

Study of serum lipid profile in psoriatic patients and correlation with disease severity

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Received 15/4/2012 accepted 15/7/2012

Abstract

Introduction : Psoriasis is a chronic proliferative skin disorder with reported incidence of 1.5%-4.8% in different countries. Its etiology is still unknown, while genetic, metabolic and immunological mechanisms have been recommended as its causes. Literature suggests that lipid metabolism maybe play a significant a role in pathogenesis of psoriasis, and psoriatic patients manifest significant lipid abnormalities.

Patients and Methods: The study comprised 53 psoriatic patients and 50 age and sex matched healthy subject. For all patients, clinical assessment by using Psoriasis Area and Severity Index (PASI) score was performed, and fasting blood sampling was collected to assess the lipid profile.

Results: Psoriatic patients, in comparison to healthy subjects, show a significant high serum level of total cholesterol (TCH) and low-density lipoprotein cholesterol (LDL) and no significant differences in the serum level of triglyceride (TG), very low-density lipoprotein cholesterol (VLDL), and high-density lipoprotein cholesterol (HDL).

Conclusions: Psoriatic patients were associated with lipid abnormalities. Atorvastatin shows a promise role in treatment of psoriasis. Furthermore, Atorvastatin demonstrate a beneficial therapeutic role in psoriasis by its hypolipemic efficacy. Further studies were recommended to assess the therapeutic efficacy of lipid lowering drugs in treatment of psoriasis.

Key words: psoriasis, lipid profile, atherosclerotic index, PASI.

دراسة مستوى الدهون في مصل مرضى الصدفية وعلاقته بحدة المرض

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Introductions

Psoriasis is common, chronic, disfiguring, recurrent inflammatory and proliferative condition of the skin that transmitted

genetically with population prevalence between 1.5 and 3%. The most characteristic lesions consist of red, scaly, sharply demarcated, indurate plaques, present particularly over extensor surfaces and scalp. The disease is enormously variable in

duration, periodicity of flares and extent that may affect any part of the skin¹. The distribution of skin lesions includes the elbows, the knees, scalp (especially the hairline), intergluteal cleft, the glans penis, palm and soles. The patients may develop psoriatic arthropathy which the only non cutaneous manifestation of the disease².

Although a very wide range of biochemical and pathological abnormalities have been reported in psoriatic skin, the exact cause of psoriasis is not yet defined. While most studies suggest a primary role for the immune system in psoriasis pathogenesis, it has been argued that vascular change precedes the immune response and some evidence suggests a genetic link. However, about five well known mechanisms have been contributed to the pathogenesis of this disease and involve epidermal proliferation, vascular changes, molecular genetics, immunology and inflammation and finally Koebner and reverse Koebner phenomena¹.

Abnormalities in lipid metabolism have been considered to be playing an important role in the pathogenesis of psoriasis and patients with psoriasis may have increased risk of arterial and venous occlusive disease (atherosclerosis). It's still controversial whether changes in lipid composition are primary events or secondary to psoriasis, or perhaps due to medications such as

retinoid^{3,4}. Furthermore, it's found that atherosclerosis and psoriasis have a similar pathogenesis. Both diseases show similarity in the immunological processes involved, as both are T-helper 1 cell (Th-1) mediated diseases. Also, similarity is found in the inflammatory cytokine profiles and both local and systemic inflammatory markers. Both diseases have the same pattern of T-cell activation and expression of adhesion molecules. In addition, psoriasis and atherosclerosis share common histological features with involvement of T-cells, monocytes, macrophages, connective tissue cells, and extracellular matrix⁵. Aim of this work was to assess the lipid profile in psoriatic patients and whether it related to disease severity or not.

Patients and Methods

Patients:

Fifty three psoriatic patients were recruited from the dermatology outpatient clinic in two medical centers (Tikrit Teaching Hospital and Salah ALdeen

General Hospital). In the period between January 2010 and November 2011, all the patients subjected to detailed examination including the general, physical and mainly the skin examination. The diagnosis was made clinically, based on the presence of characteristic psoriatic lesions. For all the patients and at the initial screening visit, baseline characteristics had been made and involve age, sex, BMI, onset and duration of the disease, previous treatment, medical

history and family history. Fifty age- and sex-matched healthy volunteers with no family history of psoriasis from the population were included in the study as a control group (healthy control). All included subjects have consented to be enrolled in this study.

