

MORPHOMETRIC ANALYSIS OF THE BODY WEIGHT AND ANATOMICAL PARAMETERS OF THE RAT PROSTATE IN CHRONIC ALCOHOL INTOXICATION**A. B. Radjabov**

Bukhara State Medical Institute, Bukhara Uzbekistan

Таянч сўзлар: каламуш простата, постнатал онтогенез, органометрик параметрлар, сурункали алкоголизм.

Ключевые слова: простата крыс, постнатальный онтогенез, органометрические параметры, хронический алкоголизм.

Key words: rat prostate, postnatal ontogenesis, organometric parameters, chronic alcoholism.

The article traces the development and growth of body weight and anatomical parameters of the prostate in male rats during late postnatal ontogenesis and in chronic alcoholism. On the basis of the study, the growth rates of body weight and organometric parameters of the rat prostate (mass, thickness, width, length) were established, the mass coefficient and the average daily weight gain were analyzed.

СУРУНКАЛИ АЛКОГОЛ ИНТОКСИКАЦИЯСИДА КАЛАМУШ ПРОСТАТА БЕЗИНИНГ ТАНА ВАЗНИ ВА АНАТОМИК ПАРАМЕТРЛАРИНИ МОРФОМЕТРИК ТАҲЛИЛИ**А. Б. Раджабов**

Бухоро давлат тиббиёт институти, Бухоро, Ўзбекистон

Ушбу мақолада постнатал онтогенез ва сурункали алкоголизмда эркак каламушларда тана вазнининг ривожланиши ва ўсиши ва простата анатомик параметрлари кўрсатилган. Тадқиқот асосида тана вазнининг ўсиш суръатлари ва каламуш простатасининг органометрик параметрлари (массаси, қалинлиги, кенглиги, узунлиги) аниқланди, масса коэффициентлари ва ўртача кунлик вазн ортиши таҳлил қилинди.

МОРФОМЕТРИЧЕСКИЙ АНАЛИЗ МАССЫ ТЕЛА И АНАТОМИЧЕСКИХ ПАРАМЕТРОВ ПРОСТАТЫ КРЫС ПРИ ХРОНИЧЕСКОЙ АЛКОГОЛЬНОЙ ИНТОКСИКАЦИИ**А. Б. Раджабов**

Бухарский государственный медицинский институт, Бухара, Узбекистан

В статье прослеживается развитие и рост массы тела и анатомических параметров простаты у самцов крыс в позднем постнатальном онтогенезе и при хроническом алкоголизме. На основании исследования установлены темпы роста массы тела и органометрических параметров простаты крыс (масса, толщина, ширина, длина), проанализированы коэффициент массы и среднесуточный прирост массы.

Relevance. The article traces the development and growth of body weight and anatomical parameters of the prostate in male rats during late postnatal ontogenesis and in chronic alcoholism. On the basis of the study, the growth rates of body weight and organometric parameters of the rat prostate (mass, thickness, width, length) were established, the mass coefficient and the average daily weight gain were analyzed.

It has been reliably established that the change in body weight and biometric parameters of the prostate gland of male rats during postnatal ontogenesis and in chronic alcoholism is of a spasmodic nature. At the same time, in the control, the highest rate of increase in body weight, weight, thickness, width, and length of the prostate was noted in 6-month-old rats. At all stages of postnatal ontogenesis, the length of the prostate is always greater than the width and thickness, and from the age of 9 months, the transverse size of the gland begins to predominate over the longitudinal and anterior-posterior dimensions [5,11].

In rats with chronic alcoholism, in comparison with control, in all age groups, there is a lack of body weight and a decrease in the weight, thickness, width, and length of the prostate, this is most pronounced in 3-month-old and 1.5-year-old animals. Since the middle of the 20th century, white rats have been in the first place in terms of their use in experimental studies among laboratory animals [6,7,9].

An important point in research is age, which is often determined by body weight. The change in body weight is reflected in the physiological state of the body. Information about the body weight of white rats in postnatal ontogenesis is given in the works of a number of authors. In most studies, body weight indicators are given at a certain age of ontogenesis, and they do not show its growth and development throughout the entire postnatal ontogenesis [8,10].

Alcohol is one of the most common toxic xenobiotics. Worldwide, the harmful use of alcohol causes 3 million deaths each year, accounting for 5.3% of all deaths; Alcohol accounts for

5.1% of the total global burden of disease and injury [2].

