Psoriasis Beyond Local Skin Disease

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Abstract

Background: Psoriasis is a skin disease that was associated with metabolic and clinical changes which suggest that psoriasis is a systemic rather than local disease.

Aim: To illustrate whether psoriasis is local or systemic disease through analysis of some biomarkers.

Materials and Method: A 256 subjects with psoriasis and 221 sex and age matched controls were included in the study. Serum total cholesterol [TC], high density lipoprotein [HDL], Malondialdehyde [MDA], triglycerides [TG], and total antioxidant capacity [TCA] were determined using commercial kits.

Results: There were no significant differences between psoriasis and control groups in regards to mean age and gender distribution, however, there was a significant difference [p<0.01] in BMI. Additionally, TC, TG, LDL and NHDL were significantly higher [P<0.001] in patients with psoriasis than in controls, while HDL was significantly lower in psoriasis than in controls. MDA mean serum level was significantly higher [P<0.001] lower while TCA value was significantly [P<0.001] lower in subjects with psoriasis as compared controls. Lipid profile rates and oxidation index were significantly higher in psoriasis than in controls, while the anti-oxidation index was significantly lower in psoriasis.

Conclusion: These study findings suggest that psoriasis may be a systemic disease rather than local skin disease.

Keywords: *Psoriasis, Cholesterol, LDL, HDL, NHDL, MDA, Total antioxidant capacity.*

Introduction

Psoriasis is a chronic inflammatory- immunologic disease with a prevalence of 2.3% in Iraqi population[1], and variable global prevalence[2]. Although the disease is recognized as local skin disease in approximately 80% of cases, however, 20% of the affected individuals are with >10% body surface area is involved [3]. The disease is with obscure aetiology, however, immunological, genetic, infectious and environmental factors may play a role in the development of psoriasis[4-6]. Previous studies indicated that psoriasis started as local skin disease and subsequently associated with systemic inflammatory-immunologic and metabolic changes[7, 8]. The systemic changes in patients with psoriasis were reported in studies conducted in Iraqi population [5,6,9,10] and worldwide[11-25]. The data presented in the above studies that are from different global communities indicated that psoriasis co-morbidities development are not confined to specific race, developing or developed communities. Previous studies conducted in Iraqi community included small study population, thus this study was conducted in a large-scale study population in comparison with controls.

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Materials and Method

Study Population: The present study included 256 subject with psoriasis attending Dermatology clinic

during the period from January 2012 to end of May 2014. A 221 subject, gender and age matched control were included in the study. The mean age of patients group was 34.8 (±15.6) years and that of control group was 34.5 (±14.9) year with none significant difference between the two groups. Additionally, the gender frequency rate was not with significant difference, Table 1. The study was approved by the ethical committee of Tikrit University College of Medicine and informed consent was taken from each subject included in the study. Subjects with diabetes, hypertension, cardiovascular disease, smoking, renal disease, liver disease, family history of hyperlipidaemia, hypothyroidism, connective tissue disease, and using lipid lowering drugs were excluded from enrolment in the study.

Determination of total cholesterol: Total cholesterol serum level was determined by an enzymatic colorimetric test kit [BioMaghreb, France] and the test was performed according to manufacturer instructions.

Determination of high density lipoprotein: High density lipoprotein serum level was determined by colorimetric test kit [LINEAR CHEMICALS S.L. Joaquim Costa 18 2ª planta. 08390 Montgat, Barcelona, SPAIN] and the test was performed according to manufacturer instructions.

Determination of triglycerides: Triglycerides serum concentration was determined by enzymatic colorimetric test kit [Linear Chemicals, Spain].

Determination of Malondialdehyde: Malondialdehyde serum concentration was determined by measuring the thiobarbituric acid reactive substances as described by Janero [26].

Determination of total antioxidant capacity: The serum concentration of Total Antioxidant Capacity was determined according to method described previously by Kampa et al [27].

Determination of very low density lipoprotein: Very low density **was** calculated by division of triglycerides by 5.

Determination of low density lipoprotein: Serum LDL concentration was calculated by subtraction of HDL and VLDL from total cholesterol serum level.

Statistical Analysis: Variables values were presented as mean ± standard deviation [SD]. Student t test was used to determine the significant differences between the groups. P value of <0.05 regarded as significant.

Results

There was a significant higher difference [P<0.001] in mean serum values of total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL) and non-high density lipoprotein (NHDL) in psoriatic subjects as compared to controls, Table 2. In contrast, high density lipoprotein (HDL) was significantly lower in psoriatic individuals than in controls, Table 2. Additionally, the lipid profile rates were significantly higher [P<0.001] in psoriasis as compared to control group, Table 2. All rates mean values about 2 times higher in psoriasis than in controls.

