

Abstract

Infertility is defined as an inability to conceive a child within one year of regular sexual intercourse. It affects up to 15 % of couples worldwide (WHO, 2010). The male factor contributes to the total infertility with more than 50 %. Fertility of a man is influenced by several factors such as genetic background, environment and various diseases such as diabetes mellitus (DM). Diabetes mellitus is a serious health problem that affects 451 million people worldwide (18-99 years) and the number of people with this disease still increases (Cho a spol., 2018). In addition, parenthood is postponed to middle age when the fertility decreases and metabolic diseases such as type 2 diabetes mellitus (DM2) appear.

The aim of this thesis was to investigate the effect of type 2 diabetes on reproductive parameters of mouse inbred line C57BL/6J compared to the control group and the possible effect of paternal diabetes on the first filial generation. In the evaluation of the effect of DM2 on reproductive parameters, we used innovative methods to study internal state of sperm and testes.

Results of our work showed that DM2 influenced the weight of body, prostate and liver. The weight of testes, epididymis and liver was reduced in the offspring. Furthermore, sperm morphology and intraacrosomal protein status were affected in both generations. In offspring the sperm head was separated from the flagellum more often. Another evaluated parameter was the state of the nucleus using protamine nuclear proteins. The protamine ratio of protamine 1 and protamine 2 was reduced in diabetic subjects in the paternal generation. The fertility ratio was reduced in the offspring.

Further, the histological status of the testes was evaluated. In diabetic mice, the diameter of the tubule and the thickness of the epidermal epithelium was reduced, and the meiotic phase of spermatogenesis was affected. The expression of proteins involved in the intercellular communication in the interstitial space of the tubules was altered.

Our results in the animal model suggest that metabolic disease type 2 diabetes may affect some reproductive parameters such as sperm quality and testes histology. Diabetes type 2 affects the reproductive parameters and fertility ratio of offspring. According to our results, the paternal transmission of epigenetic inheritance was affected by DM2.

Key words: diabetes mellitus (DM), high fat diet (HFD), streptozotocin, reproductive parameters, infertility, sperm