

Lipid Peroxidation and Antioxidative System Status in Patients with Type II Diabetes Mellitus Accompanied by Metabolic Syndrome

Oksana V. Tsygankova, MD, PhD; Zoya G. Bondareva, MD; Lyudmila A. Ruyatkina, MD
Novosibirsk State Medical University, Russia



Background

Diabetes Mellitus (DM) as a non-communicable pandemic of the 21 century (along with cardiovascular disease, cancer, tuberculosis and AIDS) and constitutes a global socio-medical problem. It is known that individual cardiovascular risk is considerably increased with the development of DM accompanied by a metabolic syndrome. Metabolic syndrome is a combination of abdominal obesity, hypertension and lipid metabolism disorder. Investigation of pro- and antioxidants (LDL) in patients with DM and metabolic syndrome allows determining pathogenesis of the disease and development of methods for medical and non-medical types of therapy.

Methods

We investigated 26 patients 49.91±0.95 years old with DM and metabolic syndrome. We measured the concentration of antioxidant vitamins A and E and levels of malondialdehyde in LDL by fluorometry on spectrofluorometer "Hitachi F-300" with wave length 533 nm. Statistical analysis was performed with the software STATISTICA (version 6.0).

Results

Levels of malondialdehyde were 1.9 times higher in patients with hyperglycemia than in controls (4.78±0.67 nmol/mg of protein versus 2.56 ± 0.54 nmol/mg respectively; p=0.037). This indicates higher degree of oxidative stress. Carbohydrate disorders are likely to be associated with other proatherogenic metabolic syndrome components forming independent and powerful mechanism provoking free radical processes. In addition, there is an evidence of decompensation of antioxidant potential of LDL, where deficiency of vitamin A is developing in early stages. Retinol levels are 1.73 times lower than control (p>0.05); and vitamin E concentration is slightly higher (0.842 ± 0.248 mg/mg of protein, and 0.738 ± 0.149, respectively; p>0.05).

Conclusions

There is early antioxidant system failure in patients with DM and metabolic syndrome, accompanied by activation of oxidative stress. These findings may explain excessive production of active oxygen metabolites, which may cause vascular cascade and the development of adverse cardiovascular events. Our studies revealed pathologic disorders and uncover the necessity of early complex treatment directed to the recovery of the balance between pro-oxidant and anti-oxidant processes.