-Inclusion criteria

Mild to moderate and severe untreated psoriatic patients or patients only on topical therapies (emollients).

-Exclusion criteria

Diabetes, obesity, family history of hyperlipidemia, renal and liver failure, hypothyroidism, patients taking systemic drugs especially lipids lowering agents, smoking and alcoholic in order to eliminate damaging factors on serum lipids level of the patients. Moreover, patients who had received oral or topical antipsoriatic therapy within four weeks were not included in this study. The allowed local application used only is vaseline as an emollient.

Methods:

The work involves two steps, firstly: the lipid profile was assessed in all psoriatic patients in comparison to healthy subjects.

$LDL\text{-cholesterol} = \text{Total cholesterol} - (\text{VLDL-cholesterol} + \text{HDL-cholesterol})$

-Atherosclerotic index

Ratio of LDL to HDL is so-called atherosclerosis-index. It was estimated as follow⁸:

Secondly, the lipid profile was assessed in relation to disease severity. Psoriatic patients were sub classified in to mild to moderate and severe cases by using psoriasis a severity measure which is Psoriasis Area and Severity Index (PASI). **PASI**, An index of the severity (thickness, redness, scaling) and extent of body surface coverage of psoriasis. Scores range from 0 to 72 refers to "no disease" and "maximal disease" respectively. Psoriatic patients with PASI score < 12 were considered being mild to moderate cases, while the psoriatic patients with PASI score ≥ 12 were considered being severe cases⁶.

-Blood sampling

Fasting blood samples (5ml) were collected from psoriatic patients and healthy control subjects. Immediately, blood were centrifuged to get serum and stored in -20 C^0 until the laboratory investigations were performed.

-Fasting lipid profile

Serum total cholesterol, triglyceride (TG), and HDL-cholesterol level were measured by an enzymetic-colorimetric method using kits of Human Performance Lab Co. (USA). VLDL-cholesterol and LDL-cholesterol values were calculated according to formulas⁷

$VLDL\text{-cholesterol} = TG/5$

$Atherosclerotic\ index = LDL/HDL$

- Statistical Analyses

All data were collected, tabulated and entered using the program statistical package for social sciences (SPSS) version 18 under windows 7. Descriptive data were summarized by using mean, standard deviation or standard error mean (SEM). The independent sample t-test was used to determine the statistical significance of differences of lipid profile between patients and healthy group, and also to determine the statistical significance of differences among psoriatic patients subgroup. The *P* values less than 0.05 or less than 0.01 were considered statically significant or highly significant respectively⁹.

Results

1-Demographic data:

This study comprised fifty three psoriatic patients, 17 (32%) female and 36 (68%) male of age range from 13-75 with mean age 28.66±11.52. The psoriatic patients have a mean of body mass index of 24.82±4.12 and verify in the duration of disease with a mean of 58.26±42.8 months. Fifty age- and sex-matched healthy volunteers were included in the study as a control group. The demographic data for study subjects (psoriatic and healthy) were statically summarized and tabulated (table 1).

Table 1: The demographic data of the study subjects (healthy and psoriatic patients).

	Healthy control	Psoriatic patients
Number	50	53
Age (years) Mean±SD	28.2±7.74	28.66±11.52
Gender	No. (%)	
	Male	35 (70)
	Female	15 (30)
Body mass index (BMI) kg /m ²	Min-max	
	Mean±SD	18-30
		24.82±4.12
Duration of disease(months) Mean±SD		58.26±42.8
Family history No. (%)		
	+ ve	-
	- ve	35 (66)
		18 (34)

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2-Comparison between psoriatic patients and healthy subjects:

In this study; the serum lipid profile and atherosclerotic index in psoriatic patients

were assessed in comparison to healthy subjects. All the psoriatic patients were untreated locally or systemically for at least one month before enrolment. Also, it's ensured that

the healthy subjects had no medication for at least one month before blood sampling.

