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Lipid profile and BMI in psoriatic patients.

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ABSTRACT— Psoriasis is highly associated with increased lipid profile, atherosclerosis, hypertension, increased body mass index, diabetes mellitus, cerebrovascular accidents, cancer, osteoporosis and depression. This study is to investigate the clinical criteria of psoriatic patients and the possible association with increased lipid profile and BMI. A case control study involving 100 patients visiting the outpatient Department of Dermatology in two large hospitals in Baghdad city/Iraq. All the patients were matching, and had subjected to general physical examination, Height and weight, and blood investigations. The age distribution was statistically matched between cases and controls (36.34 years). Mean BMI of cases was 24.9 kg/m^2, while mean BMI of the controls was 23.94 kg/m^2. According to PASI, 9 (18%) patients had mild psoriasis (PASI < 3), 14 (28%) patients had psoriasis of moderate severity (PASI 3 - 10), whereas 27 (54%) patients had severe type (PASI > 10). The mean serum cholesterol in cases was 180.16 mg/dL, the mean value triglyceride in cases was 200.3 mg/dL, both were significantly higher than the mean value in controls. The mean value HDL in cases was significantly lower than the mean value in controls (44.88 mg/dL, 52.64 mg/dL) respectively. The mean serum LDL and VLDL of cases (144.78 mg/dL & 47.37 mg/dL respectively) higher than the control (124.62 mg/dL & 42.21 mg/dL respectively). PASI score correlate positively with serum triglyceride, cholesterol, LDL & VLDL. In conclusions BMI was higher in patients with psoriasis, abnormal lipid profile was associated positively with PASI score in those patients.

KEYWORDS: psoriasis, BMI, lipid profile, TNF

1. INTRODUCTION

Psoriasis is a common, chronic, inflammatory, and proliferative skin disease characterized by increased T helper-1 (Th1) and T helper-17 (Th17) cells activity. Psoriasis has been regarded as a systematic disease associated with multiorgan complications [1], [2].

Many reports have found psoriasis to be associated with increased lipid profile, atherosclerosis, hypertension, increased body mass index (BMI), diabetes mellitus (DM), cerebrovascular accidents, cancer, osteoporosis and depression, with several studies suggest that subjects with psoriasis have raised plasma concentrations of low-density lipoprotein cholesterol (LDL), very low density lipoprotein-cholesterol (VLDL), hypertriglyceridemia and a lowered high-density lipoprotein cholesterol (HDL) concentration [3-7].

HDL takes part in the transport of cholesterol produced or accumulated in the peripheral tissues to the liver or other steroidogenic tissues and exerts the antioxidant, anti-inflammatory, antithrombotic and fibrinolytic action. It should be underlined that neither HDL nor LDL is “bad cholesterol,” because both are essential for the proper transport of cholesterol [8- 12].

In psoriasis, a decrease of HDL synthesis and HDL structural changes can be observed, due to various biochemical disturbances, such as abnormalities of receptor function, changes of hepatic structure and

function, activity changes of hepatocyte membranes, impaired Reverse Cholesterol Transport (RCT), esterification, and lipases. It can be hypothesized that HDL structural changes are caused by a decrease of cholesterol and phospholipids level as well as an increase of apolipoprotein A concentration in the HDL coat [9], [13], [14].

Lipid abnormalities play an important role on some complications observed in psoriatic patients especially on cardiovascular system. Immunological abnormalities also involved in these lipid disturbances, for this reason some authors classify psoriasis as an immune-metabolic disease [15], [16].

Lipid abnormalities are detectable in psoriasis patients at the earliest stages of the disease and may therefore be genetically determined [6- 8].

Leptin may be involved in the pathogenesis of psoriasis by many roles; in addition to its role in inflammation and stimulating monocyte and macrophage cells and elevated production of the pro-inflammatory cytokines such as tumor necrosis factor -alpha (TNF-α), interleukin -6 (IL-6), and IL-12, it also drives T cell differentiation to Th1 phenotype, therefore, it increases the expression of interferon (INF)-γ and IL-2 (17). On the other hand, leptin suppresses the production of the (Th2) cytokine IL-4 by mononuclear cells or T cells. Leptin also induces keratinocyte proliferation, angiogenesis and expression of adhesion molecules. The increase in leptin production that occurs during infection and inflammation strongly suggests that leptin is a part of the cytokine network that governs the inflammatory-immune response and the host defense mechanisms [17- 18].

2. Patients and Methods

This is a case control study comprised of 50 cases of psoriasis and 50 controls visiting the outpatient Department of Dermatology of Al-Immamein Al-Kadhamein Medical City from March 2019 to May 2020. An Ethical Committee clearance was obtained, and an Ethical Committee approved consent form was used while conducting the study.

