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Original Article

Hyperlipidemia – The Hidden Link between Psoriasis and Cardiovascular Disease

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ABSTRACT

Objective: To study the prevalence of dyslipidemia in patients of psoriasis and compare it with that of matched controls.
Study Design: Quasi-experimental study.
Place and Duration of Study: Department of Dermatology, Pak Emirates Military Hospital (PEMH), Rawalpindi Pakistan, from Mar to Jun 2023.
Methodology: The study enrolled 40 patients suffering from psoriasis and 40 healthy individuals considered as controls. Fasting Serum Total Cholesterol (TC), Serum Triglycerides (TG), Serum High Density Lipoprotein Cholesterol (HDL-C) and Serum Low Density Lipoprotein Cholesterol (LDL-C) of all the participants in both groups were measured and the results were compared and analyzed.
Results: Out of the 40 patients of the psoriasis group, 27(67.5%) had at least one lipid abnormality while in the control group only 7(17.5%) individuals had aberrant fasting lipid profile. When both the groups were compared, there were significant differences in mean fasting serum concentrations of TG and HDL (p=0.001, p=0.001 respectively) as well as fasting serum concentrations of TC and LDL (p=0.001, p=0.001 respectively).
Conclusion: Fasting lipid concentration was significantly abnormal for Serum Total Cholesterol (TC), Serum Triglycerides (TG), Serum High Density Lipoprotein Cholesterol (HDL-C) and Serum Low Density Lipoprotein Cholesterol (LDL-C), indicating a trend toward dyslipidemia in psoriasis patients.

Keywords: Cardiovascular Disease (CVD), Dyslipidemia, Lipid Profile, Psoriasis.

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INTRODUCTION

Psoriasis is a chronic inflammatory disorder of the skin which affects 2-3% of the global population.[1] Patients with psoriasis appear to have elevated levels of morbidity and mortality resulting from cardiovascular events[2] but the pathogenesis of atherothrombotic events in patients of psoriasis is not yet clear.[3] Multiple factors, including aberrant lipid and lipoprotein profiles, increased oxidative stress, decreased antioxidant capacity, and other established risk factors, such as hypertension, obesity, and diabetes mellitus, have been found to have an association with psoriasis,[4-6] however, there is no conclusive data on the effect of gender on lipid profile in psoriasis. Patients of psoriasis have a proatherogenic lipoprotein profile including hyper-triglyceridemia, raised plasma LDL-C and elevated Very-Low-Density Lipoprotein Cholesterol (VLDL-C) along with a lowered level of HDL-C, apolipoprotein B (Apo-B) and apolipoprotein A-1 (Apo-A-1).[7] It has been observed that chronic inflammation is associated with hyperlipidemia, which is a prominent feature of psoriasis.[8] There is a considerable paucity of local data describing the lipid profile of psoriasis patients, with no previous study in this demographic area on the subject under discussion while the literature indicates a significant association between psoriasis and diabetes.[9] Keeping in view this gap in knowledge, and the potentially serious implication of metabolic derangements on psoriasis,[10] there is a need to study and analyze this relationship pattern in our local genetic, ethnic, and socio-economic group, hence, this study was planned to determine and report any lipid abnormalities amongst patients with psoriasis in our population.

METHODOLOGY

The study was conducted at the Department of Dermatology, Pak-Emirates Military Hospital (PEMH), Rawalpindi, Pakistan, from March to August

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2023. It was carried out after approval of the Institutional Ethics Committee (Ref No. A/28/241 (1) EC/536/23). A total of 40 patients of biopsy-proven psoriasis were enrolled in the study as cases using non-probability consecutive sampling. The sample size was calculated using World Health Organisation (WHO) sample size calculator using 2%[1] as population prevalence of psoriasis, margin of error of 5% and confidence interval of 95%, where total sample size came out to be 40, where 40 patients were placed in the case group and 40 in the control group (n=80).

Inclusion Criteria: Males and females, of all ages, with biopsy proven psoriasis of all types and receiving topical treatment, were included.

Exclusion Criteria: Patients with psoriasis on any type of systemic therapy for example, retinoids, cyclosporine and methotrexate, and patients suffering from any other systemic diseases like hypertension, diabetes mellitus, familial hyperlipidemia, chronic liver diseases and chronic renal failure, were excluded.

