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Lipoprotein Density Stage Analysis and Cardiovascular Risk in Psoriasis

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A B S T R A C T

One of the most prevalent dermatological conditions is psoriasis, a chronic inflammatory condition. Although it is linked to a number of illnesses, cardiovascular disease is the most prevalent. Since lipid abnormalities are seen in psoriasis sufferers early on, the condition may be genetically resolved. Therefore, it is crucial to investigate lipid abnormalities in psoriatic patients in order to assess the risk of atherosclerosis and vascular obstructive disorders, as well as the morbidity and mortality that go along with them. ***Aim*:** Estimating lipoprotein levels and associated cardiovascular disease risk in psoriasis patients. ***Materials and Methods*:** This cross-sectional analytical investigation is centered in the community. The healthy ambulatory population in and surrounding Jay Prabha Medanta Super Specialty Hospital in Kankarbagh, Patna, Bihar, comprised the study population.40 psoriatic patients with a mean age of 50.68 ± 8.86 years made up the study group, while 40 healthy people of either sex with a mean age of 50.15 ± 9.6 years made up the control group. There were 55% males and 45% females in the control group and 59% males and 41% females in the test group. estimation of serum triglycerides, total cholesterol, high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol the same day, lipoprotein levels were measured. The Enzymatic End Point Method is used to estimate the amounts of lipoproteins. The mean, standard deviation, p-value, and Chi-square test were computed in order to analyze the data. ***Results*:** Psoriasis patients had significantly higher levels of VLDL and total cholesterol than control subjects ($p<0.05$). Serum TG results showed a significantly significant difference between psoriasis sufferers (6.8 ± 1.49) and controls (3.08 ± 1.3) ($p<0.001$). Serum LDL levels in psoriasis patients and controls did not differ significantly, though. Serum HDL levels did not significantly alter in either the control group or the psoriasis patients. While there were no discernible changes in the LDL/HDL ratio between the psoriasis case and control, there was a statistically significant difference in the TC/HDL ratio ($p<0.05$). ***Conclusion*:** According to the current research, hyperlipidemia was linked to psoriasis patients. Thus, they are at a significant risk of getting cardiovascular disorders. We propose that assessing psoriatic patients' serum lipid profiles will aid in early risk assessment. Cardiovascular problems can be avoided in these patients with quick therapy.

Keywords: Psoriasis, dyslipidemia, Cardiovascular risk, low density lipoprotein, high density lipoprotein, HDL/LDL ratio.

INTRODUCTION

One of the most prevalent dermatological conditions is psoriasis, a chronic inflammatory condition [1]. Just 1% of people worldwide are impacted [2]. Although it is linked to a number of illnesses, cardiovascular disease is the most prevalent. The primary cause of cardiovascular diseases is atherosclerosis. Lipid metabolism is out of equilibrium, which leads to atherosclerosis [2]. The lipid abnormalities can be identified in psoriasis patients at an early stage of the condition, they may be genetically determined [3]. According to studies, psoriasis patients may be more susceptible to a number of non-cutaneous conditions, such as venous and arterial occlusive illnesses. The elevated risk of atherosclerosis in psoriasis patients may be due to alterations in their plasma lipid and lipoprotein composition [4, 5]. Fatty acid composition anomalies in erythrocytes, adipose tissue, and epidermal cells have been noted in psoriasis patients,

indicating that lipid metabolism disruption may be a widespread phenomena in psoriasis [6]. It has been discovered that people with psoriasis are more likely to have cardiovascular irregularities, hypertension, dyslipidemia, atherosclerosis, type 2 diabetes, obesity, chronic pulmonary obstructive disease, and osteoporosis [7]. In order to assess the degree of risk that people may have for atherosclerosis and vascular obstructive disorders, as well as the related morbidity and mortality, it is imperative that we investigate lipid abnormalities in psoriatic patients [8].

