



**TOSHKENT TIBBIYOT AKADEMIYASI URGANCH FILIALI
JANUBIY OROLBO‘YI TIBBIYOT JURNALI**

2 - TOM, 1 - SON. 2026

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PHYSIOLOGICAL DEVELOPMENT IN THE FIRST POSTNATAL PERIOD OF FEMALE RATS WITH EXPERIMENTAL HYPOTHYROIDISM

**ТАЖРИБАВИЙ ГИПОТИРЕОЗ ЧАҚИРИЛГАН УРФОЧИ КАЛАМУШЛАРДАН
ТУҒИЛГАН АВЛЮДНИНГ ИЛК ПОСТНАТАЛ ДАВРДА ФИЗИОЛОГИК
РИВОЖЛАНИШИ**

**ФИЗИОЛОГИЧЕСКОЕ РАЗВИТИЕ В ПЕРВОМ ПОСТНАТАЛЬНОМ ПЕРИОДЕ
РОЖДЕННЫХ ОТ САМОК КРЫС С ЭКСПЕРИМЕНТАЛЬНЫМ ГИПОТИРЕОЗОМ**



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Abstract. The aim is to the identification of features of physiological development and formation of the endocrine status of male rats obtained under conditions of experimental hypothyroidism of pregnant females. Materials and methods. Hypothyroidism in female rats was induced by oral administration of the anti-thyroid drug Mercazolil at the rate of 0.5 mg per 100 g of body weight for 21 days.



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Keywords: *hypothyroidism of pregnant females, offspring, postnatal ontogenesis, physical development, pituitary - thyroid system, pituitary - testicular system.*

Annatsiya. Ilmiy tadqiqotda eksperimental sharoitda urg‘ochi kalamushlardan olingan erkak nasllarning jismoniy rivojlanishi va endokrin holatini shakllantirish xususiyatlarini aniqlangan. Urg‘ochi kalamushlarda 21 kun davomida 100 g tana vazniga 0,5 mg dozada antitiroid preparat Merlazolilni og‘iz orqali yuborish orqali gipotireoidizm chaqirilgan. Onaning gipotireoidizmi ularning avlodlarida jismoniy rivojlanishning kechikishiga olib kelishi aniqlandi. Eksperimental gipotireoidizm chaqirilgan urg‘ochi kalamushlardan fiziologik jihatdan yetuk bo‘lmagan nasl olinishi mumkin. Bu holat nazorat guruhiga nisbatan kalamush avlodlari sonining kamayishi, erkak kalamushlar sonining kam bo‘lishi, omon qolgan kalamushlar sonining kamayishi va postnatal sharoitda tana vaznining oshib borishini kechikishi bilan namoyon bo‘ladi.

Kalit so‘zlar: homiladorlikdagi gipotireoidizm, nasl, tug‘ruqdan keyingi ontogenez, gipofiz-tiroid tizimi, gipofiz-urug‘don tizimi.

Аннотация. Целью работы является определение особенностей физического развития и формирования эндокринного статуса потомства мужского пола, полученного от беременных самок крыс в экспериментальных условиях. Материал и методы. Гипотиреоз у самок крыс вызывали пероральным введением анти тиреоидного препарата Мерказолил в дозе 0,5 мг на 100 г массы тела в течение 21 дня. Результаты. Установлено, что материнский гипотиреоз приводит к задержке физического развития и заметному дисбалансу гипофизарно-тиреоидной репродуктивной системы у их потомства. Самки крыс с экспериментальным гипотиреозом рожают физиологически незрелое потомство, что проявляется уменьшением количества крысиного потомства, уменьшением количества крыс-самцов, уменьшением количества выживших крыс и задержкой постнатальной массы тела. Усиление симптомов и задержку полового созревания по сравнению с контрольной группой. Экспериментальный гипотиреоз, индуцированный у самок крыс до беременности, приводит к значительным дисбалансам гипофизарно-щитовидной и гипофизарно-тестикулярной систем у потомства.

