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A study of Dyslipidemia in Psoriasis Patients: a case-control study

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Abstract

Background: Psoriasis is a chronic, recurrent, inflammatory, and proliferative disease. 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. **Aim and objective:** To measure the serum total cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL) and low density lipoprotein (LDL). Material and method: This was a case-control, cross-sectional study. A total of 25 psoriatic patients and 25 healthy individuals were enrolled. This study was conducted at the outpatient department of dermatology in SBIMS, Raipur, India. The serum level of total cholesterol (TC), triglyceride (TG), very lowdensity lipoprotein cholesterol (VLDL-C), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), apolipoprotein A-I and apolipoprotein B were measured. **Result:** The results were compared between psoriasis patients and healthy controls by using 'Z' test. Serum total cholesterol, triglyceride, low density lipoprotein were significantly increased in psoriasis patients as compared to control group. But serum High density lipoprotein were significantly decrease in Psoriasis patients compared with controls. **Conclusion:**This rise in lipid levels and decreased High density lipoprotein fraction is an alarming sign that psoriasis is progressing towards Cardiovascular risk.Therefore, controling the lipid fractions and early mangement can save psoriasis patients from cardiovascular risk

Keywords: Cholesterol, Triglyceride, High density lipoprotein, Low density lipoprotein, Psoriasis.

Introduction

Psoriasis is a common, chronic, inflammatory, and proliferative skin disease associated with abnormal lipid metabolism. Its prevalence in the population is affected by genetic, environmental, viral, infectious, immunological, biochemical, hormonal, and psychological factors, as well as by alcohol and drug abuse. [1]

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It is now thought as systemic inflammatory disease with many complications, co-morbidities and adverse quality of life. [2]The incidence of psoriasis in population has been reported 2-3%, which can be considered high for any disease. [3] 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. [4-5] Psoriasis can be classified into plaque, guttate, pustular, psoriatic arthritis and erythrodermic type depending on the clinical presentation. It can affect any age, but two age groups, 16 to 22 and 57 to 60 years, are mostly affected. [6] The characteristic features of lesions in psoriasis are hyperproliferation, incomplete differentiation of keratinocytes and decreased keratinocyte apoptosis with inflammatory infiltrate in dermis and epidermis. [7] 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. [8-9] Other factors associated with psoriasis are hypertension, diabetes mellitus and obesity. [10] This metabolic syndrome is the most important comorbidity in psoriatic patients. [11] 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. [12] Defronzo, in 1992, added atherosclerotic cardio-vascular disease to it and termed it "syndrome". [13] 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-a, 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-a blockers proves this hypothesis. In the present study, we investigated the fasting lipid profiles of psoriasis patients and controls.

Materials and Methods

Present study was conducted in the Department of Dermataology and Biochemistry SBIMS, Raipur, India. All participants completed a medical history form and provided informed consent. 25 psoriatic patients in the age group of 30-50 years were studied for estimation of serum Total Cholestrol, Tryglicerides, High density lipoprotein, Low density lipoprotein. And also these biochemical parameter were determined in 25 control groups in the same age. The patients having classical symptoms of psoriasis like thick red paches of skin or plaques, dry silvery scales of skin and dermatologists decision were included in our study . The patients with psoriasis also subjected to normal renal and liver function tests patients kept for fasting at least 14 hours prior to sample collection.

Those patients who were positive for HBsAg and HIV and hemolytic sera samples were excluded from the study and those with the family history of hypertension, hyperlipidemia, diabetes mellitus were excluded from study. Also hemolysed sera samples were not taken. The approval from ethical committee of the institution was

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obtained before the study, and informed consent was obtained from each participant in the study.

Sample collection

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

Statistical

The results were expressed as mean±standard deviation (SD). A $p<0.05$ was considered statistically significant. The statistical analysis was done through the statistical package in the social sciences (SPSS, 24.0 version). The statistical significance was calculated by a one-way analysis of variance (ANOVA). The significance level was used at a 95% confidence level. A student's t-test was used to compare the continuous variables, and a chi-square test was used to compare the categorical variables.

Observation and Results

This case-control study included 25 patients with psoriasis and 25 age- and gender-matched controls, with the age range being 20 to 50 years in both groups. The mean age of patients and controls was 37.92±8.08 and 39.32±6.64, respectively. There was no statistically significant difference regarding sex, urban or rural background, or body mass index (BMI) between the two groups (Table 1). The mean disease duration was 4.66 ± 3.3 years. The mean PASI score was 16.1±7.02, and the mean BSA involved was 34.5±15.8. Serum total cholesterol ($p<0.001$), triglycerides ($p<0.015$), LDL ($p<0.001$), and VLDL ($p<0.01$) were significantly raised in psoriasis patients as compared to controls, whereas HDL ($p<0.002$) was decreased in patients (Table 2).

Table 1: Characteristics of psoriasis patients (n = 25) and controls (n = 25).

	Case	Control	P-value
	Mean±SD	Mean±SD	
Age (years)	37.92±8.08	39.32±6.64	0.506
Sex (M:F)	16:9	17:8	
BMI	23.72±3.38	23.04±2.65	0.432

Table 2: Serum lipid levels in psoriasis patients (n = 25) and controls (n = 25).

