in patients with LP and the control group.

Materials and Methods: This case-control study was done in the Department of Dermatology & Venereology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Patients with LP were taken as cases and patients with skin diseases other than LP were taken as control. Total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglyceride (TG) were measured by an enzymatic method.

Results: This study showed higher mean TC (187 vs. 168, p-value 0.01), TG (147 vs. 117, p-value 0.04), and LDL-C (118 vs. 105, p-value 0.04) in patients with LP than in the control. HDL-C level shows no significant differences (38 vs. 40, p-value 0.50). Odds ratio (OR) for high TC, TG & LDL-C are 3.6 (95% CI: 1.26–10.56), 2.3 (95% CI: 0.87–6.31) & 4.0 (95% CI: 1.4–11.6) respectively whereas OR for low HDL-C is 0.74 (95% CI: 0.31–1.77). Regarding atherogenic index, LDL-C/HDL-C and TC/HDL-C ratios were significantly higher in LP patients (p-value 0.001 & 0.002 respectively).

Conclusion: Analysis of lipid values reveals significantly higher levels of total cholesterol, triglyceride & LDL-C in LP patients. The atherogenic index is also significantly higher in LP patients which is a sensitive marker of cardiovascular risk.

Keywords: A case-control study, Dyslipidemia, Lichen planus, Lipid profile.

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1. INTRODUCTION

Lichen planus (LP) is a pruritic, inflammatory disease affecting the skin, mucous membranes, hair, and nails. It is a common papulosquamous disorder having worldwide distribution [1]. Its prevalence between 0.4% and 1.9% in different populations is [2]. Males and females both are affected. The peak age is between 40–70 years [3].

LP diagnosis is based on the clinical features and histological findings. The classic lichen planus is characterized by flat-topped, pruritic, purplish, polygonal-shaped papules or plaques distributed mainly on the flexor aspect of wrists, trunk, medial thigh, shin, dorsal aspect of hands, and glans penis. Lesions usually begin as pinpoint papules and expand to 0.5–1.5 cm plaques. On the surface, grey or white streaks are seen across the lesions known as “Wickham’s striae” [3]. It is seen more easily with

the help of dermoscopy [4]. Histological findings are a “saw tooth” pattern of epidermal hyperplasia, compact orthokeratosis, and beaded hypergranulosis along with the destruction of the basal layer. The basal cells are lost, termed “squamatized”. There is a dense band-like infiltrate in the superficial dermis composed of lymphocytes and melanophages. In the superficial dermis, necrotic keratinocytes are described as “Civatte bodies” (cytoid bodies, colloid bodies) [3].

LP is thought to be an immunologically mediated inflammatory disease, though the exact etiopathogenesis is not fully understood [5]. The antigenic stimulus by which this immunological response occurs is still elusive. Some factors and disease conditions such as genetic polymorphism of HLA markers, dental materials such as silver amalgam, infections (commonly hepatitis C virus), autoimmune diseases (e.g., ulcerative colitis,

primary biliary cirrhosis, thymoma, myasthenia gravis), drugs, anxiety, stress, and physical factors like radiation therapy have been implicated in association with LP [6]. In LP both cytotoxic T cells (CD8) and helper T cells (CD4) are stimulated to combat the antigens presented by Langerhans cells. These activated T cell release cytokines that attract inflammatory cells and eventually cause the destruction of keratinocytes and resulting in free radicals generation. During this lymphocytotoxic process, more cytokines such as IL-6, IL-2, IL-4, IL-10, TNF-alpha, and IFN-gamma are released. Higher expression of the inflammatory CXCR3 ligands CXCL9, CXCL10, and CXCL11 are observed in LP, induced by TNF-alpha that is released from activation of the plasmid dendritic cells & effector cytotoxic T lymphocytes [2]. These inflammatory cytokines along with oxidative stress produced by free radicals cause disturbances in lipid metabolism, such as increases in serum total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), triglycerides (TG), and decreases in high-density lipoprotein cholesterol (HDL-C). Thus, inflammation could potentially explain the association of lipid abnormalities observed in LP patients [7]. If the inflammation persists, the changes in the lipid profile become sustained and lead to the accumulation of cholesterol in cells. Thus, lipid foam cells are produced and fatty streaks in the arterial walls are formed. This eventually causes the development of atherosclerotic plaques and leads to cardiovascular disease (CVD) [8].

Dyslipidemia is characterized by an increase in serum TC, LDL-C, and TG and a decrease in serum HDL-C concentration [9]–[11]. The prevalence of dyslipidemia varies. It has been estimated that worldwide >50% of the adult population has dyslipidemia [12]–[14].

CVD is a chronic non-communicable disease and one of the most important causes of death and morbidity [15]. The prevalence of CVD events is increasing day by day [15], [16]. Public health organizations have concentrated on reducing the modifiable risk factors of CVD such as unhealthy diet, obesity, hypertension (HTN), and dyslipidemia to control CVD [11], [16]–[19].

