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Research Article

Dyslipidemia in psoriasis: as a risk for cardiovascular disease

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ABSTRACT

Background: Psoriasis is a common and recurrent proliferative inflammatory skin disease that has been associated with abnormal plasma lipid metabolism and with high frequency of cardiovascular morbidity and mortality. The prevalence seems to be related to the severity of psoriasis, as it occurs more frequently in patients presenting with large areas of the body affected with lesions. The aim of our work was to evaluate the development of dyslipidemia in psoriasis, and to look for a correlation between their levels and severity of diseases in which the risk factors and secondary causes of hyperlipidemia were excluded.
Methods: We evaluated the fasting lipid profile in twenty-four patients with mild to moderate psoriasis and twenty-four age and gender matched healthy subjects as the control group.
Results: Patients presented risk changes in lipid profile, serum total cholesterol ($p<0.001$), triglyceride ($p<0.01$), LDL-cholesterol ($p<0.001$), VLDL-cholesterol ($p<0.01$) and TC/HDL ratio ($p<0.01$) were found to be significantly higher than in control group. No significant statistical difference was observed between HDL levels of the two groups. Significant positive correlation in total cholesterol and LDL-cholesterol was found between mild and moderate psoriasis (PASI score) as compared with controls.
Conclusion: Our data suggest that psoriasis patients must be considered as a group at high risk for cardiovascular, since psoriasis per se seems to be associated with risk changes in the lipid profile. We conclude that psoriatic patients should be evaluated and followed up for the risk of hyperlipidemia and cardiovascular diseases.

Keywords: Psoriasis, Serum lipids, PASI, CVD

INTRODUCTION

Psoriasis is a common chronic recurrent inflammatory skin disorder characterized by hyperproliferation and reduced differentiation of keratinocytes. It is a life long chronic inflammatory condition affecting approximately 2% of general population.[1] The etiology is still unknown, while genetic, metabolic and immunological mechanism has been implicated. Psoriasis has been associated with an increased morbidity and mortality from high frequency of cardiovascular events. This seems to be related to the severity of psoriasis, considering that it occurs much more frequently in patients presenting with large areas of body affected with psoriatic lesions.[2]

However, the pathogenesis of atherothrombotic events in psoriasis patients remains to be recognized. Multiple factors including abnormal lipids and lipoprotein profiles and risk factors such as hypertension, obesity, diabetes mellitus have been associated with psoriasis.[3] Several reports suggests that psoriatic patients have proatherogenic lipid profile including increased levels of serum triglycerides, LDL-cholesterol, VLDL-cholesterol and low HDL-cholesterol levels. However, studies are

not consistent, involving heterogenous study population and not considering the severity of the disease.[4-8]

In the present study, we investigated the lipid profile in healthy control and in a group of psoriasis patients. In addition, we have evaluated the correlation between the lipid levels and severity of the psoriatic lesions by selecting psoriasis group with mild (inactive) psoriasis (IP) and moderate (active) psoriasis (AP) and compared with the normal control group to look for increased risk of cardiovascular diseases.

METHODS

The study group consisted of 24 patients grouped as mild (inactive psoriasis) and moderate (active psoriasis) groups and 24 age and gender- matched healthy controls were selected from the out-patient clinic of department of dermatology. The duration of the disease (yrs) ranged from 1 to 30 (mean 11±8.71). The ethics committee approved the protocol and informed consent was obtained from the subjects after purpose of the study was fully explained. All the patients had clinical and histopathological diagnosis for chronic plaque type psoriasis. The assessment of the severity and extend of disease was done by PASI score.[9] The inclusion criteria was an active/inactive disease which had considered PASI score between 0-10 as mild and >10 as moderate psoriasis. They were newly diagnosed cases or on treatment with topical corticosteroid and vitamin D3 analogues ointment. Exclusion criteria were coexisting inflammatory skin disease, smoking, alcoholics, diabetes mellitus, obesity, history of hyperlipidemia, renal and liver failure, hypothyroidism and systemic therapy, lipid lowering drugs for last 3months prior to blood collection in order to eliminate factors influencing the serum lipids levels.

Serum was collected using vacutainer tubes from subjects following 12 hrs of fasting for determination of lipid profile. Serum triglycerides (TG) were measured enzymatically by modified glycerol-3-phosphate oxidase /peroxidase method using commercially available kits (GPO-PAP Boehringer).[10] Serum total cholesterol (TC) was measured enzymatically by modified cholesterol oxidase/peroxidase (CHOD-PAP Boehringer) an autoanalyzer (Hitachi 917 BM).[11] HDL-Cholesterol was measured using the method referred for total cholesterol after precipitation of lipoproteins (LDL/VLDL/Chylomicrons) with sodium phosphotungstic acid magnesium chloride mixture.[12] LDL-Cholesterol was computed by Friedwalds formula:(LDL=TC-[HDL+TG÷5]).[13] VLDL-Cholesterol was calculated by formula:VLDL=TG÷5. TC/HDL-C ratio was calculated by dividing total cholesterol by HDL-C.

