The use of integral indicator of oxidative stress in women with diabetes mellitus

M. A. Darenskaya, L. A. Grebenkina, N.V. Semenova, S. V. Gnusina, L. I. Kolesnikova, S.I. Kolesnikov

Scientific Centre for Family Health and Human Reproduction Problems, Irkutsk, Russia

Introduction

Activation of free radical processes and decrease in the buffer capacity of antioxidant defense (AOD) lead to oxidative stress. It is one of the pathogenic stages in various endocrine diseases (e.g., type 1 and 2 diabetes mellitus (DM). Integral criteria are extensively used in clinical practice for detection of pathological states and diagnosis of a variety of disturbances caused by environmental factors. The aim of this study was to determine of oxidative stress index (OSI) in patients with type 1 diabetes mellitus (T1DM).

Methods

The inclusion criteria for women with T1DM (main group, N=15; mean age 35.0±3.4 years, T1DM history 12.8±2.0 years) were verified diagnosis of T1DM and insulin therapy. The exclusion criteria for the main group were severe associated somatic diseases and severe manifestations of diabetic complications (chronic renal failure and microangiopathy). The control group consisted of 20 women (mean age 28.2±1.5 years) without T1DM, acute disorders, or exacerbations of chronic diseases. Spectrophotometric and fluorometric methods were used.

Results

The content of lipid peroxidation (LPO) substrates in women with T1DM was elevated by 51% ($p<0.05$) in comparison with the control group. The content of primary LPO products, conjugated dienes, was increased by 73% ($p<0.05$). DM1 patients were also characterized by elevated content of the intermediate products of LPO: ketodienes and conjugated trienes (by 103%, $p<0.05$) and TBA-reactive substances (by 48%, $p<0.05$ in comparison with the control). Studying the AOD system revealed a decrease in SOD activity (by 16%, $p<0.05$) and increase in oxidized glutathione content (by 15%, $p<0.05$) in patients with T1DM in comparison with the control group. OSI in patients with T1DM was 8.5 in comparison with the control (1.00), respectively.

Conclusions

These data illustrate an imbalance of the LPO-AOD system and increase in the activity of prooxidants (i.e., development of oxidative stress in the body). The integral criterion of OSI can be used for individual evaluation of the imbalance in the LPO–AOD system. Moreover, OSI holds much promise for personal evaluation of the effectiveness and correction of antioxidant therapy in this pathology.