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Assessment of Ischemia-Modified Albumin Level in Patients with Psoriasis Vulgaris

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Abstract

Background: Psoriasis is a chronic proliferative inflammatory cutaneous condition manifested by pathological cutaneous lesions caused by multiple external and internal causes. This research aims to evaluate the IMA serum levels in psoriasis vulgaris cases and compare with healthy controls. **Methods:** This case control research was performed on sixty male and female psoriasis vulgaris patients with age ≥ 18 years and tewnty age and sex matched healthy control. All patients underwent general examination, clinical examination of the psoriatic lesions and laboratory investigation for measurement of IMA serum level. PASI score was utilized for disease severity evaluation. **Results:** Age, gender, disease duration and PASI score were insignificantly different between the study groups. BMI was significantly different between the study groups ($P < 0.001$). BMI showed a significant difference between paired groups, group I & IV and group II & III ($P < 0.001$, $P < 0.001$; respectively). BMI was significantly lower in group I than group II ($P < 0.001$) and was significantly lower in group III than group IV ($P < 0.001$). **Conclusions:** Obesity is a common comorbidity with psoriasis which may worsen the disease progression by adding more ROS to the pathogenesis of psoriasis. Obese psoriatic patients were shown to have a greater IMA than non-obese psoriatic patients.

Keywords: Ischemia-Modified Albumin, Psoriasis Vulgaris, IMA, Obesity.

1. Introduction

Psoriasis is a chronic proliferative inflammatory cutaneous condition manifested by pathological cutaneous lesions caused by a variety of external and internal causes. Several immunological and biochemical abnormalities are associated with it [1].

The antioxidant system dysfunction with high reactive oxygen species (ROS) generation are involved in several illnesses development [2]. It has been claimed that ROS levels are elevated in psoriatic patients' skin. Polymorphonuclear leukocytes' increased infiltration in psoriatic lesions results in ROS production, resulting in oxidative damage to proteins, cell membrane and lipid peroxidation [3].

Several comorbidities, as cardiovascular disease, obesity, metabolic syndrome (MetS) and psoriatic arthritis, are connected with psoriasis. There is evidence that obesity exacerbates present psoriasis and is considered a risk factor for psoriasis incidence, therefore weight loss may ameliorate the psoriasis severity in obese patients. Psoriasis medical treatment may be compromised by excess body weight which also enhance the cardiovascular risk profile psoriasis patients [4].

Obesity is a chronic condition associated with ROS generation via numerous routes [5]. Ischemia-modified albumin (IMA) is a serum albumin with a chemically modified N-terminus [6]. Albumin's N terminal sequence is among the proteins changed by these highly ROS [7]. IMA is identified in oxidative stress-related disorders as multiple sclerosis, diabetes mellitus vascular damage, alopecia areata and vitiligo. Increasing IMA levels in MetS and obesity have been documented earlier [8].

The aim of this study was to evaluate the level of serum ischemia-modified albumin in patients with psoriasis vulgaris and compare their levels in healthy controls.

2. Methods

This case-control study was performed on sixty psoriasis vulgaris cases and twenty age- and sex-matched healthy controls, collected from the outpatient clinic of Dermatology, Venereology and Andrology Department of Benha University Hospitals and Al-Haud Al-Marsoud Hospital.

This research was done according to the Helsinki declaration principles guidelines and was approved by the Research Ethical Committee of Benha Faculty of Medicine.

Sampling technique:

Participants were classified into four groups; group I: thirty non-obese psoriatic patients, group II: thirty obese psoriatic patients, group III: ten non-obese healthy volunteers as control and group IV: ten obese healthy volunteers as control.

Inclusion criteria:

Male and female psoriasis vulgaris patients with age ≥ 18 years. All participants signed an informed written consent.

Exclusion criteria:

We excluded pregnant and lactating patients, patients with other types of psoriasis and conditions known to be associated with elevated serum IMA level as multiple sclerosis, acute appendicitis, β-thalassemia major, active malignancy and chronic or debilitating diseases as rheumatoid arthritis, multiple sclerosis and cardiovascular diseases. Patients on systemic treatment of psoriasis for less than three months or topical treatment for less than one month were also excluded.

Methods

All patients underwent the following:

Complete history taking: included personal history, history of psoriasis, past history of other medical illness and drug history.

General examination: for any signs of systemic diseases.

Local examination: Clinical examination of the psoriatic lesions. PASI score was utilized for disease severity assessment depending on plaque appearance and area coverage. It ranges from 0 to a maximum of 72. It determines the psoriasis severity depending on the plaques' induration (I), erythema (E) and scaling or desquamation (D).

An average score for erythema, induration and desquamation in each of the four locations was calculated to determine the severity in score from (0–4); grade 4: very severe, grade 3: severe, grade 2: moderate, grade 1: mild and grade 0: none.

A percentage for skin covered with psoriasis for each anatomic area was measured and converted into a scale from (0–6) grades according to a degree of involvement as follows: grade 6: 90-100%, grade 5: 70-89%, grade 4: 50-69%, grade 3: 30-49%, grade 2: 10-29%, grade 1: 1-9% and grade 0: no involvement. If PASI <10 indicates mild psoriasis, if more than or equal to 10 to 20 indicates moderate psoriasis and if PASI is more than 20 indicates severe psoriasis.