- Lipid profile

The mean values (mean±SEM) of serum level for TCH, TG, HDL, LDL, and VLDL in psoriatic patients were 184.98±3.43, 130.26±6.06, 47.09±1.04, 112.23±3.4, and 26.65±1.21 respectively; and in healthy subjects (healthy control) were 168.2±2.51, 128.4±2.8, 48.42±0.81, 93.7±2.7, and 25.08±0.56 respectively. Statically, highly significant differences were found in the serum

level of TCH and LDL between healthy subjects and psoriatic patients ($p < 0.01$), and there were no significant differences in serum level of TG, HDL, and VLDL ($p > 0.05$) (table2) (fig1).

-Atherosclerotic index (LDL/HDL ratio)

The mean value (mean±SEM) of atherosclerotic index in psoriatic patients was 2.88±0.13 and in healthy subjects (healthy control) was 2.28±0.12. Statically highly significant difference was found in the LDL/HDL ratio between healthy subjects and psoriatic patients ($p < 0.01$) (table2) (fig2).

Table 2: Lipid profile and atherosclerotic index in psoriatic patients in comparison to healthy subjects.

Parameters	Healthy control	Psoriatic patients	P value
Lipid profile			
(mg/dl) TCH	168.2±2.51	184.98±3.43	0.000**
TG	128.4±2.8	130.26±6.06	0.750 ^{NS}
HDL	48.42±0.81	47.09±1.04	0.320 ^{NS}
LDL	93.7±2.7	112.23±3.4	0.000**
VLDL	25.08±0.56	26.65±1.21	0.750 ^{NS}
LDL/HDL (ratio)	2.28±0.12	2.88±0.13	0.002**

