Abstract:

According to the World Health Organization (WHO), 15% of couples in reproductive age suffer from infertility problems, and up to 60% of cases are caused by male factor. Causes of this condition could be genetic background, environmental factors and various diseases, including diabetes mellitus (DM). The aim of this study was to investigate the effects of DM on reproductive parameters and expression of selected testicular genes using mouse model (FVB inbred mouse strain).

DM (type 1) was artificially induced by chemical substance streptozotocin, which causes destruction of pancreatic β cells. These mice were exposed to diabetic condition for 6 weeks and then subjected to analysis.

Our results have shown that diabetic condition had an impact on body weight, weight of reproductive organs as well as kidneys and livers. We also observed decreased concentration and viability of diabetic sperm compared to control. Moreover, we noticed increased staining with apoptotic marker annexin V. Further, we evaluated changes of sperm nuclear proteins - protamines. In diabetic animals, we observed higher number of sperm with insufficient protamination. Nevertheless, protamine 1 to protamine 2 ratio (P1/P2), a marker of male fertility, was not altered in sperm of diabetic animals compared to control. Regarding the testicular tissue, we observed impaired morphology of seminiferous tubules and increased number of apoptotic cells in testes of diabetic animals. We also analysed expression of several important testicular genes where we showed changes in expression of genes responsible for proper function of spermatocytes and spermatids.

Our findings indicate that DM affects sperm quality in terms of alterations in the morphology of testicular tissue. The metabolic disorders also caused changes in the expression of genes important during meiotic phase of spermatogenesis (*Sycp1* and *Sycp3*) and genes important during spermiogenesis (*Tnp1, Tnp1, Prm1* and *Prm2*). Changes in gene expression could further contribute to impaired sperm quality of diabetic animals.

Key words : diabetes mellitus (DM), streptozotocin, reproductive parameters, male fertility, sperm, gene expression