In the available literature, there is a sufficient number of experimental studies on laboratory animals that describe the pathological effects of ethanol on various organs and systems. Alcohol can cause both local and systemic pathological effects on the body. The organs most vulnerable to ethanol intoxication include the brain, liver, kidneys, and lungs [1,4,12].

It should be noted that in the available literature, we did not find reports on complex studies of organometric changes in the prostate gland in the age aspect, as well as in chronic alcohol intoxication.

Until now, the effect of alcohol intoxication on the formation and morphological state of the reproduction of organs, in particular, the prostate gland, remains unclear.

In this regard, the study of the body weight index and morphometric parameters of the prostate gland in dynamics in animals under conditions of chronic alcoholism is of undoubted interest for theoretical and practical medicine.

Purpose of the study: to conduct a comparative analysis of the development and growth of body weight and organometric parameters of the prostate in rats during postnatal ontogenesis and in chronic alcoholism.

Material and methods of research: the study was performed on 110 outbred white male rats aged 3,6,9,12,18 months. The maintenance of animals and all manipulations with them complied with international norms and rules for working with vertebrate laboratory animals. 10 experimental groups were formed: 1st - control, 3 months (n=12); 2nd - control, 6 months (n=14); 3rd - control, 9 months (n=12); 4th - control, 12 months (n=10); 5th - control, 18 months (n=10); 6th - experimental group, age 3 months (n=12); 7th - experimental group, age 6 months (n=12); 8th - experimental group, age 9 months (n=8); 9th - experimental group, age 12 months (n=10); 10th - experimental group, age 18 months (n=10). Rats of the control and experimental groups had free access to drinking water and the main diet, which was based on root crops and grain fodder.

In the experimental groups, for modeling chronic alcohol intoxication, forced alcoholization of animals using 25% ethanol solution was used [3]. The solution was administered intragastrically using a metal probe 1 time per day at a total dose of 7 g/kg of body weight for 1 month before the indicated date. Control animals received intragastrically equal volumes of 0.9% NaCl solution. Rats were taken out of the experiment by decapitation according to the rules approved by the relevant documents [3].

Before slaughter, the body weight of the rats was measured. After opening the abdominal cavity, the prostate gland was immediately removed in a wet state in order to avoid its drying; measured mass, length, width, thickness. Measurement of body weight of rats and prostate was carried out on electronic scales JW-1 ($e = 0.02$ g) from Acom Inc. (South Korea), length, width and thickness - with a millimeter tape. Mass coefficients were calculated according to the formula: $MC = \text{Mass of the organ (g)}/\text{body weight (g)} \times 100\%$.

Mathematical processing was carried out directly from the general data matrix Excel 7.0 using the capabilities of the STTGRAPH 5.1 program, the indicators of standard deviation and representativeness errors were determined.

Research results: the study showed that at juvenile age (3 months of age) body weight varies from 104.1 to 117.1 grams, averaging 110.68 ± 1.2 grams. In 6-month-old rats, body weight ranges from 204.4 to 225.4 grams, averaging 213.07 ± 1.72 grams. The rate of weight gain is 92.5%, the average daily gain is 1.1%. At the 9th month of life, body weight varies from 280.4 to 296.7 grams, on average 289.01 ± 1.5 . The growth rate is 35.64%, the daily weight gain is 1.1%. By the first year of life, the weight of rats ranges from 303.4-325.4 grams, averaging 315.37 ± 2.38 grams. The growth rate is 9.12%, the average daily weight gain is 1.1%. By the senile period (18 months), the weight of rats varies from 318.7 to 351.4 grams, on average 335.08 ± 3.53 grams. The growth rate is 6.25%, the daily weight gain is 0.56%.

In the experimental group, in 3-month-old rats with chronic alcoholism, the body weight index ranges from 65.2 to 83.4 grams, with an average of 75.56 ± 1.67 grams. Compared to the 3-month control group, body weight is reduced by 31.73%. At the 6th month of development of the rats of the experimental group, the body weight varies from 182.1 to 203.8 grams, on average 192.46 ± 2.0 . Compared with the same age of the control group, the body weight index decreases by 9.67%. The average daily weight gain is 1.1%. In 9-month-old rats of the experimental group, the

body weight is in the range of 235.6-256.1 grams, averaging 245.22 ± 2.73 grams. Compared to 9-month-old control rats, the weight index decreases by 15.5%. The daily weight gain is 0.59%. At the 12th month of the experiment, body weight ranged from 267.7 to 289.1 grams, on average - 278.67 ± 2.31 grams. When compared with the control group, the weight index is reduced by 11.63%, the daily weight gain is 1.1%. In experimental rats of 18 months of age, body weight varies from 253.8 to 298.6 grams, averaging 267.0 ± 4.83 grams. Compared with the control of the same age, this indicator decreases by 20.32%. The average daily weight gain is reduced by 0.56%.

