Research Paper

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Serum Lipids and Lipoprotein (a) Levels in Psoriasis

Medical Science

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ABSTRACT

Psoriasis is a chronic inflammatory skin disease associated with an increased cardiovascular risk profile with multiple underlying factors. Psoriasis has been associated with abnormal plasma lipid metabolism and oxidative stress. Lipoprotein (a) [Lp(a)] has been implied in cardiovascular disease and has been reported to be elevated in patients with psoriasis. The present study was to determine the serum lipid disturbances and to assess the significance of Lipoprotein (a) levels in subjects with psoriasis. 30 patients with psoriasis in the age group of 15 to 75 years were studied and compared with 30 healthy controls matched in terms of age, gender and body mass index.

Serum TC, TG, VLDL-C, TC/HDL-C ratio levels were significantly higher in the psoriasis patients compared to controls. LDL-C was higher and HDL-C was lower respectively in the cases compared to controls, with the difference which was statistically insignificant. Patients with psoriasis showed significantly higher serum levels of Lp(a) compared to controls.

Thus Patients with Psoriasis could be considered as a high risk group for atherosclerosis and cardiovascular diseases because of susceptibility in lipid profile, Lipoprotein content and increased oxidant stress.

Introduction:

Psoriasis is a common chronic and inflammatory skin disease that can occur due to abnormalities in essential fatty acid metabolism, lymphokine secretion, free radical generation, lipid peroxidation and eicosanoid metabolism and has been associated with increased frequency of cardiovascular events.[1]

The etiology of psoriasis is unknown, but genetic, metabolic and immunologic mechanisms have been proposed.[2] Psoriasis is characterized by sharply demarcated, red and slightly raised lesions with silver-whitish scales.[3] The loss of scale from the surface observed in psoriasis may be related to lipid disorders in epidermis and serum.[4]

Recent studies suggest that psoriasis, like atherosclerosis, is an autoimmune disease. The clinical manifestation of both diseases includes inflammation which appears to be driven by T-cell cytokines characteristic of the T-helper 1 cell response. The activation of the immune system in psoriasis cause changes in patient's lipid profile.[5] Numerous studies have demonstrated that lipoprotein (a) [Lp(a)], a genetically determined lipoprotein, is most powerful and most prevalent independent risk factor for coronary heart disease. Lp (a) is a heterogeneous lipoprotein that incorporates a low-density lipoprotein (LDL) particle and highly polymorphic apolipoprotein(a) [Apo(a)], which is covalently linked to the apolipoprotein B moiety of the LDL by a single disulfide bridge.[6, 7]

Lp (a) is an essential component for tissue repair, whose primary function is to deliver large amounts of cholesterol to peripheral cells and to promote regeneration following inflammation.[8] As psoriatic patients are predisposed to high Lp(a) levels, this may increase the risk of occlusive vascular disorders in patients with psoriasis .[4]

Hence, this study intends to determine the serum lipids, lipoprotein (a) in psoriatic patients and their risk for cardiovascular diseases.

Materials and methods:

This study was carried out on 30 psoriatic patients in the age group of 15 to 75, who attended the outpatient and inpatients department at Kempegowda Institute of Medical Sciences, Bangalore and 30 age and gender matched healthy control. Patients Diabetes, hypertension, obesity, family history of hyperlipidemia, renal and liver failure, endocrine disorders, taking systemic drugs especially lipid lowering agents, smoking and alcohol users were excluded from the study.

The institutional ethical committee approved the study protocol. History and personal physical data was obtained from both cases and controls. Informed consent was taken from patient and control subjects. A pre-structured and pre-tested proforma was used to collect the data. Baseline data including age and gender, detailed medical history including conventional risk factors, clinical examinations and relevant investigations were included as part of the methodology.

5 ml of venous blood sample was collected after overnight fasting of 12 hours from both cases and controls and the samples were centrifuged and separated for the estimations. Serum total cholesterol and serum triglycerides, HDL cholesterol were estimated using commercially available kits (Biosystems S A. Barcelona). Serum VLDL-Cholesterol is calculated using the formula, VLDL = TG/5. LDL cholesterol is calculated from the values of total cholesterol, triglycerides and HDL cholesterol by applying Friedwald's equation. TC/HDL and LDL-C/HDL-C ratio were determined.

Serum Lipoprotein (a) levels were estimated by in vitro turbidimetric immunoassay using a kit (AGAPPE Diagnostic Ltd). Elevated Lp (a) levels were defined as more than 30mg/dl.

Statistical analysis: The Statistical software SPSS 15.0 was used for the analysis of the data. Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements were presented as Mean ± SD. P value < 0.05(95% confidence interval) was considered significant. Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups. Chi-square / Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Results:

The basic characteristics of the control group and cases with Psoriasis are depicted in Table 1. There is no significant difference in age, gender and BMI between two groups. The mean distribution of lipid levels and Lp(a) levels is depicted in Table 2. Serum TC, TG, VLDL-C, TC/HDL-C ratio levels were significantly higher (P <0.05) in the psoriasis patients compared to controls. LDL-C was found to be higher and HDL-C was found

to be lower in the cases compared to controls, with the difference being not statistically significant. In the present study Lp(a) levels of 30mg/dl was taken as cutoff, as levels more than 30mg/dl are considered pathologically significant. Patients with psoriasis showed significantly higher serum levels of Lp(a) relative to controls.