Ключевые слова: гипотиреоз беременных, потомство, постнатальный онтогенез, гипофизарно-щитовидная система, гипофизарно-тестикулярная система.

INTRODUCTION. It has been established that maternal hypothyroidism leads to a delay in physical development and a pronounced imbalance of the pituitary - thyroid - testicular system in their offspring. **Conclusions.** In female rats with experimental hypothyroidism, physiologically immature offspring are born, which is reflected in a decrease in the number of rat pups in litters, males, a decrease in the number of surviving rat pups, a slowdown in the accumulation of body weight after birth, and a longer preservation of signs of immaturity compared to the control group. Experimental hypothyroidism induced in females before pregnancy leads to a significant imbalance of the pituitary-thyroid and pituitary-testicular systems in the offspring.

LITERATURE REVIEW. In the world, large-scale scientific research is being carried out aimed at preventing the negative complications observed in the offspring born under conditions of thyroid gland deficiency in mothers [3, 4, 7, 8, 12, 15, 16, 18, 20, 21]. In this regard, to determine the mechanism of the effect of hypothyroidism in mothers on the postnatal development of the reproductive system of the offspring born from them, to develop a set of measures to prevent reproductive disorders that may occur in the postnatal development of the offspring born under conditions of thyroid deficiency in mothers. Focused scientific research is of particular importance [1, 2, 5, 6, 9, 11, 13, 17, 19].

RESEARCH METHODOLOGY. For research, 50 female white rats, weighing 160-180 grams, who had not given birth before, were not bred, and a total of 369 (control group - 222, experimental group - 147) rat pups were born from them. received. Morphological, morphometric and immunohistochemical examinations of testes were carried out in 70 sexually mature rats.



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Experimental animals were kept under normal laboratory ration conditions. The study was carried out in two stages.

After excluding somatic and infectious diseases in the first stage, all female rats were divided into two groups: group 1 rats (25 rats) were injected with 0.5 mg of antithyroid drug - mercazolil per 100 grams of body weight for 21 days. called experimental hypothyroidism. Group 2 (intact) female rats (25) were injected with an equal amount of sterilized physiological solution, and both groups of rats were observed. It should be noted that 2 weeks after the administration of Mercazolil, most of the rats of the 1st group showed a slight decrease in motor activity and appetite, drowsiness, and dullness of the fur coat.

ANALYSIS AND RESULTS. Taking into account that thyroid hormones are important for the production of sex hormones in the ovaries, control of ovulation, the formation of the corpus luteum, the development, growth and differentiation of tissues, especially the brain, skeleton, and reproductive organs, in the embryonic and early postnatal periods, experimentally We studied the fertility of hypothyroid female rats and the physiological development of their offspring in the early postnatal period.

Experimental hypothyroidism negatively affected fertility and pregnancy rate in female rats. The analysis of vaginal swabs of animals in the experimental group showed a violation of the sexual cycle in almost all rats: the average duration of the estrous cycle in 68% of animals - 5.9 days, in 24% of animals - 7.3 days, in 8% of animals - 11.4 day, while in the control group this figure corresponded to 4.7 days.

After mating with healthy male rats, all intact female rats became pregnant within 1-5 days and lasted 21-23 days (see Table 1). A total of 222 baby rats were born from these rats. In 59.5% of experimentally induced hypothyroid female rats, pregnancy was prolonged by 3-5 days and 24-26 days, compared to the control group. A total of 147 rats were born from rats in the experimental group. In 2 (8%) hypothyroid female rats, pregnancy was not observed throughout the experiment.

Table 1.

Fertility of female rats induced with experimental hypothyroidism

No	Period	Control group	Experimental group
1	Fertility of rats, %	100	92%*
2	Period of occurrence of pregnancy, days	3,0±0,14	5,8±0,28*
3	Duration of pregnancy, days	21,2±1,02	25,6±1,2*

Note: *-differences are reliable compared to control group values, P<0.05.