Objectives

1. Calculation of serum levels of triglycerides, HDL, LDL, and total cholesterol in psoriasis patients and a healthy, asymptomatic control group.
2. VLDL, TC/HDL, and LDL/HDL ratio estimation.
3. A comparison between psoriatic patients and controls in the aforementioned characteristics.

Materials and Methods

Jay Prabha Medanta Super Specialty Hospital in Kankarbagh, Patna, Bihar, was the site of the study. It was a cross-sectional analytical research conducted in a community. The research was carried out between April 2022 and May 2023. The healthy ambulatory population in and around the Patna area made up the study population. After receiving written consent in the local language from each participant with permission and approval from the Institutional Ethics Committee (IEC) via letter dated PMSSH/04/NPA/18/08/2024, the study was launched. There were no extra expenses for the patient as a result of the study, and none of the participants received any kind of payment.

The study population was chosen based on the inclusion and exclusion criteria.

Test group I:

- Forty psoriatic patients of either sex make up this trial group.
- Psoriasis patients aged 30 to 70 years are eligible to apply.

Control group II:

- Forty healthy people of either sex made up this group.
- Requirements for Inclusion: Healthy volunteers aged 30 to 70 years.
- The same exclusion criteria applied to both the test and control groups. Participants who refused to provide written consent, those who had a history of acute or chronic systemic illness, those taking supplements or drugs, and those who smoked or drank alcohol were all disqualified.

Methodology for Estimating Serum Total Cholesterol

The enzymatic approach-Peroxidase/cholesterol oxidase. A normal reference range is 4 < 200 mg/dl. Between 200 and 239 mg/dl: Borderline 4 >240 mg/dl: elevated.

Methodology for Estimating Serum Triglyceride Levels

Enzymatic approach-Glycerol peroxidase/phosphate. Range of Reference: 4 Up to 150 mg/dl: Normal 4 150–199 mg/dl: In the middle-high and 4 >500 mg/dl: extremely high 4 200-499 mg/dl: high.

Statistical Analysis

The data was analyzed using statistical techniques, including the Chisquare test, p-value, mean, and standard deviation.

RESULTS AND OBSERVATIONS

Table 1: Distribution of age in controls and cases

AGE GROUPS	CONTROLS (n=40)	CASES (n=40)
I(30-40) yrs	9(22.5%)	8(20%)
II(41-50) yrs	12(30%)	13(32.5%)
III(51-60)yrs	12(30%)	12(30%)
IV(61-70)yrs	7(17.5%)	7(17.5%)
Mean± SD	50.15 ± 9.6	50.68 ± 8.86

The age distribution of patients and controls is shown in Table 1. The mean age of psoriatic patients and control subjects did not differ statistically significantly (p = 0.76).

Table 2: Sex distribution of Cases and Controls

SEX	CONTROLS (n=40)	CASES (n=40)
MALES	22(55%)	23(59%)
FEMALES	18(45%)	17(41%)

This Table depicts sex distributions between cases and controls.

There was no statistically significant difference in the gender distribution of psoriatic patients and controls (p=0.371). It was found that 41% of the psoriasis patients in this study were female and 59% of the patients were male. This revealed the mean proportion of psoriasis in women was lower than in men.

Table 3: Distribution of cases and controls according to serum total cholesterol

TOTAL CHOLESTEROL (mg/dl)	CONTROLS (n=40)	CASES (n=40)
UPTO 200mg/dl(DESIRABLE)	28(70%)	22(55%)
200-239mg/dl (BORDERLINE)	12(30%)	12(30%)
>240mg/dl(HIGH)	0(0%)	6(15%)
Mean± SD	177.42 ± 34.59	196 ± 40.61*

**** P< 0.05 as compared to control***

Serum total cholesterol levels up to 200 mg/dl were found in 55% of psoriatic patients and 70% of control cases. Nonetheless, borderline blood total cholesterol (200–239 mg/dl) was present in 30% of both control and psoriatic individuals, and there was no statistically significant difference between these groups. When blood cholesterol levels were high (>240 mg/dl), psoriatic patients had significantly higher total cholesterol levels than controls.