Among dyslipidemias, LDL is not only a biomarker of increased risk but also a causal factor in the pathophysiology of atherosclerotic cardiovascular disease [20]. Currently, the main goal in the management of dyslipidemia is to reduce serum LDL-C levels [21]. Now a day's cardiovascular disease is a major public health issue and one of the leading causes of morbidity and mortality worldwide [22].

Research conducted by a few authors has demonstrated a higher prevalence of dyslipidemia in LP patients [1], [7], [23]. However, some disagreed with this statement [24],

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF THE STUDY GROUPS

Characteristics	LP	Control
Age median (range)	35 (18–68)	35 (17–72)
Male	23 (53.5%)	24 (55.8%)
Female	20 (46.5%)	19 (46.5%)
Height (cm)	164.05 ± 6.47	164.81 ± 6.91
Weight (kg)	60.05 ± 9.61	60.09 ± 7.29
BMI (kg/m ²)	22.24 ± 2.94	22.13 ± 2.48

TABLE II: LABORATORY CHARACTERISTICS OF THE STUDY GROUPS

Characteristics	Case	Control	p-value
TC (mg/dl)	187.70 ± 38.90	168.79 ± 34.15	0.01
TG (mg/dl)	147.98 ± 87.85	117.53 ± 46.23	0.04
LDL-C (mg/dl)	118.98 ± 34.04	105.1 ± 27.58	0.04
HDL-C (mg/dl)	38.77 ± 10.04	40.3 ± 11.23	0.50
LDL-C/HDL-C	3.15 ± 0.88	2.70 ± 0.66	0.001
TC/HDL-C	5.02 ± 1.14	4.32 ± 0.74	0.002
FBS (mmol/l)	5.21 ± 1.123	5.01 ± 0.81	0.35

Note: FBS: Fasting blood sugar.

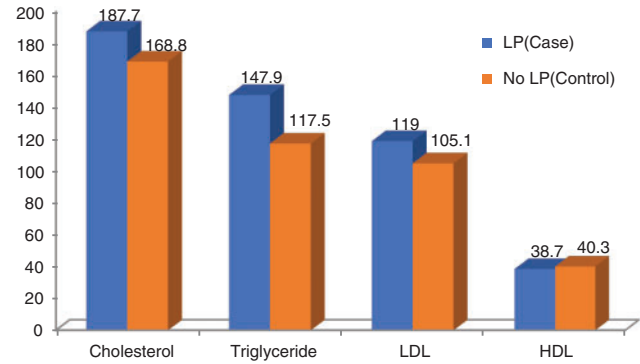


Fig. 1. Bar diagram showing comparison of mean lipid values between case & control.

[25]. This discrepancy of observation in previous results motivates further investigations of lipid profiles in LP patients.

2. MATERIALS AND METHODS

This case-control study was conducted in the Department of Dermatology & Venereology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from April 2016 to February 2018. This study included 43 patients with lichen planus as cases and 43 patients with skin diseases other than lichen planus as control. Patients with diseases known to be associated with dyslipidemia, e.g., psoriasis, acanthosis nigricans, xanthoma, lichenoid drug eruption, hypothyroidism, nephrotic syndrome, cholestatic liver disease were excluded from the study. Pregnant women and patients receiving lipid-lowering agents were also excluded. Diagnosis of lichen planus was based on clinical findings and confirmed by skin biopsy with histopathology. Normal lipid profile value is considered as follows: total cholesterol (TC) <200 mg/dl, high-density lipoprotein cholesterol (HDL-C) >40 mg/dl, low-density lipoprotein cholesterol (LDL-C) <130 mg/dl, and triglyceride (TG) <150 mg/dl [26]. Ethical issues were addressed with every patient. Fasting serum lipid levels- TC, HDL-C, LDL-C, and TG were measured by an enzymatic method in both investigated groups. Statistical Package for Social Sciences (SPSS) version 24.0 was used to carry out the statistical analysis. Qualitative and quantitative variables were expressed as percentage & mean ± standard deviation respectively. The Chi-Square test & Fisher exact test were used for categorical variables. An unpaired t-test was used to compare the mean between the two groups. For all

TABLE III: CHARACTERISTICS OF LIPID LEVELS IN CASE AND CONTROL

Characteristics	Value	LP	Control	p-value	Odd ratio (OR)	95% CI
Dyslipidemia	No	18 (41.9%)	30 (69.8%)	0.016	3.2	1.31–7.79
	Yes	25 (58.1%)	13 (30.2%)			
TC (mg/dl)	Normal	27 (62.8%)	37 (86%)	0.013	3.6	1.26–10.56
	High	16 (37.2%)	6 (14%)			
TG (mg/dl)	Normal	28 (65.1%)	35 (81.4%)	0.08	2.3	0.87–6.31
	High	15 (34.9%)	8 (18.6%)			
LDL-C (mg/dl)	Normal	26 (60.5%)	37 (86%)	0.007	4.0	1.40–11.60
	High	17 (39.5%)	6 (14%)			
HDL-C (mg/dl)	Normal	16 (37.2%)	19 (44.2%)	0.51	0.74	0.31–1.77
	Low	27 (62.8%)	24 (55.8%)			