The results were expressed as mean ± standard deviation. A $p<0.05$ was considered statistically significant. Statistical analysis was performed using the statistical package for social sciences (SPSS-16, Chicago, USA). To evaluate the differences between groups, the student's t-test was used.

RESULTS

The study group selected for the study consisted of 24 patient and 24 control group and were adjusted according to age and BMI. The mean age of cases in patient and control group was 51±10.1 and 49±3.4 years respectively. The mean BMI was 23.0±2.3 kg/m^2 in patient group and 22.6±2.1kg/m^2 in control group. The mean duration of disease (yrs) was 11±8.72 (range 1-30) and PASI score, the mean body surface area of involvement was 10.6%±8.7 (range 2%-24%) in patients with psoriasis vulgaris.

Table 1: Comparisons of lipid profile between control and psoriasis patients group (IP+AP). (Values are expressed as mean ± SD).

Parameters	Controls (n=24)	Psoriasis (n=24)
Age (Years)	51±10	49±3.4
Total Cholesterol (mg/dl)	177±30	217±39**
Triglycerides (mg/dl)	95±24	116±37*
LDL-Cholesterol (mg/dl)	106±24	142±40**
VLDL-Cholesterol (mg/dl)	18.9±5.0	23±7.5*
HDL-Cholesterol (mg/dl)	47±11.1	47±8.0
TC/HC Ratio	3.9±0.9	4.7±1.1*

*p<0.01, **p<0.001

The values of the lipid profile for the control and total psoriasis (IP+AP) patient groups was found as presented in Table 1. Serum total cholesterol ($p<0.001$), triglycerides ($p<0.01$), LDL-cholesterol ($p<0.001$), VLDL-cholesterol ($p<0.01$) and TC/HDL ratio ($p<0.01$) were found to be significantly higher in psoriasis group than in control group. No significant statistical difference was observed between HDL level of the two groups ($p=0.06$). The values of the lipid profile as compared between the control/mild psoriasis (IP) and control/moderate (AP) psoriasis patient groups is presented in Table 2. Serum total cholesterol ($p<0.01$), LDL-cholesterol ($p<0.01$) was found to be significantly higher in mild psoriasis (IP) group than in control group. There was also a very highly significant increase in total cholesterol ($p<0.001$), LDL-cholesterol ($p<0.001$) and TC/HDL-C ($p<0.01$) in moderate psoriasis (AP) than in control groups. No statistical significant differences were found in other studied lipid parameters.

Table 2: Comparisons of lipid profile between control/mild psoriasis (IP) and control/moderate psoriasis (AP) groups. (Values are expressed as mean ± SD).

Parameters	Controls (n=24)	Mild (IP) (n=10)	Moderate (AP) (n=14)
Weight (kg)	58±6.6	65±7.7*	61±6.1
T. Cholesterol (mg/dl)	177±30	208±28.9*	231±49.9**
Triglycerides (mg/dl)	95±24	117±42.3	115±30.8
LDL-C (mg/dl)	106±24	135±31.3*	153±52.1**
VLDL-C (mg/dl)	18.9±5.0	23.4±8.5	23.2±6.2
HDL-C (mg/dl)	47±11.1	47.2±8.5	47.7±8.7
TC/HC Ratio	3.0±0.9	4.5±0.9	4.9±1.3*

*p<0.01, **p<0.001

DISCUSSION

Although they have been extensive studies in lipid metabolism in psoriasis, their importance in the etiology or in the enhancement of the disease remains conflicting. It is still controversial whether changes in lipid composition are primary events or secondary to psoriasis or perhaps due to medications, such as cyclosporins and retinoids.[8,14-16]

In 1978, Madonald and Calabresi proposed a predisposition to occlusive vascular diseases in patients with psoriasis.[17] Several genetic, hormonal and environmental risk factors are known to influence the development of atherosclerosis. Much research has been performed which consistently points to a raised prevalence of lipid abnormalities in individuals diagnosed with psoriasis. However, to date all accumulated knowledge has not taken care over causes such as obesity, high alcohol intake, heavy smoking, peripheral occlusive disease, latent diabetes mellitus, hypertension, thyroid, renal, hepatic or connective tissue disorder and the use of drugs which may have effects on lipid metabolism were not excluded. In the other studies, altered lipid profile is found especially in severe psoriasis.[2,14,18] Our study is performed in patients with mild to moderate psoriasis in whom the risk factors and the secondary causes of atherosclerosis are excluded.

