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Relationship Between Dyslipidemia and Antioxidant levels in Psoriatic Patients of Kerbala Province: Iraq

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ABSTRACT

Background: Psoriasis is the dermatological disorder characterized by hyperproliferation and inflammation of the skin. The symptoms of psoriasis are erythema, itching, thickening and scaling of the skin. Psoriasis is most affecting young or middle-aged adults although no age is exempted. Along with soles and palms as common areas, psoriasis also affects elbows, knees, scalps and sacral region in symmetrical pattern. This study was designed and conducted to investigate the serum lipid profile, antioxidant enzymes glutathione (GSH) and catalase (CAT) and its association with the severity of disease. **Materials and Methods:** This case-control study was performed on 70 psoriasis patients and 30 healthy individuals as control, matched for age and sex. Blood samples were collected after 14 h fasting. Serum lipid profile, were assayed using the standard kit and GSH. CAT were assayed using the Elase kit. **Results**: Serum lipid profile levels in the psoriasis group show that the range of serum cholesterol level was 105 to 311 with a mean of (212.5 ± 52.46) mg%. The range of serum low-density lipoprotein cholesterol (LDL-C) was 34.2 to 235.6 with a mean of (137.6 ± 47.71) mg%. The range of triglyceride was 80 to 403 with a mean of (170.8 ± 62.71) mg%. The range of serum high-density lipoprotein cholesterol (HDL-C) was 25 to 68 with a mean of (39.59 ± 7.58) mg%. In addition there were serum antioxidant levels in the psoriasis group shows that the range of serum glutathione (GSH) level was 2.27 to 19.54 with a mean of (12.13± 4.431)µg/ml and the range of catalase (CAT) level was 0.07 to 21.14 with a mean of (1.48 ± 2.53)pg/ml. **Conclusion:** The results of this study conclude that cholesterol, LDL and triglyceride levels were previously reported to be higher in psoriasis patients while HDL levels were previously reported to be no change which makes a difference in the severity of psoriasis. In addition this study concludes that glutathione and catalase levels were previously reported to be lower in psoriasis patients.

INTRODUCTION

Psoriasis is a common, chronic, inflammatory, and proliferative skin disease characterized by increased T helper cell activity and associated with abnormal lipid metabolism .[1] According to world psoriasis day consortium about 125 million people all over the world suffer from this disease, however, in some countries there is a higher prevalence rate of psoriasis, as in Kazakhstan, Trinidad, Tobago, Paraguay, Kenya, Tanzania, Egypt, and Kuwait.[2] Increased risk of cardiovascular abnormalities, hypertension, dyslipidemia, atherosclerosis, diabetes mellitus type 2, obesity, chronic, cerebral stroke, osteoporosis, cancer, and depression was noticed in psoriatic patients.[3] The disease is characterized by increased keratinocyte proliferation and alteration in dermal and epidermal T-cells, monocytes-macrophages and neutrophils.[4] Increased antigen presentation by dendritic cells and their presentation to T-lymphocytes lead to the following changes: T-cell activation and secretion of type 1 (TH1) cytokines like interferon, interleukin-2 and tumor necrosis factor alpha (TNF-α). These cytokines induce inflammatory changes in epidermis, yielding thick scaly plaques.[5] Recently, the role of T- lymphocytes in pathogenesis of psoriasis and atherosclerosis has been clarified. Psoriasis has been associated with an abnormal plasma lipid metabolism and diabetes, probability related to alterations in insulin secretion and sensitivity.[6] Furthermore, there is increased oxidative stress which is accompanied by a high frequency of cardiovascular disease.[7]

MATERIALS AND METHODS

This is a cross-sectional study conducted over a period from March 2015 through March 2016. Samples collected from dermatology clinic in Al-Hussein Teaching Hospital in Karbala city. The practical side of the study was performed at the laboratory of clinical chemistry department and at the laboratory of immunology department in Al-Hussein Teaching Hospital. This study included seventy patients attending dermatology clinic in Al-Hussein Teaching Hospital (50 male -20 female) age range (7-70) years. They were diagnosed by a specialist dermatologist as having psoriasis. On the other hand, thirty apparently healthy persons (15 male-15 female) age range (9-60) was chosen as control group. A questionnaire was designed to obtain information from psoriasis patients and control group. It contained the name, age, weight, height, duration of disease and site of lesion.

Exclusion criteria for both groups were: diabetes, hypertension, cardiovascular disease, smoking, history of alcohol intake, liver obstructive disease, kidney problems, connective tissue diseases, hypothyroidism, family history of hyperlipidemia, and using lipid lowering drugs, cyclosporine, corticosteroids, β-blockers, thiazide, retinoid and methotrexate. Subjects who had high-fat foods at dinner were excluded. After explaining the purpose of the study and obtaining consent letter, data were recorded on questionnaires for each patient. After14h fasting period, 5 mL venous blood was taken in sterile syringe in the morning from all cases and submitted to the laboratory. Serum levels of total cholesterol, triglyceride, LDL-C, HDL-C and VLDL-C were measured by an enzymatic method with standard kits made by Biolabo SA France. In addition the serum levels of GSH and CAT were measured by Elase method with standard kits made by Elabscience China. The severity of psoriasis was evaluated based on the standard criteria of psoriasis. The clinical severity of the disease was determined according to the PASI score. By estimating the extent of the body surface involvement, scaling in percentage and scoring the erythema, thickening of the affected areas (scalp, trunk, the lower limb and upper limb), the severity of the disease was determined. The collected data were analyzed with student's t-test to assess the difference between the two groups. Logistic regression was used for correlation and multivariate regression was used to investigate the effect of serum lipids level on severity of psoriasis. P values<0.05 were considered statistically significant.