Table 4: Distribution of cases and controls according to serum triglyceride levels (TG)

TG (mg/dl)	CONTROLS (n=40)	CASES (n=40)
UPTO 150mg/dl(DESIRABLE)	27(67.5%)	17(42.5%)
150 – 199mg/dl (BORDERLINE)	12(30%)	11(27.5%)
> 200 mg/dl(HIGH)	1(2.5%)	12(30%)
Mean± SD	3.08 ± 1.3	6.8 ± 1.49*

**** P< 0.001 as compared to control***

At 150 mg/dl, the desired category, serum triglyceride levels were considerably lower in psoriasis sufferers than in controls. Triglyceride levels >200 mg/dl were statistically significantly higher in psoriasis cases than in controls (P < 0.001). Psoriatic patients have greater mean serum triglyceride levels than the control group. Table 4 indicates that the difference was statistically significant (p<0.001).

Table 5: Distribution of cases and controls according to serum high density lipoprotein (HDL) levels

HDL (mg/dl)	CONTROLS (n=40)	CASES (n=40)
UPTO 35 (mg/dl)	1(3%)	17(43%)
35-60 (mg/dl)	30(75%)	23(58%)
>60 (mg/dl)	9(23%)	0(0%)
Mean± SD	41 ± 6.9	43.38 ± 15.18

When compared to the control group, the cases' serum HDL values were lower. Statistically, the difference was not significant (p=0.22).

Table 6: Distribution of cases and controls according to serum low density lipoprotein (LDL) levels

LDL (mg/dl)	CONTROLS (n=40)	CASES (n=40)
I<150 (mg/dl)	39(97.5%)	33(82.5%)
II>150 (mg/dl)	1(2.5%)	7(17.5%)
Mean± SD	114.65 ± 26	117.87 ± 37.89

Psoriasis cases increased statistically significantly as compared to the control group. Serum LDL values were >150 mg/dl (P < 0.001). In psoriatic patients, the mean serum LDL levels are greater, although not significant in terms of statistics (p=0.062).

Table 7: Distribution of cases and controls according to LDL/HDL ratio

LDL/HDL	CONTROLS (n=40)	CASES (n=40)
<3.5	31(77.5%)	25(62.5%)
>3.5	9(22.5%)	15(37.5%)
Mean± SD	2.86 ± 0.75	3.02 ± 1.33

The LDL/HDL ratio was measured at the <3.5 and >3.5 levels in both control and psoriatic patients; the difference is not statistically significant. The mean LDL/HDL ratio difference between the control group and the cases is statistically not significant (p value = 0.223).

Table 8: Distribution of cases and controls according to TC/HDL ratio

TC/HDL	CONTROLS (n=40)	CASES (n=40)
< 4.99	27(67.5%)	17(42.5%)
> 4.99	13(32.5%)	23(57.5%)
Mean± SD	4.41 ± 0.99	5.03 ± 1.78

In psoriatic patients, the distribution of TC/HDL in the > 4.99 category was greater than in the control group; this difference was statistically significant. Psoriatic patients had a greater TC/HDL ratio than the controls. With a p-value of 0.043, the difference was statistically significant.

Table 9: Distribution of cases and controls according to very low density lipoprotein levels (VLDL)

VLDL (mg/dl)	CONTROLS (n=40)	CASES (n=40)
< 40 (mg/dl)	39(97.5%)	29(72.5%)
> 40 (mg/dl)	1(2.5%)	11(27.5%)
Mean ±SD	24.82 ± 7.88	34.7 ± 15.84*

**** P< 0.05 as compared to control***

Serum VLDL levels were considerably lower in psoriasis cases than in control in the distribution of psoriasis cases and control at < 40 mg/dl category. VLDL level increase, defined as greater than 40 mg/dl, was very significant in psoriasis cases relative to controls. (P < 0.001) With a p value of 0.005, the increase in VLDL levels in psoriatic patients relative to controls is statistically significant.