TABLE IV: CHARACTERISTICS OF ATHEROGENIC INDEX IN CASE AND CONTROL

Parameter	Value	CONTROL		p-value
		Case	Control	
LDL-C/HDL-C	Normal	6 (14%)	16 (37.2%)	0.013
	High	37 (86%)	27 (62.8%)	
TC/HDL-C	Normal	4 (9.3%)	4 (9.3%)	1.00
	High	39 (90.7%)	39 (90.7%)	

statistical tests, a p-value less than 0.05 was considered statistically significant.

3. RESULTS AND DISCUSSION

The median age of lichen planus patients was 35 years (range 18–68) and the median age of the control group was also 35 years (range 17–72). The male-female ratio was 1.15:1 for LP patients and 1.26:1 for the control group (Table I).

Dyslipidemia plays a vital role in the development of cardiovascular diseases, one of the leading causes of death in most developed and developing countries. Inflammation causes disturbances in lipid metabolism. In lichen planus, the T-cell-mediated inflammatory process produces lipid metabolism disturbances. Analysis of lipid parameters by [1] revealed significantly higher levels of TC, TG, and LDL-C along with decreased levels of HDL-C in LP patients as compared to the control [1]. A significantly higher atherogenic index is observed in LP patients than in the control. Reference [23] confirmed significantly higher levels of TC (158 vs. 143, p-value 0.018), TG (153.03 vs. 107.91, p-value 0.008), VLDL-C (30.61 vs. 22.75, p-value 0.021) and significantly lower levels of HDL-C (38.86 vs. 45.78, p-value < 0.001) in LP patients [23]. Both TG/HDL-C ratio (4.26 vs. 3.19) and LDL-C/HDL-C ratio (2.45 vs. 1.78) were significantly higher in LP patients than in control.

Reference [24] found that there was no statistically significant difference between LP patients and the control group according to the average values of serum lipids [24]. Similarly, [25] reported that there was no statistically significant difference between LP patients and the control group regarding TC (174 vs. 169, p-value 0.6), TG (109.2 vs. 112, p-value 0.85) & HDL-C (47.5 vs. 38.8, p-value 0.2). Mean LDL Cholesterol was higher in control patients than LP patients (118 vs. 107, p-value 0.2) [25]. However, the study by [7] and Reza

et al. (2017) is consistent with the positive association of dyslipidemia in patients with LP [7], [27]. Meta-analysis was done by Lai et al. [28], where seven studies with 5242 patients were analyzed. It was shown that LP is strongly associated with dyslipidemia especially high TG levels [28].

In this study, a significant difference was found in the mean TC (187.7 vs. 168.8, p-value 0.019), TG (147.9 vs. 117.5, p-value 0.048), and LDL-C (119.0 vs. 105.1, p-value 0.041) levels in LP patients than control groups. HDL Cholesterol levels were lower in LP patients in the control group but didn't reach statistical significance (38.8 vs. 40.3, p-value 0.5) (Table II and Fig. 1).

The mean FBS values of our study patients & control were 5.21 ± 1.12 mmol/l and 5.0 ± 0.81 mmol/l. In our study, no significant difference was observed between LP and the control group regarding mean FBS levels. No significant difference was also found between these two groups concerning alcohol consumption, familial dyslipidemia, and history of hypertension.

Our study showed the prevalence of dyslipidemia was significantly higher in patients with LP (58.1% vs. 30.2%, $P = 0.016$; odds ratio (OR) 3.20, 95% confidence interval (CI): 1.31–7.79) (Table III).

The TC was elevated in 16 (37.2%) patients with LP and 6 (14%) patients in the control group. LDL-C was elevated in 17 (39.5%) patients with LP and 6 (14%) patients in the control group. Both the findings are statistically significant (p-value 0.013 & 0.007, respectively) (Table III).

A high (>2.5) LDL-C/HDL-C ratio & high (>3.5) TC/HDL-C ratio is a sensitive predictive marker of cardiovascular risk [23]. In this study, a high LDL-C/HDL-C ratio was observed in 37 (86%) patients and 27 (62.8%) patients with LP & control group respectively with a p-value of 0.013 (Table IV).

4. CONCLUSION

Analysis of lipid parameters reveals significantly higher levels of TC, TG & LDL cholesterol in LP patients. In this study, a significantly higher LDL-C/HDL-C ratio was found in LP patients which is a sensitive predictor of cardiovascular risk. Routine screening of lipid profiles can be of great value for preventing cardiovascular events in LP patients who are at risk of developing cardiovascular disease.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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