Original Article

Zahedan Journal of Research in Medical Sciences

Journal homepage: www.zjrms.ir

Serum Lipid Profile in Psoriatic Patients in Kermanshah: A Survey on Vascular Adhesion Protein-1

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Article information

Article history:
Received: 19 Nov 2011
Accepted: 14 Dec 2011
Available online: 28 Oct 2012
ZJRMS 2013; 15(2): 8-10

Keywords:
Psoriasis
VAP-1
Lipids

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Abstract

***Background*:** Psoriasis is a chronic inflammatory skin disease characterized by excessive cellular replication. Vascular adhesion protein-1 (VAP-1) is an adhesion molecule with an enzymatic activity that partakes in the migration process of lymphocytes into sites of inflammation. The current study aimed to investigate the plasma lipids and VAP-1 in serum of psoriatic patients in Kermanshah (Iran).

***Materials and Methods*:** This was a descriptive analytical study carried out on 80 psoriatic patients, and 80 healthy volunteers as control group. Serum lipids (triglyceride (TG), cholesterol (Ch), HDL-cholesterol and LDL-cholesterol) were determined by enzymatic methods. The level of VAP-1 protein was evaluated by ELISA method.

***Results*:** The mean levels of cholesterol, TG, HDL and LDL in patients were 167.7, 123.4, 44.1 and 112.3 mg/dl, respectively. However, these values in control group were 156.7, 113.3, 45.5 and 102.4 mg/dl, respectively. In addition, the mean of VAP-1 protein in psoriatic patients and control group was 289.8 and 192.7 ng/ml, respectively. Cholesterol level and VAP1 protein in psoriatic patients were found to be significantly higher than those of control group.

***Conclusion*:** The current study showed that the levels of cholesterol and VAP-1 in psoriasis patients were significantly higher than control group. This higher level may be account for high prevalence of cardiovascular diseases among these patients and it may be useful to do early screening and treatment of psoriatic patients to prevent the atherosclerosis and its complications.

Introduction

Psoriasis is a common inflammatory skin disease affecting approximately 2% of the population of the world [1]. In psoriasis, immune cells move from the dermis to the epidermis, where they stimulate skin cells (keratinocytes) to proliferate [2]. This disease is affected by geographical location and race difference and it is more prevalent in northern cloudy regions and in winter (Scandinavia 4.8% and India 0.2%). This disease is prevalent at the age of 15-20 years old and 55-60 years old. There is no absolute treatment for this disease. Sometimes the symptoms are disappeared automatically and they are not occurred again until a neural and stressful condition does not stimulate it [3].

The lymphocytes accumulation has a significant role in the progress of skin inflammatory diseases. In such conditions, T-cells activated of lymph system enter blood and link to endothelium of skin vein and then migrate to the skin. Different kinds of adhesive molecules are necessary for linking, penetration and migration of leukocytes from the blood to inflammation site. In some studies, high expression of adhesive molecules in the skin veins of the psoriatic patients was shown [4]. Pesoriasis is a kind of autoimmune disease being characterized by increasing proliferation of keratinocytes and secretion of inflammatory cells (e.g. T lymphocytes and neutrophils) in dermis and epidermis. It seems that in inflammation site, VAP-1 is expressed severely on the luminal surface of venular endothelial cells [5].

Recently, it is defined that VAP-1 as an adhesive molecule increased the inclination of lymphocytes to endothelial cells in environmental lymph glands and inflammation sites [6].

VAP-1 is a membrane protein (type 2) belonging to enzyme group Semicarbazide Sensitive Amine Oxidase (SSAO). SSAO catalyze general reaction $NH_2 + H_2O \rightarrow R\text{-}CH_2\text{-}CHO + H_2O_2 + NH_3$ - $R\text{-}CH_2$. This is a homodimeric sialoglycoprotein 764 amino acid has molecular weight of170 KD that is expressed on the surface of endothelial cells of liver veins. VAP-1 protein has a big catalytic and extracellular domain and besides catalyzing a reaction in which a primary amine is oxidatively deaminated into an aldehyde, and then hydrogen peroxide and ammonium is important in leukocyte migration. Among final products of this enzyme, peroxide hydrogen is a signal molecule inducing the expression of p-selection and VACAM-1 of

endothelial cells and chemokin receptors (all being involved in adhesion waterfall) [7]. In 1980s, the role of VAP-1 was defined in inflammation in arthritis and animal studies showed that its expression is done only by inflammation. Later, the important role of this protein in linking of lymphocytes to the skin veins wall and inflamed joints, gout and heart tissue during ischemia reaction.

