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RESEARCH ARTICLE

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HIGH CARDIOVASCULAR RISK IN PATIENTS WITH PSORIASIS

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ABSTRACT

Objective

Dyslipidemia is one of the important risk factor for cardiovascular disease so present study was planned to evaluate risk of cardiovascular disease in patients with psoriasis.

Design and Methods

It was a hospital based case control study performed in the 85 patients of psoriasis with <25% body surface area involved. The study was done in a tertiary care setup. The patients attending the Dermatology OPD were enrolled for study. Lipid profile was evaluated to determine the cardiovascular risk in patients as compared to 85 age- and sex- matched controls.

Results

Total cholesterol (TC), LDL-C, VLDL-C, triglyceride and apolipoprotein B levels were higher in patients as compared to controls. HDL-C and apolipoprotein A1 levels were low in patients and the difference was statistically significant.

Conclusions

Abnormality of lipid profile must be taken into account in patients of psoriasis and they must be advised lifestyle modifications to decrease the risk of cardiovascular disease

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KEYWORDS

Psoriasis, Cardiovascular disease, Lipid profile, Dyslipidemia

INTRODUCTION

Psoriasis is a common, chronic, disfiguring systemic inflammatory disorder having bimodal distribution of age of onset, the larger early peak between 16 - 22 years and later between 57 to 60 years.[1] It is associated with decreased quality of life and high rates of depression. The prevalence of psoriasis in different populations varies between 0 and 12%.[2]

Psoriasis primarily affects the skin, nails, and occasionally the joints. The most characteristic lesions consist of red, scaly, sharply demarcated, indurated plaques, present particularly over extensor surfaces and scalp. It is a noncontagious skin disorder and caused mainly by anomalies of protein expression in skin cells, which can be abnormal keratinocyte differentiation, hyperproliferation of the keratinocyte, and infiltration of inflammatory elements.[3]

Both genetic and environmental factors play a role in expression of the disease. The factors which may trigger or aggravate psoriasis include streptococcal infections, stress, trauma to the skin (Koebner phenomenon), drugs (particularly lithium), alcohol, obesity, smoking and climate. Although the disease has a low attributable mortality, it can cause considerable morbidity due to associated systemic diseases.[3]

Most health care providers do not associate psoriasis with an unfavorable cardiovascular risk profile, but more and more evidence is emerging that this might be the case. The higher prevalence of classic cardiovascular risk factors, like smoking, hypertension and obesity contribute to atherogenesis in psoriasis patients, but psoriasis itself and its systemic treatment may also stimulate premature atherogenesis, increasing the cardiovascular risk.[4]

Dyslipidemia is one of the important risk factor for cardiovascular disease and few studies have been performed to find the lipid profile in patients with psoriasis before systemic treatment. Cohen and associates also demonstrated an association of psoriasis with dyslipidemia. They found total cholesterol, triglyceride and LDL levels were raised and HDL-C levels were low in patients. [5] Drateln and associates observed that only values of HDL-C were significantly low in patients with less severe psoriasis as compared to controls whereas Farshchian and co-workers failed to demonstrate such an association between psoriasis and dyslipidemia in Iranian patients.[6]

In a hospital based cross sectional study in Iran, psoriasis patients were shown to have significantly higher mean levels of triglyceride, TC, VLDL, LDL and no alteration in HDL.[7]

MATERIALS AND METHODS

This prospective study was performed in the 85 patients of psoriasis (55 males and 30 females) with <25% body surface area involved attending the Dermatology outpatient clinic of Pt. B.D. Sharma PGIMS, Rohtak. Rule of nine was used to determine this percentage.[8] Their results were compared with a group of 85 age and sex matched healthy controls (55 males and 30 females). Patients taking drugs known to affect lipid metabolism, with history of hypertension, diabetes, hypothyroidism, liver or renal failure, smoking, alcohol consumption, personal or family history of hyperlipidemia were excluded. Pregnant patients were also excluded from the

study. An informed consent was taken from all patients and healthy volunteers.