The dynamics of changes in the body weight of female rats during pregnancy are presented

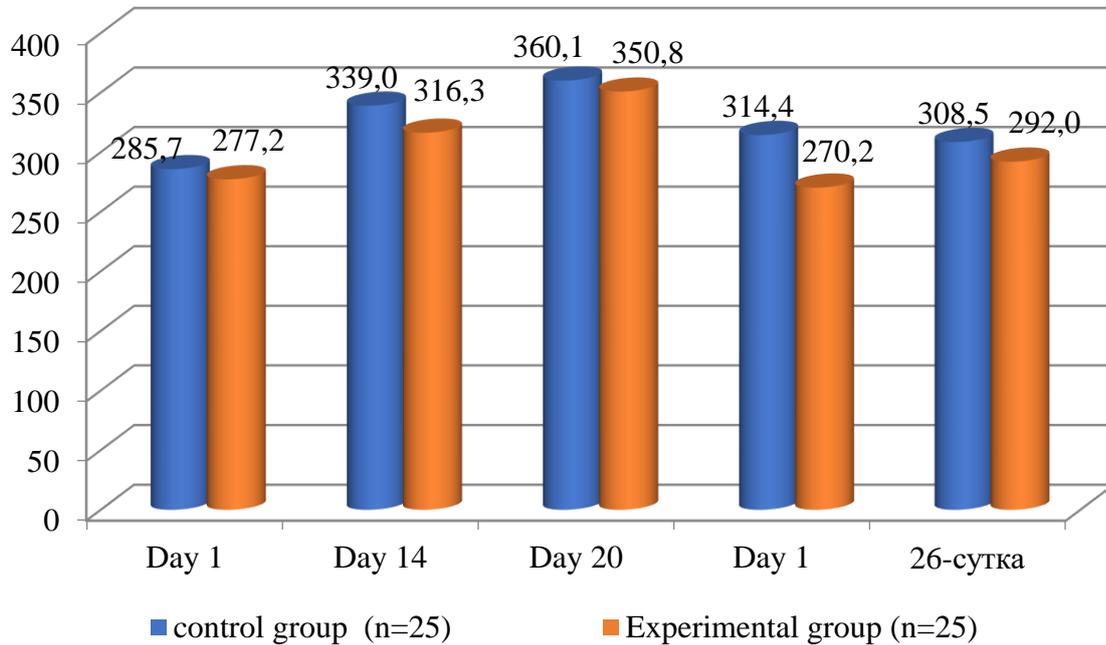


Figure 1. Body weight change dynamics of female rats during pregnancy (grams)

As can be seen from the figure, there were no statistically significant changes in the dynamics of body weight during pregnancy in animals of the control and experimental groups, but after delivery, the body weight of rats in the experimental group significantly decreased compared to the control group.

In the intact group, the average number of pups born from one female rat was 8.9, while in the hypothyroid experimental group, the number was 6.4, a decrease of 28%. .

Postnatal mortality was 2.7% (6) in the control group and 7.5% (11) in the experimental group, and the death of rat pups in both groups was recorded during the first 7 days after birth. (Table 2).

Table 2.

Number of offspring born to experimentally hypothyroid female rats (M±m)

group	The number of baby rats				Baby rats that died within 7 days after birth	
	female		male		aбс.	%
	aбс.	%	aбс.	%		
Control group (n=222)	117	52,8±2,4	105	47,2±2,2	6	2,7±0,14
Experimental group (n=147)	87*	59,4±2,7	60*	40,6±1,9	11*	7,5±0,32

Note: *-differences are reliable compared to control group values, P<0.05.

Analysis of the births of rats by gender showed a slight decrease in the percentage of male rats in the experimental group, while the percentages of female and male rats born in the control and experimental groups were 52.8:47.2 and 59.4, respectively: It was 40.6 (Table 3).



Table 3.

Mean number of offspring (M±m) of experimentally hypothyroid female rats

Group	Total	Average number of rat pups per birth	
		Female	Male
Control group (n=222)	8,9±0,42	4,7±0,18	4,2±0,20
Experimental group (n=147)	6,4±0,31*	3,8±0,17*	2,6±0,12*

Note: *-differences are reliable compared to control group values, P<0.05.