2.1 History and Examination

A detailed history was taken pertaining to the duration of psoriasis, treatment taken for psoriasis, family history of psoriasis, occupation, drug intake other than for psoriasis, personal history of diabetes, hypertension, cardiac events, smoking and alcohol intake. All the patients were subjected to general physical examination and cutaneous examinations. Height and weight of all patients were recorded.

Inclusion Criteria

- Patients with clinical forms of psoriasis > 18 years of age.

Exclusion Criteria

- Erythrodermic and pustular forms because of systemic involvement in these forms.
- Patients not willing to take part in the study or unwilling to give their written consent for the study.
- BMI > 30 kg/m^2, smokers, alcoholic.
- Patients with diseases that can cause secondary hyperlipidaemia such as cholestatic liver disease, chronic renal failure, hypothyroidism as well as patients on medications, such as beta blockers, thiazides, corticosteroids, retinoids, cyclosporin, and lipid-lowering agents, in the recent 6 months were excluded
- Pregnant and lactating patients.
- Chemotherapy within 3 months.
- The psoriatic patients who received topical therapy within 4 weeks, or systemic drug therapy and phototherapy.

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Scores
Patients were graded according to Psoriasis Area and Severity Index (PASI) score.
PASI graded as,

- Mild (PASI < 3),
- Moderate (PASI 3-10),
- Severe (PASI > 10).

2.2 Blood Sampling

After fasting of 14 hours, 5 ml of venous blood were drawn from psoriasis and control subjects by using disposable syringes (5 mL) in the sitting position. Blood was allowed to clot at 37 ˚C for 10-15 minutes, and then centrifuged at 3000 rpm for about 10-15 minutes then the sera were obtained and stored at -20˚C until analysis for lipid profiles (measure total cholesterol, HDL, TGs, VLDL and LDL) would be done. These tests were done by enzymatic method on Hitachi (Roshe®) using reagents by the same firm.

2.3 Statistical Analysis

Statistical analysis of data done by using SPSS Inc, Chicago (statistical package for social science) version 23. Data was present as mean (+/-) SD. Descriptive statistical analysis of continuous and categorical variables was performed. Data on continuous variables were presented as mean ± SD and data on categorical variables were presented in number and percentages. Mean of lipid levels in psoriatic patients and healthy controls were compared by using student t-test. Comparison between mean lipid profile and PASI indexes was made by one way ANOVA (analysis of variations)
$P \leq 0.05$ is considered significant.

3. Results

3.1 Gender distribution

Regarding cases of psoriasis, there were 26 males and 24 females and the ratio of male-to-female ratio was 1.08:1. While in controls, there were 29 males and 21 females and the ratio of male-to-female ratio was 1.38:1. Results are displayed in Table -1.

Table- 1: Gender Distribution of Cases and Controls, the male-to-female ratio was 1.38:1

Gender	Cases		Controls		*P value
	N	%	N	%	
Male	**26**	**47.3**	**29**	**52.7**	**0.688**
Female	**24**	**53.3**	**21**	**46.7**	

Chi square

3.2 Age and BMI

Mean age of cases was 36.34 years, while mean age of the controls was 34.74 years. The age distribution was statistically matched between cases and controls with p value 0.936. Mean BMI of cases was 24.9 kg/m^2, while mean BMI of the controls was 23.94 kg/m^2. (Table -2)

Table- 2: Age and BMI Distribution between Cases and Controls. The BMI distribution was statistically matched between cases and controls with p value 0.941

		Mean	SD	Maximum	Minimum	*P value
Age (yr)	Cases	36.34	11.25	58	18	0.936
	Controls	34.74	11.36	58	18	
BMI (kg/m^2)	Cases	24.90	3.01	30.00	19.60	0.941
	Controls	23.94	3.07	29.50	17.90	

T test

3.3 Severity of Psoriasis

The severity of psoriasis was graded according to the PASI score. According to PASI, 9 (18%) patients had mild psoriasis (PASI < 3), 14 (28%) patients had psoriasis of moderate severity (PASI 3 - 10), whereas 27 (54%) patients had severe type (PASI > 10). (figure 1)