All data presented as mean±SEM

** : highly significant (P value < 0.01)

NS: not significant

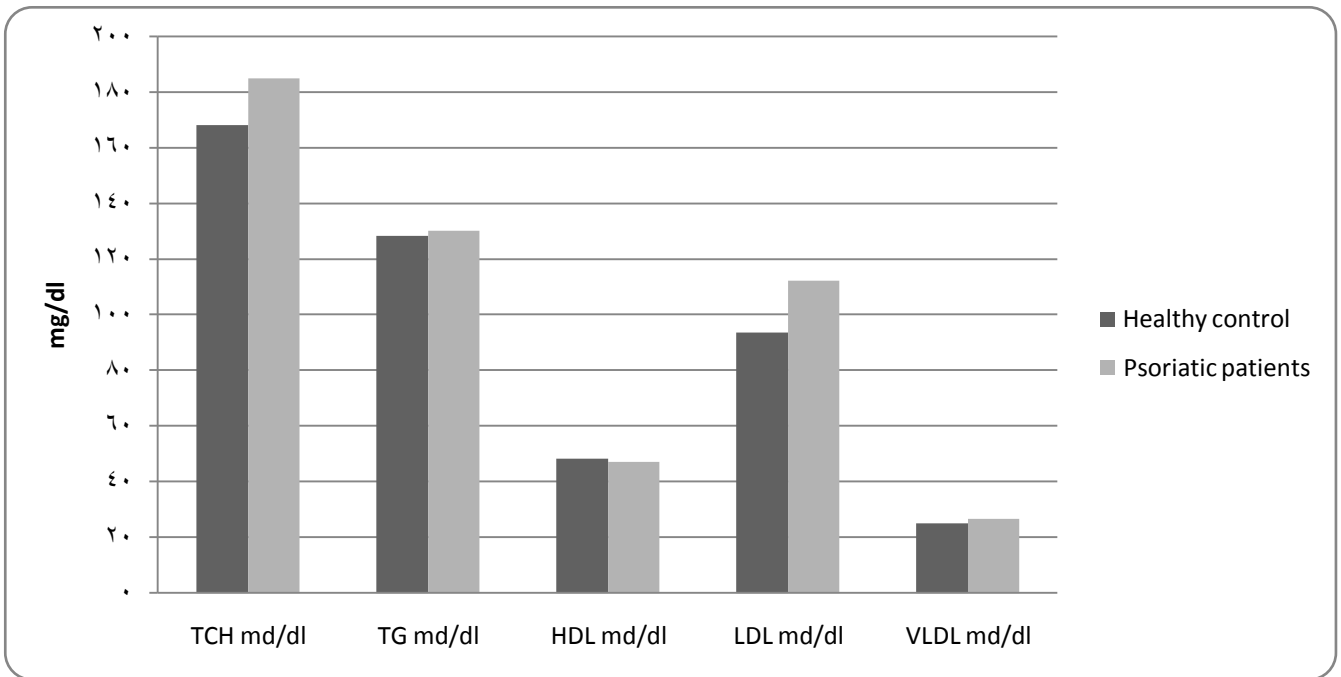


Fig 1: Lipid profile in psoriatic patients in comparison to healthy subjects.

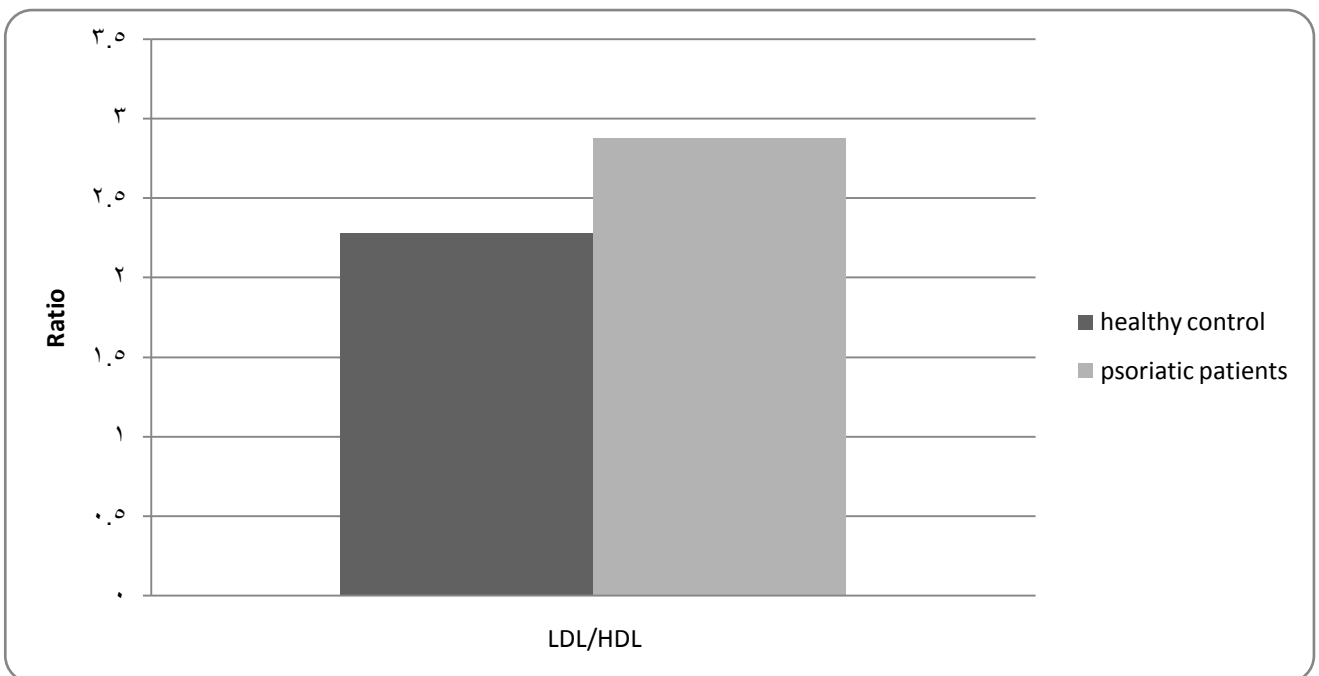


Fig 2: Atherosclerotic index (LDL/HDL ratio) for healthy and psoriatic patients.