Physiological development of rat children was evaluated on the basis of indicators such as the separation of the auricles, covering of the body with primary wool, descent of sperm into the testicles, emergence of shovel teeth, opening of eyes, covering of the body with secondary wool.

As a result of observing the physiological development processes of rat children in the dynamics of postnatal ontogenesis, it was found that indicators such as the separation of the supra-auricle, the covering of the body with primary wool in the rats of the experimental group corresponded almost to physiological standards and did not reliably differ from the indicators of the control group (see Fig. 2).

At the same time, compared to the control group, the spermatozoa in the testis was delayed by 4.7 days, the emergence of shovel teeth by 1.2 days, the opening of eyes by 1.9 days, and the body covering with secondary wool by 1.0 days. was noted (Figure2).

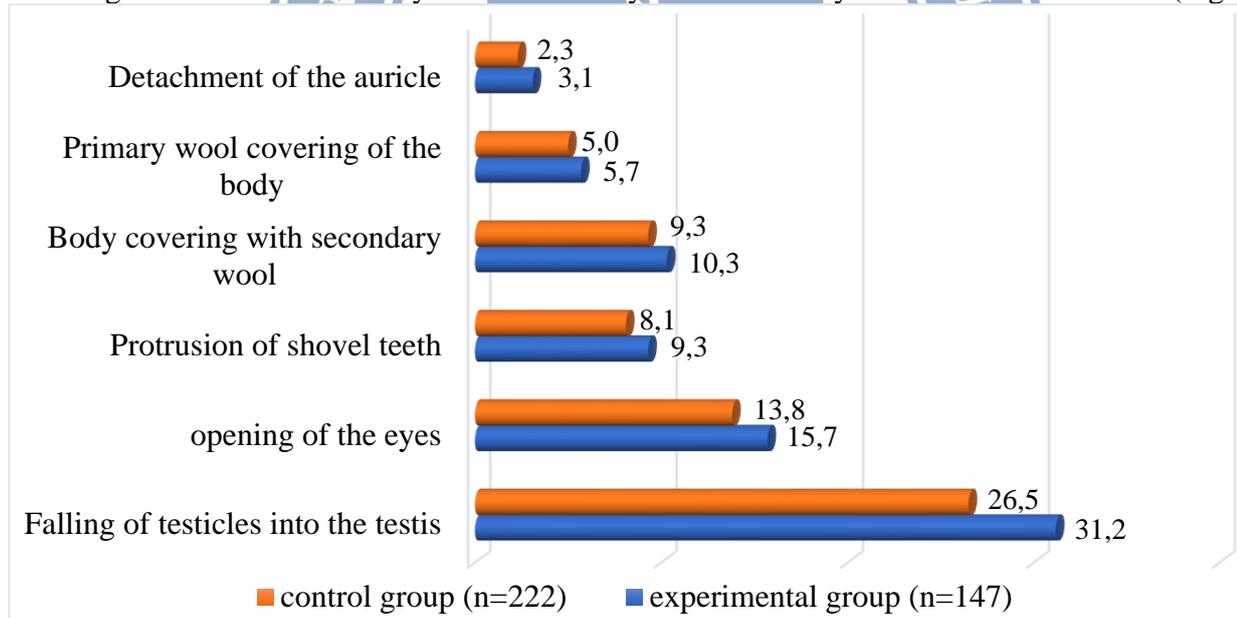


Figure 2. Physiological development dynamics of rat children (day)

It is known that during the early postnatal ontogenesis, the decrease in the growth dynamics of body weight is one of the signs of physiological immaturity. In our research, it was noted that the dynamics of body weight increase in the postnatal development period of the animals of the experimental group lags behind the indicators of the control group of rats.

