Original article **UDC: 616.379-008.64:577.1]:615.252.349.7**
doi: 10.5633/amm.2017.0412

EFFECTS OF METFORMIN ON PARAMETERS OF OXIDATIVE DAMAGE IN THE RETINA OF RATS WITH IMPAIRED GLUCOSE TOLERANCE

Branka Đorđević[1], Dušan Sokolović[1], Tatjana Cvetković[1], Tatjana Jevtović-Stoimenov[1], Milena Despotović[1], Andrej Veljković[1], Jelena Bašić[1], Davor Đukić[1], Nataša Stević[1], Aleksandra Veličkov[2], Jelena Milenković[3], Sanja Milošević[4]

[1]University of Niš, Faculty of Medicine, Department of Biochemistry, Niš, Serbia
[2]University of Niš, Faculty of Medicine, Department of Histology and Embriology, Niš, Serbia
[3]University of Niš, Faculty of Medicine, Department of Pathophisiology, Niš, Serbia
[4]University of Niš, Faculty of Medicine, Niš, Serbia

Contact: Branka Đorđević
Bul. dr Zorana Đinđića 81, 18 000 Niš, Serbia
E-mail: brankadjordjevic83@gmail.com

Impaired glucose tolerance is a state characterized by hyperglycemia, but with the levels of blood glucose between normal and diabetic values. Diabetic retinopathy is a complication of diabetes the pathogenesis of which is associated with oxidative stress. Metformin is currently the drug of first choice in the treatment of diabetes mellitus type 2.

The objective was to determine whether there is oxidative damage to the retina in an animal model using the analysis of oxidative damage parameters, TBA reactive substances (TBARS) and advanced oxidative protein products (AOPP), and whether this damage can be mitigated by metformin tratment.

The experiment was performed on 10 weeks old Wistar rats randomized into 4 groups. Impaired glucose tolerance was induced by intraperitoneal injection of strepto-zotocin (STZ), administered 15 minutes after an intraperitoneal injection of nicotinamide. After 4 weeks, metformin was introduced (100 mg/kg, per os). After 2 weeks, the animals were sacrificed under deep anesthesia.

The concentrations of TBARS and AOPP in retinal homogenates were significantly higher in animals with impaired glucose tolerance compared to controls (TBARS: 4.09 ± 0.39 vs. 2.98 ± 0.26; $p < 0.001$ and AOPP: 34.49 ± 3.21 vs. 26.26 ± 3.16; $p < 0.001$). A strong positive correlation between serum glucose level and level of TBARS ($r = 0.757$, $p < 0.01$) and AOPP levels ($r = 0.683$, $p < 0.01$) was found. Metformin did not show any significant effects on the examined parameters.

Values of the examined parameters indicate that impaired glucose tolerance causes a strong oxidative stress in the retina, which is the first step in the onset of diabetic retinopathy. Metformin therapy at a dose of 100 mg/kg, showed no significant beneficial effect on the process of lipid peroxidation and oxidation of proteins in the tissues of the retina in animals with impaired glucose tolerance.

Acta Medica Medianae 2017;56(4):75-82.

Key words: *diabetic retinopathy, oxidative stress, impaired glucose tolerance*