Malondialdehyde as a marker of oxidative stress was significantly higher [P<0.001] in psoriasis than in controls and thus the oxidation index was 3 times higher in psoriasis with a highly significant difference, Table 3. In contrast, total antioxidant capacity was significantly lower in psoriasis than in controls, with a much lower anti-oxidation index [P<0.001] in psoriasis in comparison to controls, Table 4.

As shown in Table 5, there was a significant [P=0.041 to <0.001] differences in mean serum triglyceride, TAC, BMI, Age, and HDL between male and female psoriatic individuals.

Comparison of male psoriatic with male controls indicated a significant differences [P<0.001] in all tested variables, Table 5. The same pattern was demonstrated when female psoriatic compared to female controls, with the exception of BMI, Table 6. Lipid profile, oxidation, and anti-oxidation rates were significantly different between psoriasis and controls.

Discussion

The peroxidation biomarkers as this study indicated were significantly higher in psoriatic patients as compared to controls. Additionally, gender not significantly influenced the differences in peroxidation biomarkers as demonstrated by comparative analysis on different strata. There was a significant difference when male patients compared to male control; female patients compared to female control, however, there was no significant differences in comparison between the male psoriatic and female psoriatic. These findings were in consistent with that reported previously for different

geographical areas [5-25, 8], irrespective of race, gender, and age.

The antioxidant activity as measured by TAC, HDL, and antioxidant index calculation show a significantly low capacity in psoriatic patents than in control. This finding was agreed to that reported for Iraq and other geographical areas [5-25; 28,29,30], however, some studies not confirmed such changes [15,31-33]. The genetic predisposition may form the first step in the development of psoriasis, and environmental factors interference possibility may initiate disease specific pathogenicity and disease natural history [7].

In literature, the previous studies findings suggest that psoriasis is a multisystem chronic disease with multifactorial aetiology and associated with different comorbidities that were a result of inflammatory, immunologic and infectious sequences [8,32-34].Although psoriasis was characterised by local skin lesions due to inflammatory and immunological responses, however, this study and the previously reported studies indicated that systemic changes were more than dermatologic one [34]. Sing et al [16], in a meta-analysis review reported that from 36 studies, only 1 show odd ratio of <1, and 35 studies with OR range from 1.09 to 6.09 and 21 studies with OR of >2 were demonstrated as association with metabolic syndrome.

Reich [7] 2011, in a review concluded the presence of similarities in pathogenesis of psoriasis and atherosclerosis and suggests that psoriasis is a systemic inflammatory disease. Psoriasis patients are with high prevalence of hypertension, diabetes, hyperlipidaemia, obesity, ischemic heart disease, rheumatoid arthritis and Crohn's disease[35, 36]. Davidovici et al [37] proposed a model that suggest a presence of shared genetic risk factors between psoriasis and obesity and enhance co-morbidities development.

Tampa et al [32] in a review concluded that stress was an important trigger for psoriasis, and many studies suggested the association between psoriasis and psychological stress [16,38-45]. However, the psychological stress mechanisms by which psoriasis induced or exacerbated was not completely understood [32]. Immunopsychological studies show that stress affects immune functions and hormones with subsequent events of in B lymphocytes, T lymphocytes, monocyte, cytokines and oxidative stress biomarkers [46-59]. In Iraqi population, 67% of psoriatic patients demonstrated high perceived stress scale as compared to non-psoriatic patients [60]

Cantrell et al [61] suggested that psoriasis was a systemic inflammatory disease depending on the recent studies that reported an association with cardiovascular diseases, metabolic syndrome, hypertension, psoriatic arthritis, dyslipidemia, and renal diseases[24,62-69]. Additionally, Sanz[70], concluded that psoriasis is a systemic diseases and this conclusion was attributed to the significant association between systemic disease and psoriasis as recent studies indicated. The comorbidities associated with psoriasis include psoriatic arthritis[71-74], crohn disease[75,76], and lymphoma[77-80]. Psoriasis treatment with systemic drugs modified the risk factors such as cardiovascular disease and arthritis risk reduction[62-86].

In conclusion, the present study findings indicated systemic oxidative stress in patients with psoriasis with reduction in antioxidant capacity. Collectively these findings and that of previous studies and ameliorations of biomarkers by systemic treatment suggest that psoriasis is a systemic disease.