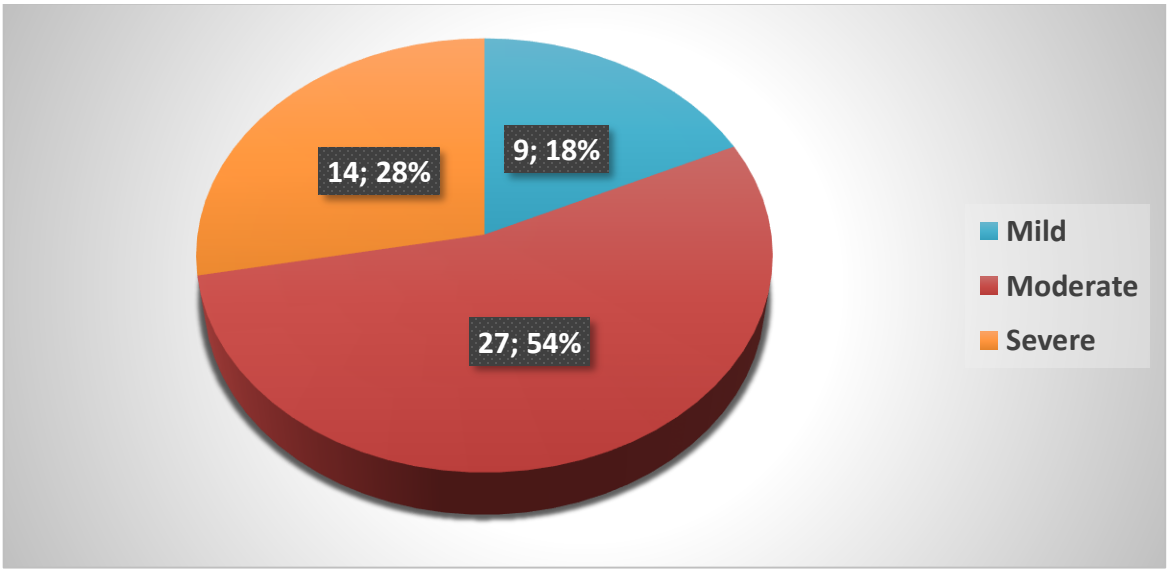

Figure-1: Distribution of Cases according to Psoriasis Area Severity Index

3.4 Lipid Profile

The cases had mean serum LDL and VLDL (144.78 mg/dL & 47.37 mg/dL respectively) higher than the control (124.62 mg/dL & 42.21 mg/dL respectively) but still statistically not significant (p value 0.129 & 0.396 respectively). (Table- 3)

Table- 3: Lipid profile Distribution in Cases and Controls, The cases had mean serum LDL and VLDL higher than the control, but still statistically not significant.

		Mean	SD	Maximum	Minimum	*P value
TG	Cases	200.30	74.83	374.00	66.00	***0.031***
	Controls	166.94	55.99	305.00	65.00	
TC	Cases	180.16	54.92	310.00	110.00	***0.019***

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	Controls	**148.40**	**43.89**	**278.00**	**102.00**	
LDL	**Cases**	**144.78**	**50.61**	**224.00**	**58.00**	**0.129**
	Controls	**124.62**	**44.60**	**211.00**	**44.00**	
HDL	**Cases**	**44.88**	**15.14**	**88.00**	**24.00**	***0.035***
	Controls	**52.64**	**18.44**	**92.00**	**31.00**	
VLDL	**Cases**	**47.37**	**20.03**	**89.00**	**19.90**	**0.396**
	Controls	**42.21**	**18.40**	**97.00**	**21.00**	

T test

A significant increase in (total cholesterol, triglycerides, VLDL and LDL concentration), significant decrease in HDL concentration in sera psoriatic patients according to the severity of psoriasis.

Table- 4: Lipid profile Distribution according to PASI grades. A significant increase in (total cholesterol, triglycerides, VLDL and LDL concentration), significant decrease in HDL concentration in sera psoriatic patients according to the severity of psoriasis.

		PASI			
		Mild	**Moderate**	**Severe**	**P value***
TG	**Mean**	**125.22**	**201.63**	**246.00**	***0.001***
	SD	**39.26**	**55.00**	**89.18**	
	Minimum	**72.00**	**66.00**	**79.00**	
	Maximum	**193.00**	**295.00**	**374.00**	
TC	**Mean**	**142.11**	**158.63**	**246.14**	***0.001***
	SD	**31.53**	**36.41**	**38.08**	
	Minimum	**110.00**	**110.00**	**183.00**	
	Maximum	**198.00**	**233.00**	**310.00**	
LDL	**Mean**	**83.89**	**141.56**	**190.14**	***0.001***
	SD	**20.27**	**43.19**	**29.44**	
	Minimum	**58.00**	**58.00**	**119.00**	
	Maximum	**119.00**	**210.00**	**224.00**	
HDL	**Mean**	**52.14**	**45.19**	**32.67**	***0.008***
	SD	**14.84**	**15.01**	**7.26**	
	Minimum	**31.00**	**27.00**	**24.00**	
	Maximum	**87.00**	**88.00**	**49.00**	