RESULTS

In this case-control study, 70 psoriatic patients and 30 normal individuals as the control group were enrolled for investigation. As in Table 1, total cholesterol, triglycerides, VLDL-C, HDL-C and LDL-C were significantly altered ($p<0.05$).

Table 2 depicts the levels of GSH and CAT ($p<0.05$) which were significantly decreased in psoriatic patients as compared to normal healthy controls.

Table 1. Lipid profile of psoriatic and control

Parameters	Group	Mean ± SD	Range	p-Value
TC (mg/dl)	Patient	212.5 ± 52.46	105.0- 311.0	<0.05
	Control	127.3 ± 18.87	165.0 - 101.0	
TG (mg/dlT TG (mg/dl)	Patient	170.8 ± 62.71	403.0– 80.0	<0.05
	Control	108.2 ± 11.56	140.0–87.0	
HDL-C (mg/dl)	Patient	39.59 ± 7.58	68.0- 25.0	>0.05
	Control	40.70 ± 4.10	51.0 - 35.0	
LDL-C (mg/dl)	Patient	137.6 ± 47.71	235.6– 34.20	<0.05
	Control	66.55 ± 19.52	103.2 - 39.0	
VLDL-C (mg/dl)	Patient	34.33 ± 12.58	16.00- 80.60	<0.05
	Control	21.63 ± 2.313	28.0 - 17.40	

Table 2. Glutathione and Catalase of psoriatic and control.

Parameters	Group	Mean ± SD	Range	p-Value
GSH (µg/ ml)	Patient	12.13 ± 4.431	2.27 – 19.54	<0.05
	Control	33.72 ± 10.63	21.51 -60.68	
TG (mg/dlT CAT (pg/ml)	Patient	1.48± 2.53	0.07–21.14	<0.05
	Control	24.84 ± 30.69	3.89 –118.4	

In the patients group, the serum total cholesterol, triglyceride, VLDL-C, and LDL-C were significantly higher than the controls while the HDL-C level was no change ($P<0.05$). In addition, the serum Glutathione and Catalase levels were significantly lower than the controls ($P<0.05$).

DISCUSSION

Psoriasis is a chronic inflammatory skin disease characterized by increased T helper-1 and T helper-17 cells activity.[1] Complex network of cytokines and chemokines mediate the pathological reaction,

whereas the abnormal function of psoriatic regulatory T cells is likely responsible for the chronic nature of psoriasis.[8] There are contraindicating reports about the association between serum triglyceride, cholesterol, LDL, VLDL and HDL with psoriasis; the discrepancy goes so far that some studies indicate normal[9,10] higher[11,12,13] or even lower serum triglyceride levels in psoriatic patients.[12]

In the present study, the serum triglyceride level was significantly in psoriatic patients compared to the controls ($P<0.05$). There have been controversial results on serum cholesterol level in psoriatic patients; different studies report higher,[14] lower[13] or even normal levels.[15,16] Our results indicate significantly were higher serum cholesterol levels in psoriatic patients compared to controls ($P<0.05$). In numerous studies, serum LDL levels in psoriatic patients are reported normal[17] or higher.[15] In our investigation, serum LDL in the case group was higher than the control group. Also in our study, the VLDL level was higher which contrasts the other data that indicate normal range.[13,16] Also, the HDL level was non-significantly in psoriasis patients compared with control group ($p>0.05$) inconsistent with other studies.[11,13,16] The differences in results of various studies might reflect genetic factors, lifestyle, severity of disease, daily activity and diet in each region. The causes of dyslipidemia (abnormal amount of lipids) in psoriasis may be multiple; the immune mechanisms involving IL-6 and tumor necrosis factor, C-reactive protein, and cellular oxidative stress may be responsible for altered lipid metabolism.[7]

There may be several mechanisms for the increased lipid levels in psoriasis. Psoriasis is a chronic inflammatory state characterized by an increase in the immunological activity of helper T cells and chronic inflammation has been suggested as a part of the metabolic syndrome. Both psoriasis and the metabolic syndrome are characterized by increases in the immunological activity of helper T cells.[18]

Chronic systemic inflammation induces endothelial dysfunction, altered glucose metabolism, and insulin resistance that plays a significant role in the development of obesity, diabetes mellitus, dyslipidemia, and cardiovascular diseases such as atherosclerosis and myocardial infarction or stroke.[19]

In this study, we try to investigate the relation between antioxidants levels and the development of psoriasis. Antioxidant status which represented in the present study was reduced glutathione which is the master antioxidant in the body, and the other important active enzymes in the antioxidant system which is catalase (CAT). This was achieved by evaluating the changes according to the activity of the disease. Data in this regard showed that catalase level was significantly lower in severe psoriasis compared to the healthy control, p value (<0.05). This study tested the relation between some antioxidants markers and psoriasis. It has been stated that psoriasis is characterized by elevated keratinocyte proliferation, alterations in dermal vasculature, elevated cellular antioxidant activities and the presence of dermal/epidermal inflammatory cells within or near psoriatic lesions.[20]

An imbalance in the oxidant/antioxidant system had been suggested to be involved in the pathogenesis of psoriasis.[21]

Recommendations

It is important to measure serum lipid level particularly cholesterol, LDL and TG in psoriatic patients for early screening of hyperlipidaemia to evaluate risk to atherosclerosis and vascular obstructive disorders and its complications. Further research is needed to assess the impact of traditional cardiovascular risk factors, comorbidities, psoriasis disease severity, and the choice of lipid-lowering therapy on lipids in patients with psoriasis. Administering lipid-lowering medicines for patients particularly cases with severe disease may be beneficial in prognosis especially that hyperlipidemia is relatively easy to treat.

Lifestyle modifications like low in fat diet and physical exercise, prevention of smoking must be advised to patients to prevent cardiovascular disease.

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