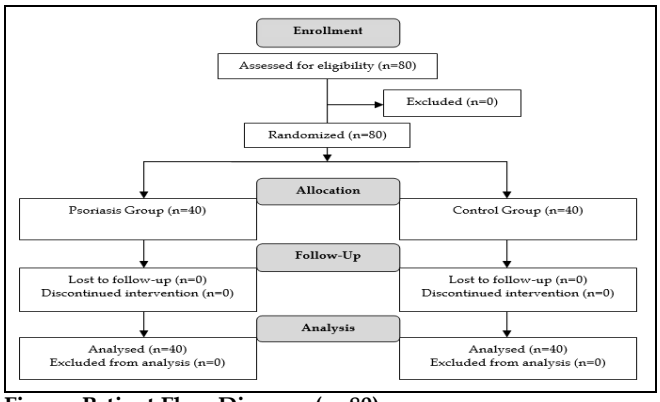

Figure: Patient Flow Diagram (n=80)

Informed consent was obtained from every participant. All patients were explained the importance of prior fasting for the purpose of testing their lipid profile. After interview, history and physical examination, the subjects were seated comfortably for 15 minutes before sampling. For every individual, 5 ml of venous blood was collected in plain serum tubes under aseptic conditions. The samples were centrifuged for 5 minutes at 3500 revolutions per minute (rpm) and serum TC, TG, HDL-C and LDL-C were measured photometrically using automated chemistry analyzer. All statistical calculations were performed using Statistical Package for the Social Sciences (SPSS) 26.00. The normality of the data was checked with Shapiro-Wilk test and the data showed parametric distribution. The quantitative data was statistically described in terms of range, Mean±SD and the qualitative data was expressed as frequencies and percentages. Comparison between cases and controls was done using independent sample t-test where a *p*-value of less than 0.05 with a Confidence Interval (CI) of 95% was considered statistically significant.

RESULTS

The outcome measure in both groups was lipid profile analysis, which included serum TC, TG, HDL, and LDL. The age of enrolled patients ranged from 18 to 60 years with a mean age of 34.53+12.96 years. Of the total 40 patients included in the study, 22 were male and 18 were female. Details of socio-demographic variables are depicted in Table-I, while parameters of lipid profile for both groups are shown in Table-II. When comparing both groups, there were significant differences in mean fasting serum concentration of TG and HDL (p=0.001 and p=0.001 respectively) and also mean fasting serum concentration of TC and LDL (p=0.001 and p=0.001 respectively). Psoriasis patients had at least one lipid abnormality in 27(67.5%) patients, while in the control group only 7(17.5%) patients had aberrant lipid profile. The frequencies of individual lipid abnormalities are listed in Table-III. Among psoriasis cases, 14(35%) patients had elevated TC (>5.2 mmol/l), 13(32.5%) patients had elevated TG (>2.3mmol/l), 10(25%) patients had borderline or decreased HDL (< 0.9mmol/l) while 9(22.5%) had elevated LDL (<2.6 mmol/l). In the control group, 5(12.5%) individuals had elevated TC, 4(10%) had abnormal TG while 3(7.5%) patients had elevated HDL and LDL.

Table-I: Socio-demographic Variables of the Study Groups (n=80)

Socio-Economic Variables		Psoriasis (n=40)	Control (n=40)	*p*-value
Age (years) (Mean±SD)		34.53±12.96	31.68±12.35	0.62
Gender	Male	22(27.50%)	26(32.50%)	0.83
	Female	18(22.50%)	14(17.50%)	
Body Mass Index	<25	35(44.00%)	32(40.00%)	0.83
	≥25	5(6.00%)	8(10.00%)	
Smoking	Yes	4(5.00%)	5(6.00%)	0.12
	No	36(45.00%)	35(44.00%)	

