

Evaluation of G6PD Deficiency in Acne Patients

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Abstract

Introduction: Various factors are involved in the pathogenesis of acne vulgaris. Recently, G6PD deficiency has been proposed in the pathogenesis of acne. G6PD has an important role in the oxidant/antioxidant balance. According to this theory, antioxidants are used in the treatment of acne recently. The aim of this study was to evaluate G6PD deficiency in patient with acne vulgaris.

Methods: The activity of G6PD enzyme was measured in the venous blood of 82 patients with acne vulgaris of different severity. The fluorescent lamp method was used in order to determine the activity of G6PD enzyme.

Results: The mean age of the patients was 25 ± 3 . From 82 patients, the level of the G6PD enzyme was normal in 77 (93.9%) patients. Also, 4 (4.9%) patients had relative G6PD deficiency and 1 (1.2%) patient had severe G6PD deficiency. As the incidence of G6PD deficiency is 5.7% in the normal population, there was no statistically significant difference in G6PD deficiency between patients and the normal population. No significant relationship was found between acne severity and G6PD deficiency.

Conclusion: In order to detect the association between acne and G6PD deficiency, other case-control studies with larger sample sizes are recommended. (*Iran J Dermatol 2010;13: 54-56*)

Key words: Acne, G6PD, Antioxidant, Fluorescent spot test

Introduction

Acne is a chronic inflammatory disease of the pilosebaceous unit¹. There are four important factors in the pathogenesis of acne and increased sebum secretion is the most important one. Other factors include changes in the normal flora, ductal hypercornification and inflammation². G6PD is the key enzyme in the pantose phosphate pathway. NADPH, produced by the enzyme, plays an important role in keeping the balance between oxidants and anti-oxidants of the cells and reduces stress oxidase³. It also revives glutathione and revived glutathione plays an important role in all cells because it keeps sulphhydryl groups and different proteins and also prevents the demolition of the cells. Free oxygen radicals turn into H₂O₂ which is very poisonous. To detoxify each H₂O₂ molecule, one glutathione molecule should be revived, oxidized and turned into glutathione oxide form. Therefore, revived glutathione can play its own role when it is regularly produced by reduced glutathione enzyme⁴. G6PD is considered as the

most important antioxidant enzyme that prevents erythrocytes from producing revived glutathione. Thus, G6PD deficiency makes the cells vulnerable to oxidants. In this condition, hemoglobin precipitates in erythrocytes which leads to the hemolysis of these cells⁴. Activity of antioxidant enzymes in erythrocytes may have a role in acne pathogenesis⁵.

Successful treatment of a disease needs accurate, deep and perfect knowledge about the disease pathogenesis. Because there has not been enough study on the relationship between G6PD deficiency and acne, we tried to find out the role of G6PD deficiency in acne patients. It would also be helpful to discover new treatment modalities.

Patients and Methods

All patients with acne vulgaris who were clinically diagnosed by a dermatologist entered the study. Patients with previous history of G6PD deficiency and those who took the drugs that affect G6PD level were excluded from the study. Eighty two patients with different severity of acne vulgaris

were analyzed. The severity of acne was graded using the Global Acne Grading System (GAGS). The blood level of G6PD was evaluated using the fluorescent spot test. This test is considered as the most specific and reliable test to measure G6PD in all patients ⁶.

Blood samples were taken from the forearm vein and kept in CBC test tubes containing EDTA. The level of the oxidant enzyme in erythrocytes was measured in 82 patients. The association between acne severity and deficiency of this enzyme was evaluated. G6PD activity measurement kits for the fluorescent spot test were prepared by Kimia Pajohan, which is the center of research and laboratory kits production in Iran.

G6PD enzyme in a proper environment revives NADP and turns it into NADPH. NADPH produces fluorescence under ultraviolet light at a wavelength of 365 nanometers. The intensity of this fluorescence in blood is high in healthy people and low or negative in patients suffering from G6PD deficiency.

Results were analyzed with SPSS 11.5 software. The chi-square statistical test, a 95% CI and a significance level of 0.05 were used to compare and evaluate different variables.

Results

In this study, there were 82 patients with mild, moderate and severe acne [11(13.4%) men and 71 (86.6%) women] with a mean age of 25 ± 3 ranging from 16 to 51 years. The acne lesions were located on the face, back, arm and forearm. Face was the most common site of involvement and back was the least. From 82 patients, 77 (93.9%) patients had normal tests (10 men and 67 women) while 4 (4.2%) patients (women) suffered from a mild and 1 (1.2%) patient (man) suffered from a severe deficiency. In a study on G6PD deficiency in Iranian normal population, the prevalence of G6PD deficiency was 5.7% ⁷. Therefore, there was no significant difference in G6PD deficiency between acne patients and the normal population in this study. Also, there was no association between acne severity and the test results.

Discussion

Oxygen free radicals are poisonous molecules and play an important role in inflammatory skin diseases ⁸. *Propionibacterium Acnes* releases some chemotactic factors which cause neutrophil accumulation. Epithelial follicular cells get damaged after the release of the inflammatory factors, such as lysozyme enzymes, by phagocytic cells ⁸. O₂

free radicals are released from active neutrophils in inflamed tissues. These oxidants attack DNA or membrane lipids and damage healthy tissues. Squalene protects the surface of the skin against lipid peroxidation whereas lipid peroxidation products have comedogenic effects and result in open or closed comedones in high concentrations ⁹.

The antioxidant effects of some drugs such as tetracycline, erythromycin, minocycline and metronidazol have been used for acne treatment. These medications have proved effective and they are preferred to other antibiotics. Topical benzoyl peroxide is effective in acne treatment because it has antibacterial activities and also affects the inflammatory oxidative activity of neutrophils ¹⁰.

Only one study was done in 2005 to evaluate G6PD deficiency in acne patients. In this study, the effect of oxidative stress on 43 acne patients and 46 individuals in the control group was evaluated. Based on the results, the level of G6PD was significantly lower in cases in comparison with the control group ¹.

In our study, however, there was no association between G6PD deficiency and acne. This finding may have resulted from the following reasons:

-The laboratory methods used in the previous study were different from our study. In the previous study, the Beutler method was used which is less accurate than the fluorescence method.

-The previous study was a case-control study while our study was a cross sectional one and we used the data of an Iranian study to determine the prevalence of G6PD deficiency.

-The sample size in the previous study was smaller than the present study. In the present study, we could not achieve our goals completely because of lack of a control group.

In conclusion, we suggest further case-control studies with larger samples and more accurate laboratory tests to elucidate any possible role of G6PD in the pathogenesis of acne vulgaris.

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