3-Correlation between lipid profile and atherosclerotic index with disease severity (PASI):

In this study, the serum lipid profile and atherosclerotic index according to disease severity (PASI score) has been compared.

Statistically, it was found that a highly significant difference in PASI scores between psoriatic patients with mild to moderate degree and those with severe degree with a mean value (mean±SEM) of 8.9±0.7 and 21.8±1 respectively ($p < 0.01$) (table 3).

-Lipid profile

The mean values of serum level (mean±SEM) of TCH, TG, HDL, LDL and VLDL for the mild to moderate group were 180.2±5.1, 128.7±2.8, 48.5±1.04, 106.6±5 and 25±1.3 respectively, and for severe group were 189.8±4.4, 132.9±10.3, 45.2±0.81, 118±4.6 and 26.5±2.21 respectively (table 3).

Comparison of lipid profile according to groups of severity of disease with healthy group:

Statistically, in mild to moderate group, highly significant differences were found in the sTCH and sLDL ($p < 0.01$) and no significant difference in sTG, sHDL and serum VLDL in comparison to healthy group ($p > 0.05$). While, in severe group, a highly significant differences were found in the sTCH and sLDL ($p < 0.01$), a significant difference in the sHDL ($p < 0.05$), and no significant difference in sTG and serum VLDL were found in comparison to healthy group ($p > 0.05$) (table 3).

Comparison of lipid profile in between mild to moderate group and severe group of disease:

Table 3: Correlation between lipid profile and atherosclerotic index with disease severity (PASI).

	Healthy control	Mild to moderate	Moderate to severe
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Statistically, no significant differences in the serum level of TCH, TG, LDL and VLDL ($p > 0.05$), and significant difference in the serum level of HDL were found in comparison between those groups of severity of diseases ($p < 0.05$) (table 3).

Atherosclerotic index (LDL/HDL)

The mean values (mean±SEM) of LDL/HDL for the mild to moderate and severe groups were 2.3±0.13 and 2.7±0.13 respectively (table 3).

Comparison of Atherosclerotic index according to groups of severity of disease with healthy group:

Statistically, in mild to moderate group, no significant difference was found in the values of LDL/HDL ($p > 0.05$) in comparison to healthy group. While, in severe groups, a highly significant difference was found in values of LDL/HDL in comparison to healthy group ($p < 0.01$) (table 3).

Comparison of Atherosclerotic index in between mild to moderate group and severe group of disease:

Statistically, a significant difference was found in the values of LDL/HDL in comparison between those groups of severity of diseases ($p < 0.05$) (table 3).

		No.(50)	Patient no.(26)	Patient no. (27)
PASI at baseline <i>Pb</i>		-	8.9±0.7 **	21.8±1 **
Lipid profile mg/dl	TCH <i>Pa</i> <i>Pb</i>	168.2±2.51	180.2±5.1 ** NS	189.8±4.4 ** NS
	TG <i>Pa</i> <i>Pb</i>	128.4±2.8	128.7±2.8 NS NS	132.9±10.3 NS NS
	HDL <i>Pa</i> <i>Pb</i>	48.42±0.81	48.5±1.04 NS *	45.2±0.81 * *
	LDL <i>Pa</i> <i>Pb</i>	93.7±2.7	106.6±5 ** NS	118±4.6 ** NS
	VLDL <i>Pa</i> <i>Pb</i>	25.08±0.56	25 ±1.3 NS NS	26.5±2.21 NS NS
(LDL/HDL) ratio <i>Pa</i> <i>Pb</i>	2.2±0.12	2.3±0.13 NS *	2.7±0.13 ** *	

All data presented as mean±SEM

Pa: level of significance in comparison to healthy control (if Pa *, **, or NS, it mean significant, highly significant or not significant respectively).

Pb: level of significance in comparison between mild to moderate and severe psoriasis (if Pa *, **, or NS, it mean significant, highly significant or not significant respectively).

