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Original Research Article

Dyslipidemia in psoriasis patients: a case-control study

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ABSTRACT

Background: Psoriasis is a chronic inflammatory disorder with defective proliferation and differentiation of keratinocytes. It is associated with metabolic syndrome i.e. dyslipidemia, hypertension, obesity, cardiovascular diseases and insulin resistance. The high incidence of cardiovascular events in psoriasis is highly associated with abnormal lipid metabolism. This case-control study was done in North Indian medical institute to investigate the levels of serum lipids in psoriasis patients taking in account various parameters like weight, height, body mass index, blood pressure and diabetes.
Methods: We assessed the fasting lipid profile in 48 psoriasis patients and 48 healthy, age and sex matched controls.
Results: The study found significant elevation ($p<0.05$) of serum total cholesterol, triglycerides, low density lipoproteins (LDL) and very low density lipoproteins (VLDL) in psoriasis patients compared to controls. The levels of high density lipoproteins (HDL) were also significantly lower ($p<0.05$) in psoriasis patients.
Conclusions: This study suggests that psoriasis is a high risk disorder for cardiovascular mortality and morbidity because of its association with dyslipidemia.

Keywords: Dyslipidemia, Psoriasis, Cardiovascular risk

INTRODUCTION

Psoriasis runs a very chronic course and is characterized by hyperproliferation of keratinocytes and chronic inflammation. It is now thought as systemic inflammatory disease with many complications, co-morbidities and adverse quality of life.[1] The incidence of psoriasis in population has been reported 2-3%, which can be considered high for any disease.[2]

Various factors like genetic, immunological, metabolic, environmental and many others play a role in the pathogenesis of psoriasis. The quality of life becomes catastrophic in these patients because of the scaly plaques all over the skin. Moreover, this disease has been associated with metabolic syndrome in a large number of patients. The high incidence of dyslipidemia, visceral obesity, insulin resistance and hypertension increases the incidence of cardiovascular mortality and morbidities in these patients. Indeed, psoriasis is a systemic pathology which includes psoriatic arthritis, metabolic diseases and cardiovascular diseases.[1,3,4] Psoriasis can be classified into plaque, guttate, pustular, psoriatic arthritis and erythrodermic type depending on the clinical presentation.[5] It can affect any age, but two age groups, 16 to 22 and 57 to 60 years, are mostly affected.[1,5] The

characteristic features of lesions in psoriasis are hyperproliferation, incomplete differentiation of keratinocytes and decreased keratinocyte apoptosis with inflammatory infiltrate in dermis and epidermis.[6]

Various studies have reported increased serum levels of triglycerides, cholesterol, low density lipoproteins (LDL), very low density lipoproteins (VLDL), and low levels of high density lipoproteins (HDL) in psoriatic patients.[7,8] Other factors associated with psoriasis are hypertension, diabetes mellitus and obesity.[9] This metabolic syndrome is the most important comorbidity in psoriatic patients.[10]

The proatherogenic serum lipid profile is one of the factors for high incidence of cardiovascular events in these patients. 'The deadly quartet', which is a combination of obesity, hypertension, triglyceridemia and glucose intolerance was described by Kaplan, in 1989.[11] Defronzo, in 1992, added atherosclerotic cardio-vascular disease to it and termed it "syndrome".[12] The cause of abnormal lipid profile is not well understood. It can be an association, causal relationship or change in gut endothelium because of inflammatory mediators of psoriasis (like cytokines, TNF-α, interleukins). This change in gut endothelium causes increased absorption of fats from the ingested food. The reduction of cardiovascular events in psoriasis patients treated with TNF-α blockers proves this hypothesis.

In the present study, we investigated the fasting lipid profiles of psoriasis patients and controls.

METHODS

This case-control study was carried out in the dermatology outpatient department of Maharaja Agrasen Medical College (MAMC), Agroha, India in the year 2018 between August and November. The approval from ethical committee of the institution was taken before the study.

48 patients of chronic plaque psoriasis, attending outpatient department of dermatology, and 48 age and gender matched controls were enrolled in our study, after informed and written consent, and permission of the subjects for including their data in this study with confidentiality. The severity of psoriasis was measured by internationally accepted psoriasis area and severity index (PASI) score. The body surface area (BSA) was calculated by rule of nine. The age of the patients and control group was 18-70 years and the diagnosis of psoriasis was clinical. They were divided into urban and rural categories.

The patients who were smokers, alcoholics, having hypothyroidism, cholestatic /inflammatory liver disease, chronic liver disease and those on medicines affecting lipid metabolism (thiazide diuretics, retinoids, beta blockers, lipid lowering drugs), and pregnant women were excluded from this study. Similarly, controls were selected with exclusion criteria.

A sample of 5 ml venous blood was taken, after 12 hours fasting, in a syringe and sent to the laboratory for measurement of serum lipid profile. Serum was immediately separated by centrifuging and the serum was analyzed for levels of lipids.

Serum triglycerides (TG) were measured by enzymatic method (modified Glycerol-3- Phosphate Oxidase – Peroxidase, GPO-PAP). Total serum cholesterol (TC) was estimated enzymatically by modified Cholesterol Oxidase: Peroxidase, CHOD-PAP). HDL-cholesterol was estimated using direct method. LDL-cholesterol was calculated by Friedwalds formula i.e. LDL = TC – (HDL + TG ÷ 5). VLDL was calculated by formula VLDL= TG ÷ 5.