DISCUSSION

Psoriasis is a chronic inflammatory disease with potentially debilitating consequences, involving articular and cardiovascular system.[11] One of the major modifiable risk factors for Cardiovascular Diseases (CVD) is dyslipidemia.[12] International studies

have consistently pointed to an elevated level of lipid parameters in individuals diagnosed with psoriasis, without any other apparent chronic disease.[13] Our study showed that majority of patients with psoriasis had abnormal levels of at least one lipid parameter, namely TC, TG, HDL-C and LDL-C, consistent with other studies,[13-15] which document abnormal lipid levels in patients of psoriasis. According to the findings in our study, the levels of dyslipidemia were significantly more profound due to diversity of demographic factors, including the genetic profile and dietary habits, which may be a confounding factor for our results compared with the international data. Hypercholesterolemia (TC > 5.2mmol/l) was the most frequent lipid abnormality and the mean concentration of TC was significantly contrasting in both the groups (*p*-value <0.09), similar to one study, where raised plasma concentration of cholesterol was a prominent independent predictor of risk for coronary heart disease.16 Hypertriglyceridemia (TG>2.3 mmol/l) was also a notable lipid abnormality in our patients, where a significant difference between cases and controls was noted when their mean fasting concentration of TG (*p*<0.07) was estimated, a finding that is consistent with another study.[17] Aberrant levels of HDL-C (<0.9mmol/l) were another frequent finding in our study with a significant difference in mean fasting levels of HDL (*p*-value <0.132) especially as low HDL-C levels are associated with a raised risk of coronary heart disease18 but increased plasma concentrations of HDL-C have a cardio-protective[19] and anti-inflammatory[20] effect. The mean fasting levels of LDL were also significantly different (*p*-value <0.057) which is consistent with literature.[21] While psoriasis is a complex genetic condition, clinical and experimental evidence suggests that T cells play a significant role in the pathogenesis of both psoriasis and atherosclerosis:[22] both have inflammation, regulated by T Cell cytokines characteristic for T-helper type I cell response, but the precise antigen that instigates psoriasis remains elusive. Despite this, the prospective role of lipid abnormalities themselves manipulating the immune system has been discussed.[23] Dyslipoproteinemia is an acknowledged risk factor for cardiovascular events[24] and the results obtained in this study lend further credibility to the theory that there is a definitive biological link between metabolic disturbance and psoriasis which contributes to cardiovascular morbidity. The possibility of a molecular link existing between psoriasis and lipid abnormality, could, in future, direct therapy towards treating both these diseases at molecular level.[25]

Table-II: Mean Serum Lipid Concentrations in Both Groups (n=80)

Variable (mmol/l)	Psoriasis (n=40) (Mean±SD)	Control (n=40) (Mean±SD)	*p*-value
TG	2.24 ±0.47	1.80 ±0.37	<0.001
HDL	0.95±0 .08	1.10±0.22	<0.001
TC	5.44±0.66	5.08±0.53	0.01
LDL	3.03±0.35	2.86±0.41	0.05

** TG: Triglycerides, HDL: High Density Lipoprotein, TC: Total Cholesterol, LDL: Low Density Lipoprotein*

Table-III: Frequency of Dyslipidemia in Both Groups (n=80)

Lipid abnormality	Psoriasis (n=40) n(%)	Control (n=40) n(%)	*p*-value
TC >5.2 mmol/l	15 (37.50%)	5 (12.50%)	0.09
TG >2.3 mmol/l	14 (35.00%)	4(10.00%)	0.07
HDL ≤0.9mmol/l	6(15.00%)	2(5.00%)	0.13
LDL >3.4 mmol/l	9(22.50%)	3(7.50%)	0.06

** TG: Triglycerides, HDL: High Density Lipoprotein, TC: Total Cholesterol, LDL: Low Density Lipoprotein*

LIMITATIONS OF STUDY

There are several limitations of this study. The severity of psoriasis and presence or absence of psoriatic arthritis was not considered and that could possibly influence the results. Moreover, in general, patients with psoriasis have a greater tendency to have traditional environmental risk factors for cardiovascular events, such as smoking and diminished physical exercise. It is evident that these co-morbidities and factors pertaining to an individual's lifestyle affect the intensity of psoriasis. To reduce the confounding potential of these factors in this study, we excluded those patients with a previous history of such factors.

CONCLUSION

Fasting lipid concentrations were significantly abnormal for serum TG, TC, HDL and LDL, indicating a trend towards dyslipidemia in patients diagnosed with psoriasis. Early detection of lipid abnormalities, treatment and lifestyle modification may lead to decreased risk of cardiovascular disease in patients suffering from psoriasis.

Conflict of Interest: None.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

ANM & NI: Data acquisition, data analysis, critical review, approval of the final version to be published.

MA & MA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

HH & AHM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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