It was found that in juvenile age the weight of the prostate ranges from 0.26-0.39 grams, on average - 0.34 ± 0.001 grams. The mass factor is 0.21%. In young 6-month-old rats, the mass of the prostate gland ranges from 0.31 to 0.83 grams, averaging 0.60 ± 0.04 grams. The growth rate is 76.5%, the mass coefficient is 0.28%. At the 9th month of development, the weight of the prostate varies from 0.66 to 1.09 grams, with an average of 0.91 ± 0.04 grams. The growth rate of the organ mass is 51.7%, the mass coefficient is 0.31%. By the 1st year of life, the weight of the organ ranges from 0.86 to 1.34 grams, with an average of 1.12 ± 0.05 grams. The growth rate is 23.1%, the mass coefficient is -0.36%. At the age of one and a half years, the mass of the prostate is in the range from 0.96 to 1.65 grams, on average it is 1.23 ± 0.07 . The growth rate is 9.8%, the mass ratio is 0.37%.

In the experiment at the 3rd month of life, the weight of the prostate varies from 0.10 to 0.28 grams, on average it is 0.20 ± 0.02 grams. Compared with the control, the weight of the gland is reduced by 70.0%. The mass coefficient in this case is 0.26%. In experimental 6-month-old rats, the mass of the prostate ranges from 0.18 to 0.63 grams, with an average of 0.45 ± 0.04 grams. When compared with the control group of the same age, the weight of the prostate gland is reduced by 33.3%. The mass coefficient is 0.23%. In the experiment at the 9th month of development, the mass of the prostate is in the range from 0.61 to 1.04 grams, on average - 0.85 ± 0.06 grams. Compared with the control, the weight of the gland is reduced by 7.1%, the mass coefficient is 0.35%. In experimental one-year-old rats, the mass of the prostate varies within 0.80-1.27 grams, averaging 1.03 ± 0.05 grams. Compared with the control group of the same age, the weight of the gland is reduced by 8.74 times. The mass coefficient is equal to 0.37%. In the experiment at the 18th month of development, the mass of the prostate ranges from 0.61 to 1.1 grams, on average it is 0.80 ± 0.05 grams. Compared with the control, the weight of the gland is reduced by 53.8%. The mass coefficient is 0.24%.

It was revealed that at the 3rd month of development, the thickness of the prostate varies from 4 to 6 mm, averaging 5.0 ± 0.18 mm. In 6-month-old rats, the thickness of the prostate is in the range of 5-8 mm, on average 6.7 ± 0.25 mm. The growth rate is 34.0%. By the 9th month of development, the thickness is 6-8 mm, on average 7.5 ± 0.18 mm. The growth rate is 11.9%. By the end of the 1st year of life, the thickness of the prostate ranges from 6 to 9 mm, averaging 7.9 ± 0.32 mm. The growth rate is 23.1%. In rats at the 18th month of development, the thickness of the prostate gland varies within 7-10 mm, on average it is 8.4 ± 0.32 mm. The growth rate is 9.8%.

In the experiment, in 3-month-old rats, the thickness of the prostate gland is in the range of 3-5 mm, on average - 4.0 ± 0.18 mm. Compared with the same age of the control group, it decreases by 20.0%. At 6 months in rats of the experimental group, the thickness of the organ is 4-6 mm, on average 5.7 ± 0.18 mm. When compared with the control, it decreases by 14.9%. In the experiment, in 9-month-old rats, the thickness of the organ varies from 5 to 7 mm, on average, 6.5 ± 0.27 mm. Compared to the same age control, the thickness decreases by 13.3%. By the 1st year of the experiment, the thickness of the prostate varies within 6-8 mm, on average - 7.0 ± 0.22 mm. Compared with the control, it decreases by 11.4%. In rats of the experimental group of 18 months of age, the thickness of the prostate is in the range of 6-8 mm, averaging 7.1 ± 0.22 mm. When compared with the control of the same age, this indicator of the organ decreases by 15.5%.