Table 1 Basic characteristics of study population

Basic characteristics	Controls	Cases	p value
Age (yrs)	48.70±13.28	49.07±15.15	>0.921
Male: Female	14:16	15:15	>0.795
BMI (kg/m2)	23.03±1.73	23.82±1.91	>0.084

Table 2 Mean distribution of lipid and Lp (a) levels in patients and controls

Lipid parameters	Controls	Cases	t value	p value
Total cholesterol (mg/dl)	186.80±29.45	211.96±32.17	3.159	0.003
Triglycerides (mg/dl)	136.77±36.55	182.07±75.19	2.967	0.004
HDL-C (mg/dl)	40.17±5.74	36.83±7.29	1.968	0.054
LDL-C (mg/dl)	119.30±26.52	134.00±31.98	1.937	0.058
VLDL-C (mg/dl)	27.33±7.26	37.27±14.80	3.299	0.002
T.Chol/HDL-C ratio	4.76±0.95	5.89±1.14	4.179	<0.001
LDL-C/HDL–C ratio	3.03±0.78	3.72±0.99	2.970	0.004
Lp(a)	24.61±5.27	32.72±9.71	4.018	<0.001

Discussion:

The purpose of this study is to determine the serum lipid disturbances in psoriasis and to assess the significance of lipoprotein (a) levels in psoriasis.

The chronic inflammation in psoriasis has an unfavorable effect on the cardiovascular risk profile. Although there have been extensive studies of serum lipids and apolipoprotein levels in psoriasis, their importance in the etiology or in the enhancement of the disease remains controversial [9, 10]. Genetic studies demonstrate that psoriasis and cardiovascular disease share common pathogenic features, for example inflammatory cytokines like TNF-α and IL-1 play an important role. Multiple cardiovascular risk factors seem to be influenced like, the blood pressure, oxidative stress, dyslipidemia, endothelial cell dysfunction and blood platelet adhesion.[11, 12]

In our study it was found that patients with psoriasis had significantly elevated levels of TC, TG, VLDL-C and TC/HDL-C.

Study by Vanizor Kural et al, on 35 psoriatic patients have shown that TC, TG, LDL-C levels in patients with psoriasis are significantly higher than those of healthy subjects.[1] Mallbris et al., in a study on 200 psoriatic cases proved that there was higher total cholesterol, VLDL-C, apo B and apoA-1 levels compared to normal control group.[13]

Piskin in his study on 100 psoriasis cases showed serum total cholesterol and LDL-C levels to be significantly higher than that of control group.[14] Rocha-Preira reported rise in TC, TG, LDL, VLDL and a reduction in HDL in psoriatic patients.[9] The serum LDL-C levels were elevated and HDL-C levels reduced in patients with Psoriasis compared to controls. But the difference was not statistically significant. Dreiher in his study on 10,669 psoriasis patients and 22,996 subjects without psoriasis observed that triglyceride levels were higher in psoriasis patients and high-density lipoprotein cholesterol levels were lower.[15]

Mechanism of pathogenicity of Lp(a) excess include destabilization of plaque, increased smooth muscle cell proliferation and migration, inhibition of transforming growth factor β, formation of occlusive thrombus, impaired formation of collateral vessels, enhanced oxidation uptake and retention of LDL-C and upregulation of expression of the plasminogen activator inhibitor (PAI-I).[8, 16] It is reported that macrophages activated by engulfing low density lipoprotein (LDL) immune complexes release large quantities of tumor necrosis factor (TNF) -alpha and IL-1β. Cytokine-driven inflammation and tissue destruction is a common theme of chronic inflammatory diseases such as psoriasis and atherosclerosis.[17] The striking homology of apo(a) with plasminogen causes impaired fibrinolysis by competing with plasminogen and enhances thrombogenesis. So Lp (a) modulates thrombosis and fibrinolysis.[18]

In the present study there was significant elevation of Lp(a) levels ($P < 0.001$) in Psoriatic patients compared to controls. In a study by Uyanik et al, Lp (a) level was significantly higher in patients with psoriasis than in controls ($p < 0.01$). Pietrzak in his study on 34 psoriasis cases showed significantly higher serum levels of Lp (a) relative to controls.

Lp (a) may be a factor contributing to an increased cardiovascular risk in patients with psoriasis. A pathogenetic link may exist between this lipoprotein and psoriatic pathophysiology. Since lipids and Lp(a) are involved in the immuno-inflammatory and oxidative stress process in psoriasis, the present study has explored the possible usefulness of these parameters as markers of risk factor for development of cardiovascular disease in psoriasis.

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