Lipid profile	Case	Control	P-value
	Mean±SD	Mean±SD	
Total cholesterol (mg/dl)	188.92±24.5	160.48±23.21	0.000

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Triglycerides (mg/dl)	167.44±16.47	143.36±19.57	0.0008
HDL (mg/dl)	37.08±4.28	43.64±7.06	0.00005
VLDL (mg/dl)	33.46±3.3	28.71±3.89	0.00002
LDL (mg/dl)	118.33±24.13	89.08±22.87	0.0000

Our finding suggests that levels of serum total cholesterol, triglyceride, high-density lipoprotein, and low-density lipoprotein are altered in psoriasis patients compared to age-matched control subjects.

Discusion

Various studies on serum lipid levels in psoriasis have been published since the beginning of the 20th century. Boehncke and Boehncke (2011) published a study a study about the severity of psoriasis and cardiovascular morbidity. [14] Later on, multiple studies were carried out in different ethnic and geographical populations, consistently reporting dyslipidemia in this disease.

In our study, table no. 2 shows that the range of serum cholesterol levels was 188.92±24.5. In the case and 160.48±23.21 in the control group, which was statistically significant (p = 0.001). The degree of elevation of serum total cholesterol is associated with the progression of psoriasis. Several studies have demonstrated that serum total cholesterol levels are higher in patients with psoriasis. [15–16] These findings support our results. Table . 2 shows that the serum triglycerides significantly rose (p = 0.001) in psoriasis patients (167.44±16.47) compared to the control group (143.36±19.57). Similar observations were reported by Pietrzak et al. [17] and Mustafa Calapogly et al. [18].

High-density lipoprotein levels were significantly decreased in psoriasis (p = 0.001). patients as compared with healthy controls. The serum high-density lipoprotein levels progressively decrease was seen as the disease. In our present study, we observed significant high value of low density lipoprotein in psoriasis patients 118.33±24.13 as compared to healthy controls 89.08±22.87, which was statistically significant (p = 0.001). The serum low-density lipoprotein levels were significantly increased in (p 0.001) psoriasis patients as compared with healthy controls. Similar results were shown by Lea KlATr, Cornish et al. (19), Lyer D., Woods P. [20], m. akhyani. AH Ehsanietal. [21]

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. An increasing number of studies continue to demonstrate that psoriasis patients have a higher risk of cardiovascular disease than the general population. 16-20 The biological mechanism of pathogenesis in psoriasis is still poorly understood but seems multifactorial. Recent studies on immunopathogenesis and genetics in this disease point towards a systemic inflammatory process in psoriasis rather than a single organ disease.

Abnormal fat metabolism is considered to be an important factor in psoriasis. A large number of proinflammatory cytokines (like TNFa, INF-Gamma, and IL-1, 6, 17) form a pro-inflammatory environment in the body. Inflammatory changes in the gut

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endothelium in psoriasis lead to increased fat absorption. Moreover, various drugs used in psoriasis cause dyslipidemia. Further, other risk factors like diabetes, smoking, alcohol, and obesity will also cause more cardiovascular mortality and morbidity in psoriasis. In the present study, serum cholesterol, triglycerides, LDL, and VLDL were found to be elevated, whereas HDL was decreased in psoriatic patients as compared to controls.

Various studies have reported varying degrees of dyslipidemia in psoriasis patients. Ghafoor et al. studied 128 patients with controls and found raised cholesterol, triglycerides, and LDL, with a p value in each parameter of <0.05.28. Another study from Romania in 2013 reported increased cholesterol (patient 28.17% vs. control 23.95%), triglycerides (26.05% vs. 22.75%), and LDL (30.25% vs. 25.15%). [22] Similarly, dyslipidemia has been reported by various researchers. [23]

A similar study was done by Pranali P. Karne **e**t al. The results were compared between psoriasis patients and healthy controls using the 'Z' test. Serum total cholesterol, triglyceride, and low-density lipoprotein were significantly increased in psoriasis patients as compared to the control group. But serum high-density lipoprotein levels were significantly decreased in psoriasis patients compared with controls. The study found an abnormal lipid profile, which is a risk factor for cardiovascular diseases (CVD) in psoriasis patients. [24] Surinder Gupta also found a 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. [25]

It is clearly seen that the relationship between psoriasis and dyslipidemia is a matter of controversy. Based on these controversial findings, no one can conclude which one of them causes the other or whether both of them are caused by a common genetic abnormality on a solid scientific basis. However, we suggest that psoriasis possibly induces secondary hyperlipidemia, which places psoriatic patients at greater risk of having CVD. However, we cannot rule out the other two possibilities. Therefore, a future advanced study is advisable to clarify this issue with certainty.

The power of this study lies in the measurement of lipoprotein levels in addition to the lipid profile among the studied participants. There are limitations in this study, which include the inability to ascertain the causation of the relationship between a disturbed lipid profile and psoriasis due to its design as well as the fact that it was conducted in a single center.

Conclusion

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 the prescription of statins, abstinence from smoking and alcohol, and weight reduction, along with other lifestyle modifications like exercise or walking.

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low-saturated-fat diet. Drug therapy (like retinoids) for psoriasis patients should also be chosen with care so as not to further increase lipid levels.

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