VLDL	**Mean**	**25.92**	**48.19**	**59.57**	***0.001***
	SD	**5.14**	**19.14**	**16.83**	
	Minimum	**19.90**	**22.72**	**29.00**	
	Maximum	**33.00**	**88.00**	**89.00**	

ANOVA (Kruskal Wallis Test)

BMI in psoriatic patients were correlated positively with serum triglyceride, cholesterol, LDL & VLDL and correlate negatively with HDL. Statistically, a significant relationship was observed between the PASI index and serum lipids level. PASI score correlate positively with serum triglyceride, cholesterol, LDL & VLDL. (Table -5 & -6)

Table- 5: Correlation of BMI with lipid profile. BMI in psoriatic patients were correlated positively with serum triglyceride, cholesterol, LDL & VLDL and correlate negatively with HDL.

Correlation with BMI		**TG**	**TC**	**LDL**	**HDL**	**VLDL**
Control (50)	**Pearson Correlation**	**0.463**	**0.442**	**0.634**	**0.252**	**0.455**
	P value	***0.001***	***0.001***	***0.001***	**0.077**	***0.001***
Cases (50)	**Pearson Correlation**	**0.567**	**0.443**	**0.309**	**-0.014**	**0.369**
	P value	***0.001***	***0.001***	***0.029***	**0.925**	***0.008***
All cases (100)	**Pearson Correlation**	**0.533**	**0.461**	**0.479**	**0.092**	**0.422**
	P value	***0.001***	***0.001***	***0.001***	**0.361**	***0.001***

Table- 6: Correlation of PASI with lipid profile. PASI score correlate positively with serum triglyceride, cholesterol, LDL & VLDL

PASI Score	**TG**	**TC**	**LDL**	**HDL**	**VLDL**
Pearson Correlation	**0.339**	**0.665**	**0.614**	**0.230**	**0.426**
P value	***0.016***	***0.001***	***0.001***	**0.109**	***0.002***

Pearson Correlation

4. Discussion

Psoriasis is a chronic and relapsing inflammatory skin disease. This study was done to study a debatable association between psoriasis and abnormal lipid profile. Studies conducted so far on psoriatic patients have shown controversial results. Some studies show lipid levels to be significantly high [19- 25] while others found results to be insignificant by different [26], [27].

Our results showed that there were significant increase of cholesterol and triglycerides levels in psoriatic patients in comparison to controls. This is in agreement with the results obtained by many studies all found significant increase in plasma level of cholesterol and triglycerides in psoriatic patients in comparison to controls and correlated positively with psoriasis severity [12], [17], [19- 25], [28- 29]. While [30] found triglyceride (TG) is low in psoriatic patients than controls.

The results of the present study revealed that LDL and VLDL didn't show significant difference between the patients and controls, but show significant increase in sera psoriatic patients according to the increased severity of psoriasis. These results were consistent with [24] but not agreed with others [23], [27], [31], [32].

HDL showed significant difference between the patients and controls and correlates negatively with PASI score. These findings were in agreement with the results obtained by previous researches [6], [20], [33]. In the study done by Malbris and Drateln only abnormal HDL was associated with psoriasis [6], [32] other researchers didn't show significant difference between the patients and controls, which obtained by [10], [20], [25], [27].

In psoriasis, a decrease of HDL synthesis and HDL structural changes can be observed, due to various biochemical disturbances, such as abnormalities of receptor function, changes of hepatic structure and function, activity changes of hepatocyte membranes, impaired RCT, esterification, and lipases [34].

Nowadays there is an increased interest in HDL cholesterol, because clinical and epidemiological studies showed an inverse relationship between the level of HDL and the development of atherosclerosis. In psoriasis, a decrease of HDL synthesis and HDL structural changes can be observed, due to various biochemical disturbances, such as abnormalities of receptor function, changes of hepatic structure and function, activity changes of hepatocyte membranes, impaired RCT, esterification, and lipases [35], [36].

Also our study showed that PASI and BMI in psoriatic patients were correlate positively with serum triglyceride, cholesterol, LDL & VLDL and correlate negatively with HDL. The alteration in lipid metabolism in psoriatic patients have not been fully explained in the literature. The activation of the immune system in psoriasis may lead to some abnormalities in patients' lipid index. However, these changes may be related to some abnormalities of the digestive system as it takes part in the decomposition, modification, and synthesis of many organic compounds, including lipids. In psoriatic patients, structural and functional abnormalities have been found in nearly all the segments of the gastrointestinal tract [23], [27]], [28], [30], [37], [38].

5. Conclusion

This study found that BMI was significantly higher in patients diagnosed with with psoriasis, in addition, abnormal lipid profile was associated positively with PASI score in those patients.

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