Laboratory investigation

Sampling: Under complete aseptic condition by a standard venipuncture technique, five ml venous peripheral blood was collected from all participants in plain tubes. At room temperature for 10-20 min, serum was allowed to coagulate and then centrifuged for 20 min at 2,000-3,000 rpm. After supernatant removal, the samples were stored at -20 °C for preservation. Repeated freeze-thaw cycles were avoided.

Measurement of serum IMA level: According to the manufacturers' guidelines, ELISA method by using the commercially available specific human ELISA kit was utilized for IMA level assessment.

Statistical analysis

SPSS v27 (IBM, Armonk, NY, USA) was used for the statistical analysis. To determine the data distribution, Shapiro-Wilks test and histograms were used. Chi-square test was used for qualitative data expressed as frequencies and percentages. Parametric quantitative data were analysed by ANOVA followed by post hoc test and expressed as means (± SD). Mann–Whitney U test used for non-parametric quantitative data reported as median (IQR). ROC curve analysis was used for overall diagnostic performance assessment. Spearman's and Pearson's correlation coefficients was utilized. Psoriasis vulgaris prognosis was analysed using a multivariate logistic regression model. All statistical analysis was unidirectional. P values <0.05 indicated a statistical significance.

3. Results

Age, gender, disease duration and PASI score were insignificantly different between the study groups. BMI was significantly different between the study groups ($P < 0.001$). BMI showed a significant difference between paired groups, group I & IV and group II & III ($P < 0.001$, $P < 0.001$; respectively). BMI was significantly lower in group I than group II ($P < 0.001$) and was significantly lower in group III than group IV ($P < 0.001$) (Table 1).

The IMA level was significantly higher in group I and group II than in group III and group IV ($P < 0.001$). IMA was significantly lower in group I than group II ($P = 0.002$). Also, IMA was significantly lower in group III than group IV ($P = 0.006$), but it was significantly higher in group I than group III ($P <0.001$) and in group II than group IV ($P <0.001$).

Table (1) The general characteristics of the study groups and disease duration and PASI score between groups I & II

		Group I (n = 30)	Group II (n = 30)	Group III (n = 10)	Group IV (n = 10)	Test	P
Age (years)		33 ±11	41 ±14	35 ±12	37 ±12	F = 2.085	0.109
Gender	**Males**	15 (50%)	15 (50%)	5 (50%)	5 (50%)		
	Females	15 (50%)	15 (50%)	5 (50%)	5 (50%)	X^2= 0	1.0

BMI	$24.5 \pm 3.6^{2,4}$	$37.5 \pm 4.9^{1,3}$	$25.1 \pm 2.4^{2,4}$	$35.8 \pm 4.2^{1,3}$	F = 61.29	<0.001*
	Group I (n = 30		**Group II (n = 30**			
Disease duration (years)	4 (0.08 - 30)	3 (0.5 - 17)	4 (0.08 - 30)	3 (0.5 - 17)	Z= -.531	0.595
PASI score	19.7 (12.6 - 67.2)	26 (11.7 - 63)	19.7 (12.6 - 67.2)	26 (11.7 - 63)	Z= -1.346	0.178

BMI: body mass index, Data presented as mean ± SD, frequency (%) or median (IQR), F = One-way ANOVA test, X^2 = Chi-square test, Z = Mann Whitney U test. Post hoc was done using Bonferroni's method. [1]: different from group I, [2]: different from group II, [3]: different from group III, [4]: different from group IV.

*** P < 0.05 is significant**

4. Discussion

Psoriasis is a prevalent polygenic chronic inflammatory cutaneous condition that has been linked to ROS generation by both external pro-oxidant stimuli and internal causes [9]. Psoriasis is known to be closely related to obesity. IMA is a biomarker of ischemia of cardiac and skeletal muscles [10]. Elevated IMA has been demonstrated in many chronic oxidative disorders as MetS [8] and obesity [11]. A possible IMA function as an oxidative stress biomarker was proposed by Duarte et al. [12].

As shown by our research, psoriatic patients had much higher IMA levels than controls.In the same line, Işik et al. [13] using ACB test reported that psoriatic cases had significantly different IMA levels than control (P = 0.048).

Regarding the psoriasis severity that was estimated in the form of PASI score and its relation to IMA levels, this study found that there was an insignificant correlation between PASI score and IMA. Similarly, Özdemir et al. [14] found no association between PASI score and IMA.

In the present research, in the obese psoriatic patients, there was a significant positive correlation between PASI score and BMI. This agreed with large prospective research of Danielsen et al. [15] which reported that above BMI threshold of 27–28 kg/m^2, both men and women have a greater than 40% increased psoriasis risk, and that adult weight gain was connected with an increased risk of late-onset psoriasis for both sexes by 70–90%. Also, prospective research conducted by Snekvik et al. [16] revealed that high abdominal fat mass and obesity quadrupled the likelihood of developing psoriasis. The present research was in disagreement with Sobhan and Farshchian [17] who reported no correlation between BMI and the severity of psoriasis. Although they found that patients with more severe psoriasis had a greater mean BMI and waist circumference.

In this study IMA levels were insignificantly different between psoriatic males and females. Also, Özdemir et al. [14] reported insignificant difference in IMA levels between male and female patients (P = 0.25). On the other hand, IMA levels were found to be positively corelated to the mean age of the patient groups.

5. Conclusion

ELISA test was found to be both sensitive and specific test in detecting the level of IMA based on the N-terminus modification of HSA. Obesity is a common comorbidity with psoriasis which may worsen the disease progression by adding more ROS to the pathogenesis of psoriasis. Obese psoriatic patients had higher IMA than non-obese psoriatic patients.

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