The first and the most sensitive stage of immigration of lymphocytes from the blood to environmental tissues of the cells lining (lymphocytes) to blood venular endothelial cells. The migration of lymphocytes to the skin is directed by some other adhesive molecules in endothelial cells and leukocyte. The peroxide hydrogen produced in catalyzed reaction by enzyme activity of VAP-1 induces these adhesive molecules (e.g. p-selection and ICAM-1: Intercellular Adhesion Molecule-1) being required for efficient migration of leukocytes are required [8].

The initial link (by VAP-1) causes that lymphocyte rolls on venular endothelial and the lymphocyte receptor is correlated with intercellular adhesion molecules-1 (ICAM-1) and VCAM-1. Finally, in response to chemotactic factors (chemokin and cytokine, lymphocyte migrates to target tissue [9]. As psoriasis is prevalent about 2-3% and its etiology is unknown and besides mental diseases and taking considerable costs one of its complications is cardiovascular diseases and in Iran VAP-1 protein is not measured in psoriatic patients. Thus, we attempted to investigate the level of this protein as a factor in severity of the disease and the complications in these patients.

Materials and Methods

In this analytical-descriptive study, after obtaining written consent, 80 psoriatic patients, and 80 sex, race and age-matched healthy volunteers were selected as control group by introduction of dermatologist in attending skin clinics in Kermanshah. Control group were the ones who attended the clinic to do periodical tests of jobs in 2010 and participated in the study by obtaining written consent. The samples included psoriasis patients attending the specialized skin clinic in Kermanshah, for 1 year (March 2010 - March 2011).

A Blood sample of 5ml was collected of psoriasis patients and healthy people fasting for 10-12 hours. Then, it was centrifuged and isolated of blood serum and was kept at -20ºC until the test day. The serum concentration of VAP-1 was measured by Human sVAP-BMS259 (Germany) by ELISA assay and the blood lipids and lipoproteins were measured by Pars kit. After the data collection, the data were analyzed by statistical package of SPSS-16. The results of patients and control groups were evaluated by *t*-test. A significance level of 0.05 was set for all statistical analyses in this study.

Results

In this study by investigating 80 psoriatic patients attending skin clinic in Kermanshah and comparing with 80 healthy subjects as control group, after measuring the lipids and blood lipoproteins and VAP-1 protein in both groups as shown in Table 1, the mean of VAP-1 of cholesterol and LDL was significantly higher among the patients than the control group. The mean of TG was higher among the psoriatic patients than the control group. The mean of HDL was lower among psoriasis patients than control group but it was not statistically significant. The average age of the patients and control group were 34.7 and 33 years, respectively (Table 1).

Table 1. The comparison of mean VAP-1 among psoriasis patients and control group

		Mean ± SD	*p*-Value
VAP-1 (ng/ml)	Patients	289.8 ± 134	0.001
	Controls	192.7 ± 41	
Triglyceride (mg/dL)	Patients	123.4 ± 67.2	0.226
	Controls	113.3 ± 44.3	
Cholesterol (mg/dL)	Patients	167.7 ± 42.6	0.048
	Controls	156.7 ± 31.1	
HDL (mg/dL)	Patients	44.1 ± 14.5	0.698
	Controls	45.5 ± 15.1	
LDL (mg/dL)	Patients	112.3 ± 37.1	0.035
	Controls	102.4 ± 23.3	
Age (years)	Patients	34.7 ± 10	0.692
	Controls	33.0± 11	
BMI (kg/m2)	Patients	25.5 ± 2.4	0.435
	Controls	25.3 ± 2.3	