Rocha-Pereira reported increased serum total cholesterol, VLDL-cholesterol, LDL-cholesterol and a decrease HDL-cholesterol levels.[4] Piskin in his study showed serum total and LDL-cholesterol was significantly higher in psoriasis group than the control group.[19] Collectively in various studies, serum total cholesterol level of psoriatic patient as high[4,20], low[21], and normal[7] levels are reported. In our study, we found significantly higher levels of serum total cholesterol levels in psoriatic patients (p<0.001). LDL-cholesterol levels of psoriasis patients has also been reported to be high[4,19] or normal[5] in different studies. We found LDL-cholesterol levels in psoriasis group was significantly higher than in control group (p<0.001). As for serum triglycerides level has been reported to be high[4] low[21] and normal[15] in different sources, yet serum triglycerides levels of our patients was significantly higher than normal group (p<0.01). The VLDL-cholesterol of patients with psoriasis as high[2,4] levels have been detected. We found significant increase in VLDL-cholesterol level between psoriatic and control group (p<0.01). The same controversy exists regarding HDL-cholesterol as normal[7,14,15] and low[2,4] levels in psoriasis groups. However we could not find any significant difference in HDL-C levels between the psoriatic and control group (p=0.06). With regard to these controversial results, our study showed significant increase in the mean levels of serum total cholesterol, triglycerides, LDL-cholesterol, VLDL-Cholesterol and TC/HDL ratio between patients and control groups (Table 1). Hence, the observed changes in the profile except for HDL-cholesterol can be considered as modifications of risk for cardiovascular diseases.

Cardiovascular events occur frequently particularly in psoriasis patients with severe pattern and long duration of the disease.[3] However, the severity in most of the studies was not classified. Considering the importance of an altered lipid profile with severity, we tried evaluating these parameters in mild and moderate psoriasis, to look for a correlation between the severity of psoriasis with a rise in risk factors for cardiovascular diseases.

The comparative study of the lipid profile between control and each of the pathologic groups, mild (IP) and moderate (AP) psoriasis as shown in (Table 2). In mild psoriasis (IP) group as compared to control showed significant increase in serum total cholesterol (p<0.01) and LDL-cholesterol (p<0.01). In moderate psoriasis (AP) group as compared with control showed very highly

significant increase in serum total cholesterol ($p<0.001$), LDL-cholesterol ($p<0.001$) and TC/HDL ratio ($p<0.01$). The other studied parameters were not showing any significant results in both the groups. These findings suggest that worsening of the disease may be associated with the more pronounced risk modifications in lipid profile to lead in enhancement of the atherogenic risk. Hence, serum lipid changes showed a parallel accompaniment with the severity of the disease. Therefore, the severity of the disease needs to be considered as an increased risk for cardiovascular disease.

Furthermore, in agreement with previous findings suggesting of abnormal lipoprotein metabolism may be related to the high incidence of atherosclerosis in psoriasis. Hypertriglyceridemia secondary to VLDL is associated with both procoagulant and prothrombotic factors in the blood. VLDL mediated platelet adhesion may play an important role in atherosclerosis. These VLDL remnants are susceptible to retention within the arterial intima, thereby promoting atherosclerotic plaques growth. In these regard, antibodies recognizing oxidized LDL is reported to correlate with disease severity.[6,22] Interestingly, macrophages activated by engulfing LDL immune complexes release large quantities of tumor necrosis factor (TNF-α) and IL-1β.[23] Cytokine driven inflammation and tissue destruction is a common theme of chronic inflammatory disease. The clinical manifestations of both the diseases include inflammation that seems to be driven by certain T- cell cytokines including chemokines, local and systemic expression of adhesion molecules and endothelins which are characteristic for the T-helper 1 cell response.[24,25] In light of these findings, the lipid abnormalities seen in psoriasis patients, while promoting atherosclerosis might in parallel facilitate and maintain the inflammatory reaction in the skin.

In summary, our data suggest that psoriasis patients must be considered as a group at high risk for cardiovascular disease, since psoriasis per se seems to be associated with risk changes in the lipid profile. We suggest early screening with serum lipid profile assay in psoriatic patients at the time of presentation and follow-up for evaluating risk and treatment of hyperlipidemia to modify and prevent the risk of cardiovascular diseases.

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