As a result of studying the dynamics of daily growth of body weight in rat children, the following was determined:

During the first 2 weeks (1-14 days) after birth, the daily weight gain of the control group rats was 0.98±0.05 grams, while the hypothyroid female rats born in the experiment in the last generation, this indicator was equal to 0.87±0.04 grams;



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Daily body weight gain in 15-30 days after birth was 1.49 ± 0.06 grams and 1.39 ± 0.07 grams in control and experimental groups, and 1.40 ± 1.40 grams in 30-60 days, respectively. It was 0.07 and 1.27 ± 0.06 grams (Table 4).

Table 4.

Dynamics of weight gain of rat pups in experimental and control groups (grams, $M \pm m$)

No	Days after birth	Control group	Experimental group
1	1	$5,9 \pm 0,26$	$5,4 \pm 0,27$
2	3	$8,3 \pm 0,37$	$7,4 \pm 0,32$
3	7	$12,4 \pm 0,53$	$11,2 \pm 0,48$
4	14	$19,7 \pm 0,89$	$17,7 \pm 0,83$
5	21	$28,1 \pm 1,2$	$27,2 \pm 1,35$
6	30	$42,2 \pm 2,06$	$38,6 \pm 1,84$
7	60	$84,2 \pm 3,75$	$76,6 \pm 3,72^*$

Note: *-differences are reliable compared to control group values, $P < 0.05$.

Thus, in the period of postnatal development, the rate of daily weight gain of rats was significantly reduced in the experimental group compared to the offspring obtained from healthy female rats.

Conclusion. Based on the obtained results, it can be concluded that experimental hypothyroidism induced in female rats reduces their fertility and has a negative effect on the physiological development of their offspring in the postnatal period. This is an increase in the number of rat pups that died during the first week after birth compared to the control group, a slowdown in body weight gain in dynamics, signs of physiological maturity (detachment of the auricle, covering the body with primary wool, spermatozoa falling into the testicles, shovel teeth, opening of eyes, covering of the body with secondary wool) is represented by the delay in the formation processes.

REFERENCES:

1. Джураев А.М., Юсупова,И.А. Реабилитация детей и подростков с различными диспластическими изменениями в тазобедренном суставе. Medical Journal of Uzbekistan. – 2024. №4. – С. 267-270.
2. Касымова С.Д., Турдалиева Н.М. Влияние йодного дефицита на половое развитие подростков // Вестник последипломного образования в сфере здравоохранения. – 2016. – № 2. – С. 23-25.
3. Козлов В.Н. Морфофункциональные изменения в щитовидной железе у белых крыс при моделировании тиреоидной патологии // Ветеринарная медицина. – 2006. – № 1. – С. 18-19.
4. Кубасов Р.В. Функциональные изменения гипофизарно-гонадного и тиреоидного эндокринных звеньев в ответ на стрессовые факторы // Fundamental research – 2014. – № 10. – С. 1010-1014.
5. Мадаминава Г.И.; Оллаберганов М.И. Тажрибавий гипотиреоз чакирилган урғочи каламушлардан туғилган авлодда гипофиз-қалқонсимон без-уруғдон тизими гормонларининг динамик ҳолати // Toshkent tibbiyot akademiyasi “Yosh olimlar tibbiyot jurnali” № 9(03), 2024. Б. 118-126 ISSN: 2181-3485.
6. Мадаминава Г.И. Особенности физиологического и гормонального развития потомства, рожденного от самок крыс с экспериментальным гипотиреозом в раннем постнатальном периоде // Vol.7No.6(2024): Journal of innovations in scientific and educational research. VOLUME-7 ISSUE-6 (30-JUNE) P. 186-194.