Table 1. Study population characteristics

Variable	Psoriasis	Control	P value
Number	256	221	---
Male/female	137/119	113/108	>0.05
Mean age in year (SD)	34.8 (15.6)	34.5 (14.9)	>0.05
Mean BMI (SD)	26.7 (1.3)	25.4 (1.5)	<0.01

Table 2. Mean of Lipid profile with rates in psoriatic patients compared to control

Variable	Mean (SD)		t value	P value
	Psoriasis	Control		
Total cholesterol mg/dl	218.6 (15.6)	184.3 (27.6)	17.13	<0.001
Triglyceride mg/dl	174.2 (15.7)	123.7 (24.8)	26.51	<0.001
HDL mg/dl	40.6 (4.3)	55.2 (9.7)	20.84	<0.001
LDL mg/dl	143.5 (35.6)	104.2 (17.1)	15.12	<0.001
NHDL mg/dl	178 (37.9)	129.1 (18.5)	17.38	<0.001
Cholesterol/HDL	5.5 (1.4)	3.3 (0.2)	23.15	<0.001
LDL/HDL	3.6 (1.3)	1.9 (0.1)	19.38	<0.001
Triglyceride/HDL	4.4 (0.9)	2.2 (0.5)	32.28	<0.001
NHDL/HDL	4.5 (1.4)	2.4 (0.2)	22.10	<0.001

Table 3. Malondialdehyde and total antioxidant capacity in psoriatic patients compared to control

Variable	Mean (SD)		t value	P value
	Patients	Control		
Malondialdehyde µmol/l	4.6 (0.7)	2.3 (0.3)	45.3	<0.001
Total Antioxidant Capacity µmol/l	755 (121)	1045 (194)	19.8	<0.001
Oxidation Index	6.09 (1.2)	2.2 (0.8)	40.1	<0.001
Anti-oxidation Index	164.1 (17.3)	454.3 (59.7)	74.5	<0.001

Table 4. Lipid profile, age, Malondialdehyde, Body Mass Index and Total Antioxidant Capacity in psoriasis according to gender

Variable	Mean (SD)		t value	P value
	Male	Female		
Cholesterol	217.1 (35.7)	221 (32.8)	0.9	>0.05
Triglyceride	179 (15.4)	158 (7.2)	13.6	<0.001
HDL	40.3 (4.9)	41.6 (4.7)	2.1	0.031
LDL	142 (37.1)	145 (34.8)	0.7	>0.05
NHDL	177 (38.9)	179 (37.5)	0.4	>0.05
Age	34.1 (4.7)	35.7 (7.6)	2.1	0.041
BMI	27 (1.58)	26.4 (2.6)	2.3	0.024
Malondialdehyde	4.6 (1.1)	4.5 (0.51)	0.9	>0.05
Total Antioxidant Capacity	702 (83.6)	737 (132.8)	2.5	0.011

Table 5. Lipid profile, age, Malondialdehyde, Body Mass Index and Total Antioxidant Capacity in psoriatic male compared with control male

Variable	Mean (SD)		t value	P value
	Male psoriasis	Male control		
Cholesterol	217.1 (35.7)	185 (16.1)	8.7	<0.001
Triglyceride	179 (15.4)	128 (22.1)	21.2	<0.001
HDL	40.3 (4.9)	57 (2.1)	31.1	<0.001

Variable	Mean (SD)		t value	P value
	Male psoriasis	Male control		
LDL	142 (37.1)	104.7 (9.6)	10.0	<0.001
NHDL	177 (38.9)	129 (17.5)	12.0	<0.001
Age	34.1 (4.7)	31 (3.7)	5.5	<0.001
BMI	27 (1.58)	24.3 (1.5)	10.6	<0.001
Malondialdehyde	4.6 (1.1)	2.1 (0.37)	22.9	<0.001
Total Antioxidant Capacity	702 (83.6)	1046 (127.4)	25.2	<0.001

Table 6. Lipid profile, age, Malondialdehyde, Body Mass Index and Total Antioxidant Capacity in psoriatic female compared with control female

Variable	Mean (SD)		t value	P value
	Female psoriasis	Female control		
Cholesterol	221 (32.8)	182 (19.9)	10.3	<0.001
Triglyceride	158 (7.2)	120 (28.2)	13.4	<0.001
HDL	41.6 (4.7)	54 (3.7)	17.7	<0.001
LDL	145 (34.8)	104.6 (16.7)	11.0	<0.001
NHDL	179 (37.5)	128 (18.9)	12.6	<0.001
Age	35.7 (7.6)	32 (3.5)	4.5	<0.001
BMI	26.4 (2.6)	26 (2.5)	1.8	>0.05
Malondialdehyde	4.5 (0.51)	2.4 (0.38)	34.9	<0.001
Total Antioxidant Capacity	737 (132.8)	1044 (146.3)	16.5	<0.001

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Conflict of Interest: None

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