The study showed that at the 3rd month of development, the width of the organ ranges from 5 to 7 mm, averaging 6.2 ± 0.18 . In 6-month-old rats, the width of the prostate varies within 7-10 mm, averaging 8.9 ± 0.25 mm. The growth rate is 43.5%. By the 9th month of development, the width of the prostate is in the range from 12 to 18 mm, on average 15.0 ± 0.55 mm. The growth rate of the organ width is 68.55%. In one-year-old rats, the width of the organ ranges from 14 to 18 mm, averaging 16.1 ± 0.43 mm. The growth rate is 7.3%. At the 18th month of development, the width of the prostate varies from 16 to 20 mm, averaging 17.4 ± 0.43 mm. The growth rate is 8.1%.

In the experiment in 3-month-old rats, the width of the prostate gland ranged from 4 to 6 mm, averaging 5.1 ± 0.18 mm. Compared to the same age control, it decreases by 17.7%. At the 6th month of the experiment, the width of the organ ranged from 7 to 11 mm, on average, 8.1 ± 0.37 mm. Compared to the control, it decreases by 9.0%. By the 9th month of the experiment, the width of the prostate varies from 11 to 17 mm, averaging 13.4 ± 0.8 mm. When compared with the control, it decreases by 10.6%. In rats of the experimental group of 12 months of age, the width of the prostate varies from 13 to 18 mm, averaging 15.2 ± 0.54 mm. Compared with the control, the width of the organ decreases by 5.6%. In the experiment, at the 18th month of development, the width of the prostate is in the range of 12-17 mm, averaging 14.4 ± 0.54 mm. When compared with the control of the same age, it decreases by 17.2%.

It was found that at the 3rd month of development, the length of the organ varies from 8 to 11 mm. On average, it is 10.1 ± 0.28 mm. In 6-month-old rats, the length of the prostate gland ranges from 10 to 15 mm, on average 13.0 ± 0.41 mm. The growth rate is 28.7%. At the 9th month of development, the length of the prostate ranges from 11 to 16 mm, averaging 14.1 ± 0.46 mm. The growth rate is 8.5%. In 12-month-old rats, the length of the prostate varies from 13 to 17 mm, on average, 15.2 ± 0.43 mm. The growth rate is 7.8%. At the 18th month of development, the length of the prostate gland ranges from 14 to 18 mm, averaging 16.1 ± 0.43 mm. The growth rate of the organ length is 5.9%.

In the experiment in 3-month-old rats, the length of the prostate varies within 6-9 mm, on average - 7.9 ± 0.28 mm. Compared with the control of the same age, the length of the organ decreases by 21.8%. In 6-month-old rats of the experimental group, the length of the prostate ranges from 7 to 13 mm, on average - 11.0 ± 0.55 mm. When compared with the control, the length of the prostate decreases by 15.4%. In the experiment, in 9-month-old rats, the length of the organ ranged from 10 to 15 mm, averaging 12.2 ± 0.67 mm. Compared with the control, this parameter of the gland decreases by 13.4%. In 12-month-old rats of the experimental group, the length of the gland varies from 11 to 16 mm, averaging 13.9 ± 0.54 mm. When compared with the control, it decreases by 8.6%. In the experiment, in 1.5-year-old rats, the length of the prostate varies from 11 to 15 mm, averaging 13.0 ± 0.43 mm. Compared with the same age control, the length of the gland decreases by 19.3%.

Conclusion: during late postnatal ontogenesis, the greatest increase in body weight, weight, thickness, width and length of the prostate is observed in male rats of 6 months of age, then, until the end of postnatal ontogenesis, the growth rate gradually decreases. At all stages of postnatal ontogenesis, the length of the prostate is always greater than the width and thickness, and from the age of 9 months, the transverse size of the gland begins to prevail over the longitudinal and anterior-posterior dimensions.

Until the age of one year, rats showed the same value of the average daily weight gain, by the 18th month this parameter decreases by 2 times. During postnatal ontogenesis, the organ mass coefficient tends to gradually increase up to 18 months of age.

In rats with chronic alcoholism, in comparison with control, in all age groups, there is a lack of body weight and a decrease in the weight, thickness, width, and length of the prostate, this is most pronounced in 3-month-old and 1.5-year-old animals.

In the experiment, the average daily weight gain does not undergo any special changes compared to the control. The exception is 18 months of age, when this indicator has a negative value, instead of growth, there is a decrease. The index of the mass coefficient in rats with chronic alcoholism in comparison with the control group decreases at 6 and 12 months of age, in other age groups there is a slight increase.

Thus, the process of growth of the body weight index and organometric parameters of the prostate during late postnatal ontogenesis and in chronic alcoholism is characterized by unevenness and depends on the anatomical, physiological, age-related characteristics of the body and the time when the body was chronically exposed to alcohol.

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