Discussion:

Many studies have evaluated the serum lipid profile in psoriatic patients. According to these studies, controversial results have been reported. The high serum levels of TCH, TG, VLDL, LDL, and low serum level HDL have been reported¹⁰. Another study showed normal serum levels of TCH, TG, LDL, and HDL¹¹. Furthermore, a study by Javidi et al (2007) showed that serum levels of TCH, TG, and LDL were found to be significantly higher in psoriatic patients than in normal control group and no significant statistical

difference was observed between HDL levels of the two groups. Data of high serum level of TCH and LDL was reported by Suleyman et al (2003) in study compressed one hundred psoriatic patients.

In the present study, the serum levels of TCH and LDL in psoriatic patients were significantly higher than that of healthy subjects, and there were no significant differences in serum level of TG, HDL, and VLDL. The controversy in data that seen in the current study and other studies may be related to the limitation in these studies, as the number of patients was small and

sometimes not controlled. Larger studies may clarify this controversy, as in a population based study involve more than 10000 psoriatic patients in comparison to 22000 healthy; it was found that psoriasis was found to be associated with a higher prevalence of dyslipidemia, with higher triglycerides levels and lower HDL levels. The associations with total cholesterol and LDL were not statistically significant in the multivariate analysis¹².

Multiple reasons for dyslipidemia in psoriasis were reported in many studies. Pietrzak et al (1998) were report the structural and functional changes in digestive tract of psoriatic patients that may causes lipid abnormalities. Furthermore, the chronic inflammatory state of psoriasis has been characterized by significant role for immunological cells (e.g. Th-1) and cytokines (e.g. TNF- α , IL-6, and IFN- γ) in pathogenesis¹³. It was reported that, those cytokines may be responsible for the generation of proatheromatous abnormalities (dyslipidemia, insulin resistance, endothelial dysfunction, clotting system activation, and pro-oxidative stress)^{14,15}. Furthermore, a controversial data was reported on the role of antipsoriatic medications on lipid profile in psoriatic patients. Burns et al (2010) stated the role of oral retinoids and
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multiorgan abnormalities and complications. In psoriatic patients an increased risk of

cyclosporine in lipid abnormalities in those groups of patients. This finding was not agreed with data reported in study by Jyothi et al in 2011 that showed, the lipid abnormality was related to the psoriasis and not to the medications used in psoriasis.

Jacob et al (2008) stated that dyslipidemia seems to be strongly associated with more severe psoriasis. In the current study, although there were no significant differences in serum level of TCH, LDL, TG, and VLDL between mild to moderate and severe psoriatic patients, the severe cases showed a significant higher atherosclerotic index than mild to moderate cases. This was related to the significant low serum level in HDL of severe cases in comparison to mild to moderate cases. The atherosclerotic index is obtained from ratio LDL to HDL; so, as LDL increased and/or HDL decreased, the atherosclerotic index increased. Nowadays there is an increased interest in HDL, because clinical and epidemiological studies showed an inverse relationship between the level of HDL and the development of atherosclerosis¹⁶.

The established lipid abnormality in psoriasis at present study and other studies may be associated with more serious comorbidities. Recent studies showed that psoriasis has been associated with numerous cardiovascular diseases, diabetes mellitus type 2, and obesity was noticed¹⁷. Although,

the coexisting of others diseases with psoriasis was not assessed in this study, atherosclerotic index was found to be significant higher in psoriatic patient than healthy subjects and strongly associated with more severe psoriasis cases. Accordingly, psoriatic patients with high atherosclerotic index were possibly associated with higher prevalence of atherosclerotic disease, including coronary artery disease, cerebrovascular disease, and

peripheral vascular disease which contributes to their increased mortality¹⁸.

Inconclusion, Psoriatic patients have lipid abnormalities and lipid screening test should be consider as a routine test for all psoriatic patients in the initial diagnosis and regularly for follow up to exclude any lipid abnormality. Furthermore, lipid lowering agents could be of therapeutics value in psoriatic patients.

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