Discussion

In this study, it was observed that there was a considerable difference in VAP-1 among psoriasis patients and control group as this protein level in patients was significantly higher than control group. It was observed that TG, Chol, LDL levels were higher among psoriasis patients than control group while HDL was lower among patients. Psoriasis is an inflammatory chronic skin disease in which keratinocyte cells are exposed to immune system attack because of the penetration of lymphocytes and neutrophils and skin cells are forced to be replicated increasingly. Various studies showed that cardio-vascular diseases and atherosclerosis diseases are higher among psoriasis patients [10]. Vascular dysfunctions are one of the most important elements of inflammation in psoriatic skin (other inflammatory diseases). Pinkus and Mehregan found that vascular changes were the first signs of histology in the progress of psoriatic plaques [11]. Vascular changes include the replication of endothelial cells resulting into the increase of veins. Thus, it is believed that VAP-1 is the marker of the presence or identification of small veins of high Endothelial Venules HEV 12. It is obvious that in case of expression of this molecule, lymphocytes have more chance to migrate from blood to target tissue. VAP-1 belongs to aminoxidoses and play role in various diseases as diabetics, psoriasis and altzeimer [13].

Various studies showed high expression of different kinds of adhesive molecules in veins in various patients. In a study conducted by Kemik et al. on the level of VAP-1 in the patients with liver cancer found that this protein is

increased among the patients [14]. Recently, in the study of Madej et al., they reported an increased level of VAP-1 serum among psoriasis patients as compared with healthy people. In the mentioned report, high expression of VAP-1 in psoriatic skin was observed to normal skin. Also, high expression of VAP-1 in the involved skin to the involved skin without psoriatic damage stated of the role of VAP-1 in inflammation in the skin. There was no significant relation between the serum level and clinical parameters (except itching) [15]. It is possible that in psoriasis disease, the lymphocytes easily migrate from the blood to the skin. In this study, by evaluating and comparing the levels of VAP-1 protein in psoriasis patients with the control group, it was observed that the level of this protein among the patients was significantly higher than control group. This finding was in agreement with the finding reported by Madej et al. By investigating the lipids level in psoriasis patients, different results were obtained. In this study, it was defined that cholesterol mean, TG and LDL in psoriasis patients were higher compared to control group but this difference was significant only about cholesterol and LDL. HDL mean in the patients was lower than control group but this difference was not significant statistically. The effect of the increase of Chol is defined in the prevalence of cardio-vascular diseases in people. In addition, the increase of VAP-1 in psoriasis patients is supported repeatedly in the studies and by affecting the white cells migration to skin regions, increases the stimulation and cellular immunity reactions in that regions of the skin in psoriasis patients. By investigating the VAP-1 protein and lipids of patients' serum and the comparison with the control group, we found that there was a significant relation between the increase of Chol, LDL, VAP-1 in psoriasis and control patients. By investigating the relation between VAP-1 and lipids level, we found that there was a direct relation between the increase of VAP-1 protein in vein and the increase of lymphocytes migration to dermas region and the increase of skin inflammations. Finally, it is concluded that determining the serum level concentration VAP-1 about psoriasis presented some information about disease monitoring and selecting good therapy methods and as this disease doesn't have any absolute treatment and is controlled only by protective drugs and by discontinuance of the drug is occurred again, VAP-1 can be a drug aim in clinic region being considered as a path in screening and patients treatment.

Acknowledgements

This paper is inspired of a part of MSc thesis of Masood Sadeqi No. 89034 approved by Medical Sciences University of Kermanshah and the authors of the paper appreciate the deputy of researches and technology and biological medical researches of Kermanshah Medical sciences for financial support and considerable collaboration in this study.

Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

Funding/Support

Kermanshah University of Medical Sciences.

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Please cite this article as: Nemati H, Khodarahmi R, Sadeghi M, Rahmani A, Rezaei M. Serum lipid profile in psoriatic patients in Kermanshah: A survey on vascular adhesion protein-1. Zahedan J Res Med Sci (ZJRMS) 2013; 15(2): 8-10.