The results were expressed as mean±standard deviation (SD). A $p<0.05$ was considered statistically significant. The statistical analysis was done through statistical package through social sciences (SPSS – 16.0 version). The statistical significance was calculated by one way analysis of variance (ANOVA). Significance level was used at 95% confidence level. Student's t-test was used to compare the continuous variables and Chi-square test was used to compare the categorical variables.

RESULTS

This case-control study included 48 patients of psoriasis and, 48 age and gender matched controls, the age range being 18 to 70 years in both the groups. The mean age of patients and controls was 40.04±10.20 and 40.10±10.13 respectively. There was no statistically significant difference regarding sex, urban/rural background and body mass index (BMI) between the two groups (Table 1).

The mean disease duration was 4.60±3.27 years. The mean PASI score was 15.90±6.93 and mean BSA involved was 33.78±15.46.

Serum total cholesterol ($p<0.001$), triglycerides ($p<0.015$), LDL ($p<0.001$) and VLDL ($p<0.015$) were significantly raised in psoriasis patients as compared to controls, whereas HDL ($p<0.002$) was decreased in patients (Table 2).

There was no statistically significant difference between serum lipid levels of urban and rural patients in our study. Serum levels of LDL correlated with age ($r=0.326$, $p=0.024$), HDL levels correlated with duration of the disease ($r=0.423$, $p=0.003$), and serum levels of triglycerides and VLDL correlated with BMI ($r=0.298$, $p=0.039$), and PASI ($r=0.326$, $p=0.024$).

Table 1: Characteristics of psoriasis patients (n=48) and controls (n=48).

	Mean±SD	Min - Max	P - value
Age (years)			
Patients	40.04±10.20	21 – 60	0.976
Controls	40.10±10.13	22 – 58	
Sex (male:female)			
Patients	28:20		0.837
Controls	27:21		
Urban/rural (n)			
Patients	23/25		0.838
Controls	22/26		
BMI (kg/m^2)			
Patients	24.46±1.73	22 – 29	0.285
Controls	24.08±1.74	18 – 28	

Table 2: Serum lipid levels in psoriasis patients (n=48) and controls (n=48).

		Mean±SD	Min - Max	P value
Total cholesterol (mg/dl)	Patients	176.06±33.89	140.4 – 288.0	0.001*
	Controls	157.05±21.03	126.8 – 206.1	
Triglycerides (mg/dl)	Patients	150.94±64.26	65 – 376	0.015*
	Controls	125.00±33.42	57 – 198	
HDL (mg/dl)	Patients	40.10±8.95	22.5 – 70.8	0.002*
	Controls	45.44±7.51	36.0 – 68.4	
LDL (mg/dl)	Patients	107.18±32.20	41.7 – 207.4	0.001*
	Controls	86.61±22.32	46.8 – 134.7	
VLDL (mg/dl)	Patients	30.19±12.85	13.0 – 75.2	0.015*
	Controls	25.00±6.68	11.4 – 39.6	

*p<0.05; significant.

DISCUSSION

Various studies on serum lipid level in psoriasis have been published since the beginning of 20th century. Boehncke and Boehncke, in 2011 published about severity of psoriasis and cardiovascular morbidity.[13] Later on multiple studies were carried out in different ethnic and geographical population consistently reporting dyslipidemia in this disease.

Many studies have reported increased serum lipid levels in psoriasis but few have reported normal levels too. In most studies, total serum cholesterol and triglycerides have been found to be significantly elevated.[14,15] An increasing number of research continues to demonstrate that psoriasis patients have higher risk of cardiovascular diseases than general population.[16-20] The biological mechanism of pathogenesis in psoriasis is still ill-understood but seems multifactorial.[21] Recent studies on immunopathogenesis and genetics in this disease point towards a systemic inflammatory process in psoriasis rather than a single organ disease.[1,22] Systemic inflammation and hypercoagulability links it to metabolic syndrome, and cardiovascular disease through Th1 and Th17 inflammation.[23-27]

Abnormal fat metabolism is considered to be an important factor in psoriasis. A large number of proinflammatory cytokines (like TNFα, INF-Gamma and IL-1, 6, 17) form a pro-inflammatory environment in the body. Inflammatory change in gut endothelium in psoriasis leads to increased fat absorption. Moreover, various drugs used in psoriasis cause dyslipidemia. Further, other risk factors like diabetes, smoking, alcohol, obesity will also cause more cardiovascular mortality and morbidity in psoriasis.

In present study, serum cholesterol, triglycerides and LDL and VLDL were found to be raised whereas HDL was decreased in psoriatic patients as compared to controls. Various studies have reported varying degree of dyslipidemia in psoriasis patients.

Ghafoor et al studied 128 patients with controls and found raised cholesterol, triglycerides and LDL with p value in each parameter as <0.05.[28] Another study from Romania in 2013, reported increased cholesterol (patient 28.17% v/s control 23.95%), triglycerides (26.05% v/s 22.75%) and LDL (30.25% v/s 25.15%).[29] Similarly dyslipidemia has been reported by various researchers.[30-34]

Our study also proves that dyslipidemia does occur in psoriasis, which is a big risk factor for cardiovascular diseases. It is suggested that psoriasis patients should be investigated for dyslipidemia especially those with increased BMI, increased PASI/BSA and chronicity of the disease. In cases of dyslipidemia, corrective action should be taken like prescription of statins, abstinence from smoking, alcohol and weight reduction along with other life-style modifications like exercise/walking and low-saturated fat diet. Drug therapy (like retinoids) in psoriasis patients should also be chosen with care so as not to further increase lipid levels.

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