MEDICAL SCIENCES

DYNAMICS OF THE MASS INDEXES, INSTRUMENTAL AND LABORATORY PARAMETERS OF FEMALE RATS IN THE MODEL FOR INTRODUCTION TO EXPERIMENTAL METABOLIC SYNDROME

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Introduction. Obesity affects almost one quarter of the adult population and is increasing rapidly amongst young women globally, with 30–50% of women of childbearing age falling within the spectrum of being overweight to obese [1, p. 235; 2, p. 56]. Childhood and adolescent obesity, prolongeted the adult period has a more severe course, accompanied by pronounced weight gain and the frequency of associated diseases [3, p. 284].

Some studies have shown that it is the body weight of a mother during pregnancy that can be a trigger, which in the future leads to metabolic disorders in offspring's [4, p. 35; 5 p. 73]. Over the past decades, obesity in pregnant women has doubled [6 p. 153], and an increased body mass index is threatening an increase in gestational age of pregnancy. Thus, physicians pay more attention to pregnant women with overweight and obesity.

The modeling of experimental MS in animals demonstrates that the mother's obesity «programs» the offspring for excess body weight [4, p. 35]. However, the peculiarities of changes in laboratory-instrumental and mass indexes in animals require more in-depth study.

Purpose to study the dynamics of changes of mass indexes, instrumental and laboratory parameters in mature females rats with an experimental metabolic syndrome.

Materials and methods. 20 females of white, mature laboratory rats, aged 18-20 months were divided into 2 groups. The first one is an experimental group: 13 female's rats with an experimental metabolic syndrome; the second one – control group: 7 intact rats, with standard food and water regime. When working with animals, the standards of the Council of Europe Bioethics Convention 1997, the European Convention for the Protection of Vertebrate Animals were observed. Instruments used during scientific research were subject to metrological control.

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The simulation of the metabolic syndrome occurred during 60 days. The females supported a special high-calorie diet (grain with margarine 82 % milk fat, corn and sunflower seeds). The water regime included a 20 % solution of fructose and regular water ad libitum, with change every other day. Also, during the first and the fourth weeks of the experiment, the female daily subcutaneously administered Dexamethasone solution at a dosage of 0,1 mg/kg.

Results. Females rats who received a special high-calorie diet showed a statistically significant increase in all morphometric and instrumental indexes compared to similar rats in the control group. An increase in body weight in the experimental group was found to be 28,93 % higher than the original weight, was observed arterial hypertension (141/85±5 mmHg), dyslipidemia: elevated total cholesterol (5,37±0,33 mmol/L) and TG (2,55±0,24 mmol/L); elevated level glucose (8,52±0,17 mmol/L). The above indicators are criteria indicating the presence of a metabolic syndrome in animals under study.

Compared to other models of the experimental metabolic syndrome [7–10], the advantage of the model used is a longer duration (two months), a lower dose of dexamethasone and a more varied diet (grain with 82% fat margarine, corn and sunflower seeds), which is better perceived by experimental animals and is a less stressful factor for them.

Some methods of modeling the metabolic syndrome [9], in addition to high-calorie carbohydrate-lipid diet use a physical factor, namely – round-the-clock lighting with an intensity of 1500 lux for 30 days, which is an additional stress factor for animals.

The closest model in essence and result is the model [8], which consists in prescribing fructose to laboratory animals (rodents) for two months. However, along with the introduction of a solution of fructose prescribe a diet of the following composition: refined wheat flour, skimmed milk powder, starch, table margarine, peroxidized sunflower oil, sodium chloride. The disadvantages of this diet are that it consists of many components and requires a lot of time for cooking (6-10 hours for peroxidized sunflower oil). The water regime consists only of a solution of fructose, which is a stress factor for the animal's body.

Conclusions. Taking into account the morphometric, instrumental and laboratory parameters of experimental group rats, there are grounds to assert that the used model for introduction into the metabolic syndrome is effective, and females are in a metabolic syndrome.

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