Table 10: Distribution of lipid parameters, in control and cases in terms of Mean ± S.D

PARAMETERS	CONTROLS (n=40)	CASES (n=40)	P value
Age(years)	50.15 ± 9.6	50.68 ± 8.86	NS
Total cholesterol (mg/dl)	177.42 ± 34.59	196 ± 40.61*	*p < 0.05
Triglycerides(mg/dl)	124.1 ± 39.42	173.86 ± 79.22**	**p<0.001
HDL(mg/dl)	41 ± 6.9	43.38 ± 15.18	NS
LDL(mg/dl)	114.65 ± 26	117.87 ± 37.89	NS
LDL/HDL	2.86 ± 0.75	3.02 ± 1.33	NS
TC/HDL	4.41 ± 0.99	5.03 ± 1.78*	*p < 0.05
VLDL	24.82 ± 7.88	34.77 ± 15.84*	*p < 0.05

***p < 0.05 statistically significant, **p<0.001 highly significant**

DISCUSSION

Psoriasis has been shown to be a risk factor for cardiovascular disease on its own. Patients with psoriasis are far more likely to have dyslipidemia, obesity, diabetes, hypertension, coronary calcification, elevated C-reactive protein (CRP), reduced folate, and hyperhomocystenimia. The unifying factor that underlies both illnesses is inflammation. According to our research, men are more likely than women to have psoriasis; Sunil Dongra *et al*., (2010) found comparable results. In comparison to men, they found that women had a lower mean percentage of psoriasis [9]. Several investigations have shown that serum total cholesterol levels are greater in psoriasis [10, 11], and these findings complement our current study, which shows that the blood total cholesterol is significantly higher in psoriatic individuals.

Similar findings were observed for serum triglyceride levels, which were higher in psoriatic patients but significantly elevated in the majority of studies [12, 13]. Low density lipoprotein (LDL) was not substantially elevated in psoriatic patients in the current study when compared to control, although it was elevated in psoriasis patients in prior studies [14–17]. This demonstrates inconsistencies with our current research. Reverse cholesterol transfer is the primary function of HDL particles. In atherosclerotic plaques, altered HDL particles promote endothelial-dependent vasoreactivity, anti-oxidative activity, and cholesterol efflux from foam cells. Seishima found that 38 psoriasis individuals had normal HDL and total cholesterol levels [18].

HDL levels are lower in this study as compared to the control group. Coronary heart disease is closely linked to elevated VLDL levels. VLDL-induced hypertriglyceridemia is linked to pro-coagulant and pro-thrombotic effects. Elements in the blood and influences how sticky platelets are. Platelets at rest move freely. not sticking to one another or to other cells. Activated platelets, however, stick to all lipoproteins, particularly VLDL. The development of atherosclerosis may be significantly influenced by VLDL-mediated platelet adhesion. Moreover, VLDL fragments may be retained in the artery intima, which would encourage the development of atherosclerotic plaque3. The LDL/HDL values of the control group and psoriatic patients in this study do not differ significantly.

However, psoriatic patients had statistically higher VLDL levels and TC/HDL ratios than controls [19]. This study demonstrates a correlation between lipid imbalances and psoriasis with high risk of cardiovascular diseases indications in patients with psoriasis.

Limitations

In patients with psoriasis there were certain restrictions on the current investigation. Not all forms of morphological psoriasis were covered, and there was no post-treatment follow-up. Second, the sample size is comparatively smaller with a total of just 80 research participants. A bigger sample size would have confirmed our findings and encouraged more investigation.

CONCLUSION

According to current research in patients with psoriasis, hyperlipidemia is linked to psoriasis patients. Thus, they are at a significant risk of getting cardiovascular disorders. We recommend that serum lipid screening profile in psoriatic patients will aid in the early assessment of risk.

Cardiovascular problems can be avoided in these patients with quick therapy. Additionally, these straightforward indices could be useful for evaluating cardiovascular risk in psoriasis, negating the need for pricey biomarkers that might only be used in research settings.

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