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2 - TOM, 1 - SON. 2026

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7. Юсупова И.А., Оллаберганов М.И. Результаты хирургического лечения тазобедренного сустава в хорезмской области // Проблемы биологии и медицины. - 2023. №5. Том. 148. - С. 283-285.
8. Юсупова И.А. Оперативный метод лечения диспластических деформаций проксимального отдела бедра у детей. Medical Journal Of Uzbekistan. - 2024. №3. – С. 235-238.
9. Chiao Y.C., Lee H.Y., Wang S.W., Hwang J.J., Chien C.H., Huang S.W., Lu C.C., Chen J.J., Tsai S.C., Wang P.S. Regulation of thyroid hormones on the production of testosterone in rats // Journal of Cellular Biochemistry. 1999;73: 554–562.
10. Duarte-Guterman P., Navarro-Martín L., Trudeau V.L. [Mechanisms of crosstalk between endocrine systems: regulation of sex steroid hormone synthesis and action by thyroid hormones](#) // Gen Comp Endocrinol. 2014 Jul 1; 203:69-85. doi: 10.1016/j.ygcen.2014.03.015. Epub 2014 Mar 29. PMID: 24685768 Review.
11. G.I.Madaminova, F.Kh. Azizova, P.Kh. Azizova. I.R. Tursunmetov, D.R. Sobirova. Morphofunctional features of the formation of the testicular generative function in the female rats' offspring with experimental hypothyroidism // NeuroQuantology|June 2022| Volume 20|Issue 6|Page 3471-3475. doi: 10.14704G'nq.2022.20.6. NQ 22352.
12. Kumar A., Shekhar S., Dhole B. Thyroid and male reproduction // Indian J Endocrinol Metab. – 2014. – V. 18(1). – P. 23-31.
13. La Vignera S., Vita R. [Thyroid dysfunction and semen quality](#) // Int J Immunopathol Pharmacol. – 2018 Jan-Dec; 32:2058738418775241. doi: 10.1177/2058738418775241.PMID: 29737216.
14. Madaminova G.I., Ismailov B.M. Tajribaviy gipotireoz chaqirilgan urg‘ochi kalamushlardan tug‘ilgan avlodning ilk postnatal davrda fiziologik rivojlanishi // Toshkent tibbiyot akademiyasi Медицинский журнал молодых ученых, 1(13 (03), 97–102. ISSN: 2181-3485.
15. Madaminova G.I., Azizova F. Kh. Sobirova D.R. Otajano‘va A.N. Mirtolipo‘va M.A. Функциональное состояние гипофизарно-тиреоидно-яичковой системы потомства полученного в условиях экспериментального гипотиреоза у самок.// Toshkent tibbiyot akademiyasi axborotnomasi. Toshkent-2022. №10. B-76-80. ISSN2181-7812 www.tma-journals.uz
16. Madaminova G.I., Azizova F.Kh., Ishandzhanova S.Kh., Azizova P.Kh. Features of physical development and formation of the endocrine status of the offspring obtained under conditions of experimental hypothyroidism in females // British Medical Journal. Volume 2, No.6, November 2022. Page 47-53.Great Britain-2022.
17. Madaminova G.I., Matyakubova L.Sh. Functional state of the pituitary-thyroid-testicular system of offspring obtained under conditions of experimental hypothyroidism in females // Innovations in technology and science education. SJIF 2023: 5.305. VOLUME 2 ISSUE 14. ISSN 2181-371X. P. 85-95.
18. Ollaberganov M. I., Ruzibaev R. Y., Madaminova G. I. Biochemical Changes in Blood after Experimental Osteoporosis in Rats //European journal of innovation in nonformal education. – 2022. – T. 2. – №. 2. – С. 360-363.
19. Ollaberganov M. I., Ruzibaev R. Y., Madaminova G. I. Morphological changes in the long tubular bones of rats in experimental osteoporosis //Central Asian Journal of Medicine. – 2022. – №. 1. – С. 28-32.
20. Yuldashov J.A., Akhmedova N.Sh., Mukhammedjanova M.Kh. Feature of anemia in patients with cronical viral // Asian journal pharmaceutical and iological research (AJPRB) Vol 11. Iss.2 p. 218-223 IF-4,46



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JANUBIY OROLBO‘YI TIBBIYOT JURNALI

2 - TOM, 1 - SON. 2026

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21. Yuldashov J.A., Akhmedova N.Sh., Matrasulova D.M. Use of Non-Invasive Methods of Diagnosing Liver Fibrosis in Patients with Chronic Virus Hepatitis C // The American Journal of Medicine and Medical Sciences, 2024, 14(2): 481-483