Methodology: Three ml of venous blood was collected aseptically from antecubital vein after 12 hour overnight fast and serum was separated by centrifugation (2000 rpm for 15 minutes).

Lipid profile: Serum triglycerides, total cholesterol, high density lipoprotein-cholesterol (HDL-C) and triglyceride levels were estimated and very low density lipoprotein-cholesterol (VLDL-C), low density lipoprotein –cholesterol (LDL-C) were calculated.

A**. Estimation of total cholesterol**

Determination of total serum cholesterol was done enzymatically by using commercially available kit. It was based on the development of quinoneimine whose absorption was read at 510nm, which is directly proportional to the concentration of cholesterol (mg/dL).[9]

Reference range: Total cholesterol = 150 – 220 mg/dL

B. **Estimation of HDL – C**

Magnesium chloride and sodium phosphotungstate was used to precipitate low density and very low density lipoproteins, which were precipitated and removed by centrifugation at 3000rpm. The HDL-C left in the supernatant was estimated by the method as described above for total cholesterol.[9]

Reference range: 30 – 60 mg/dL

C. **Estimation of triglyceride**

Triglyceride was estimated enzymatically using commercially available kit. It was based on the development of quinoneimine whose absorption is read at 520nm, which was directly proportional to the concentration of triglyceride.[10]

Reference range: Serum triglycerides = 36 – 165 mg/dL

D. **VLDL-C** was calculated by Friedwald formula.[11]

E. **LDL-C** will be calculated by standard formula.[12]

F. **Estimation of apolipoprotein**

Apolipoproteins A-I and B were analyzed using immunoturbidimetric immunoassay (Randox-make) run in random access auto analyzer (Konelab 30i).

Normal range: Apo A-I = 120-176 mg/dL

Normal range: Apo B = 63-114 mg/dL

RESULTS

Values are expressed as Mean ± SE. The p value was calculated using paired 't' test. The mean age of patients was 27.93 ± 1.24 years while the mean age of controls was 28.97 ± 0.78 years.

Plasma cholesterol levels were significantly increased in the patients (212.99 ± 5.02) mg% when compared to controls (176.92 ± 1.8) mg% ($p < 0.001$). Low density lipoprotein-cholesterol (LDL-C) levels in patients were 162.69 ± 3.08 mg% and in controls were 100.6 ± 6.34 mg%, this difference is highly significant statistically (Table 1).

In our study we found serum triglyceride levels in patients of psoriasis were

towards the upper limit and were significantly raised compared to controls. Triglyceride levels in patients were 151.56 ± 1.93 mg% and in controls were 82.57 ± 2.15 mg%. This difference is highly significant statistically ($p < 0.001$). VLDL-C levels in patients of psoriasis were elevated compared to controls, and the increase was not significant statistically (Table 1).

In our study, we found patients had decreased high density lipoprotein-cholesterol (HDL-C) levels (35.65 ± 0.53 mg %) compared to controls (51.75 ± 0.56 mg %), and the difference was highly significant statistically.

Apolipoprotein AI levels in patients were 133.83 ± 1.11 mg % and that in controls were 154.38 ± 1.53 mg %, and the difference was statistically highly significant (Table 1).

Table 1

Comparison of lipid profile in patients of psoriasis with healthy controls (Mean ± S.E)

PARAMETERS	PSORIASIS PATIENTS (n=85)	HEALTHY CONTROLS (n=85)	p VALUE
Total cholesterol levels(mg/dL)	212.99 ± 5.02	176.92 ± 1.8	< 0.001*
LDL-C levels(mg/dL)	162.69 ± 3.08	100.6 ± 6.34	< 0.001*
HDL-C levels(mg/dL)	35.65 ± 0.53	51.75 ± 0.56	< 0.001*
Triglyceride levels(mg/dL)	151.56 ± 1.93	82.57 ± 2.15	< 0.001*
VLDL-C levels(mg/dL)	30.35 ± 0.39	16.5 ± 0.12	< 0.001*
Apo A-I levels(mg/dL)	133.83 ± 1.11	154.38 ± 1.53	< 0.001*
Apo B levels(mg/dL)	98.57 ± 2.05	68.57 ± 1.84	< 0.001*

