Effect of Nitrobenzene on Morphometric Indices of Rat Testes Under Cold Stress

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One of important issues nowadays is the effect on human health of the most adverse factor, e. g. the combined effect of chemicals and physical factors, in particular nitrobenzene and reduced temperature. Nitrobenzene (NB) is widely used in various areas of industry, agriculture and medical practice. The demand for its production worldwide is increasing, so studying the effect of this chemical compound in combination with the lowered temperature is very important.

The study was performed in adult male WAG rats after 30 administrations of NB to stomach at a dose of 1/10 LD50 (70 mg/kg) and exposure of animals to two different thermal regimens: (4 ± 2)°C (cold stress) and (25 ± 2)°C (thermoneutral zone) for 4 hours a day 3 times a week.

The testes were studied morphometrically using following indices: the number of tubules with the desquamated seminiferous epithelium, the spermatogenesis index, total number of normal spermatogonial cells in the first layer of cells on the basal membrane of the tubule (number of spermatogonia), the area of Leydig cell nuclei, the index of spermatogenesis in the animals exposed to the NB under both temperature regimens revealed common changes: the lumen of the tubules was sharply increased due to the thinning of the spermatogenic epithelium layer, and desquamated spermatogenic epithelium was observed in the lumen of the tubules. The developmental stages of spermatozoa in seminiferous tubules were reduced. The growth zone was thinned, spermatogonia were rare, the basal membrane was largely devastated, and the picnotic nuclei were found in most spermatogoniae. Interstitial Leiding cells often had the signs of apoptosis, and other Leydig cells had larger nuclei, i. e. they were active. It should be noted that due to the NB effect under cold stress, the indicated alterations had more pronounced changes. In particular, under a combined effect of NB and cold stress, the number of spermatogoniae in the tubule was reduced more (7.3 ± 0.5 vs. 28.9 ± 5.4)%; an inhibition of spermatozoa development was found, the index of spermatogenesis in the animals exposed to the NB under a cold stress was (0.2 ± 0.04) vs. (0.5 ± 0.06).

Thus, according to the findings the NB has been established to have a toxic effect on reproductive system of rats, and moreover under conditions of cold stress its presence led to more significant changes in the studied morphometric indices.