** Highly significant*

DISCUSSION

Psoriasis has been traditionally viewed as an inflammatory skin disorder of unknown etiology. Recent advances in our understanding of the immunopathogenesis and genetics of the disease have shifted the focus from a single organ disease confined to dermal structures to a systemic inflammatory condition.[4]

Patients with psoriasis are prone to cardiovascular disease. The biologic mechanisms that putatively contribute to accelerated atherosclerosis and increased risk of cardiovascular events in psoriasis are largely unknown but are likely to be multifactorial.[4] Dyslipidemia is one of the important risk factors for cardiovascular disease so in the present study we evaluated lipid profile to predict the risk of cardiovascular disease in patients of psoriasis and we found that lipid profile was deranged in patients of psoriasis as compared to healthy controls.

Dietary factors and socioeconomic status could account for it.

We found that though total cholesterol, LDL-C, VLDL-C, triglyceride levels were at upper limit of normal range in patients but the increase was statistically significant compared to controls. The lipid abnormalities seen in psoriasis might facilitate and maintain the inflammatory reaction in the skin. Psoriasis is characterized by increase in the immunological activity of type 1 helper T cells. Cytokines such as TNF-α and interleukin-6 seem to play a central role. TNF-α may lead to insulin resistance by inhibiting insulin-mediated tyrosine phosphorylation of the insulin receptor, as well as insulin receptor substrate-1. TNF-α has also been shown to be a potent activator of c-Jun amino-terminal kinase, which stimulates activator protein-1, a major regulator of pro-inflammatory activity. Mouse models show that c-Jun amino-terminal kinase activity is abnormally elevated in obesity, while its absence is associated with decreased adiposity, improved insulin sensitivity and enhanced insulin receptor signalling. [13]

An increased number of VLDL particles are strongly associated with coronary heart disease. Hypertriglyceridemia secondary to VLDL elevation is associated with both procoagulant and prothrombotic factors in the blood and affects the adhesiveness of platelets. Resting platelets circulate freely, adhering neither to each other nor to other cells. However, activated platelets adhere to all lipoproteins, especially VLDL. VLDL-mediated platelet adhesion may play an important role in the progression of atherosclerosis. Furthermore, VLDL remnants are susceptible to retention within the arterial intima, thereby promoting atherosclerotic plaque growth.[14]

In our study, we found patients had significantly decreased high density lipoprotein-cholesterol (HDL-C) levels compared to controls. Apolipoprotein AI levels in psoriasis patients were significantly low as compared to healthy controls. Cholesterol ester transfer protein (CETP) could play a plausible role in increased LDL and decreased HDL-C levels. It transfers the esterified cholesterol from HDL (HDL_2) to VLDL and LDL and replaces it with triacylglycerol. LDL, so altered, is a potential substrate for hepatic lipase. The enzyme plays a major role in lipoprotein metabolism as a lipolytic enzyme and hydrolyzes triglycerides and phospholipids in chylomicron remnants, IDL, and HDL.[15.16]

In conclusion patients with psoriasis are at an increased risk of cardiovascular disease because of deranged lipid profile and this abnormality must be taken into account for the treatment of patients of psoriasis. Even when all the levels are with-in the normal range lifestyle modifications like diet low in fat and physical exercise must be advised to patients to prevent cardiovascular disease. Statins may be beneficial to patients with psoriasis, as these reduce LDL oxidation and may even have immunomodulatory activities that may improve the psoriasis skin and cause a shift from pro-inflammatory to anti-inflammatory conditions in psoriasis.[4]

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