

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Histological And Functional Evaluation Of The Thyroid Gland Pigs In The Condition Of Hypotrophy.

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ABSTRACT

The goal is to study the patterns of histophysiology of the thyroid gland of piglets-normotrofiki and hypotrophy pigs in the age aspect. The object of the study is the thyroid gland and serum of piglets of large white breed of the control (piglets-normotrophic) and experimental (piglets-hypotrophic) groups at the age of 1, 5, 15 and 30 days. As a result of the study, histoarchitecture of the thyroid gland of piglets-normotrophs was established in the neonatal period, of five, fifteen and thirty-day age, morphologically formed, the structural components are clearly differentiated. From the first to the thirtieth day of the study, the follicles of the thyroid gland are of the correct round shape, the thyrocytes are cubic, in the colloid there are significant resorption zones, indicating coherent processes of secretion of thyroid hormones, the concentration of which was high in the neonatal period and decreased by the 30th day of postnatal development. In the histophysiology of the thyroid gland of diurnal and five-day-old hypotrophic piglets, signs of organ hypofunction were noted: slight resorption of the colloid, flattened thyrocytes and their nuclei, narrowing of the lumens of the hemomicrocirculatory bed. The low level of thyroid-stimulating hormone on the first day had no effect on the synthesis and secretion of thyroid hormones. An increase in the amount of thyrotropin in the five-day age did not affect the micromorphology of the thyroid gland and, accordingly, the synthesis of thyroxin and triiodothyronine. Changes in the histoarchitecture of the thyroid gland of hypotrophic piglets at the age of 15 and 30 days on the background of an increase in the level of thyrotropin, contributed to the active synthesis and elimination of thyroid hormones.

Keywords: piglets, hypotrophy, thyroid gland, thyroid-stimulating hormone, triiodothyronine, thyroxin, thyrocyte, follicle

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INTRODUCTION

One of the effective branches of animal husbandry is pig breeding, characterized by the highest productivity, multiple fertility (for one farrowing from the sow get 10 - 12 pigs), early maturation of offspring (at 6 months of age). Slaughter yield of pig meat is one of the highest – 75-85% (cattle 50-60%, sheep – 44-52%) [1,6]. One of the specific features of swine development is low growth rate in the embryonic period in contrast to post-embryonic [2].

The factors that reduce productivity, both in the prenatal and postnatal periods, include diseases of various etiologies, among which antenatal hypotrophy of piglets is common, which is characterized by a violation of the morphophysiological processes of fetal development. Underdevelopment of internal organs in the offspring is manifested both in the reduction of absolute mass and in the inferiority of their structure (immaturity of parenchyma cells with weak differentiation), that inevitably contributes to a decrease in their functional reactivity of the part of pathology department at the metabolism and toxicity [3,4,9]. The growth, development and natural resistance of piglets in the postnatal period is significantly influenced by the thyroid gland [4,7], the histophysiology of which is insufficiently studied in hypotrophy.

Based on this, the aim of the study was to study the laws of histophysiology of the thyroid gland of piglets – normotrophs and piglets-hypotrophs in the age aspect.

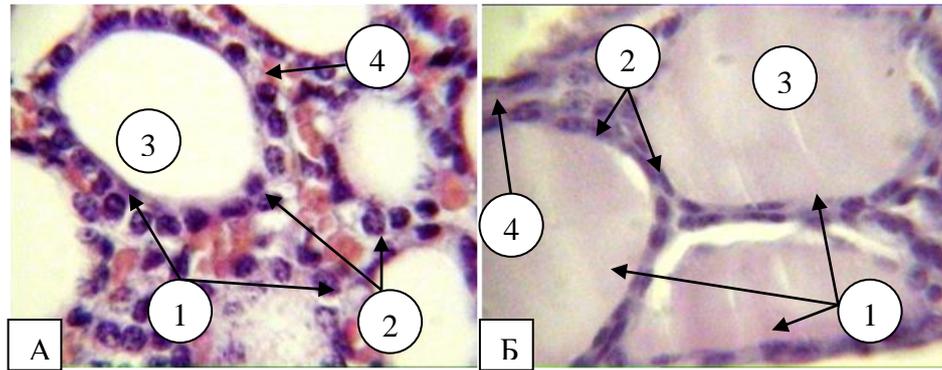
TECHNIQUE

The scientific experiment made on the basis of the pig farm SPK "Pokrovsky" of the Orenburg region and in the conditions of the Department of morphology, physiology and pathology of FSBEI HE Orenburg state agrarian university. The object of the study is the thyroid gland and blood serum of piglets of large white breed of control (normotrophic piglets) and experimental (hypotrophic piglets) groups at the age of 1, 5, 15 and 30 days. Methods used in the work, histological, morphometric, immuno-enzyme analysis. Using "Microsoft Excel" program was carried out statistical processing of results and determination of medium parameters. The reliability of differences between experimental groups were explained with the help of t-criterion of student's.

RESULTS

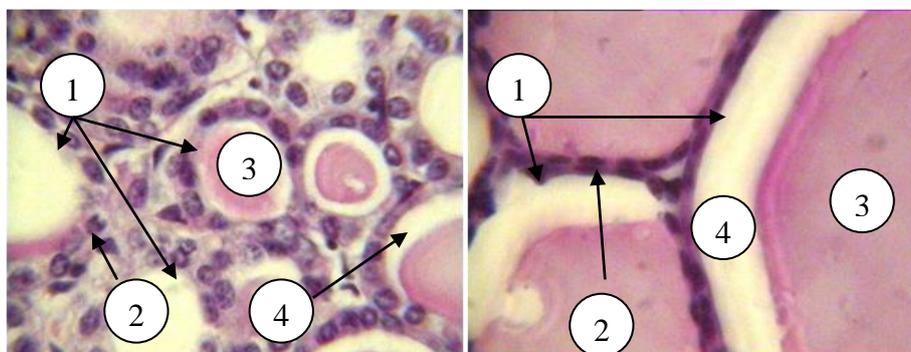
As to architectonics of the thyroid gland of piglets of the control and experimental groups on the first day was heteromorphic in nature, from the connective tissue capsule in the parenchyma of the organ are given trabeculae dividing the gland into lobules, a distinctive feature was the thickening of the capsule of the organ of piglets-hypotrophs by 19.74% in relation to the control (Rice. 1.). Mainly round-shaped thyroid follicles in both groups, but organ parenchyma in the control is characterized by a change in the size of this structure from smaller in the center with an increase to the peripheral part, while the average diameter was less by 37.77% ($p \leq 0.05$) when compared with the experimental group. Foci in both groups were observed the formation of follicles, the cavities of which are filled with a homogeneous colloid, with the presence of resorption zones, the color of the colloid mass in the control is pale pink, in the experimental – pink. In the control group, thyrocytes from flattened to cubic form with rounded basophilic nuclei, nucleoli are clearly visible. The height of the thyrocytes of the thyroid gland of piglets hypotrophs reduced by 31.37% ($p \leq 0.05$) relative to control values, the nucleoli in a flattened hyperchromatic nuclei are not visualized. The vascular bed is blood-filled in the control and experimental groups.

In newborn piglets-hypotrophic hormone levels of thyroid-tropic, triiodothyronine and thyroxine in serum significantly decreased ($p \leq 0.01$) by 71.70%, 25.50% and 57.09%, respectively, compared with the control group.



Rice 1: Thyroid of daily piglets of control (A) and experimental (B) groups. Increase 15x100; coloring with hematoxylin of Mayer and eosin: 1 – follicles; 2 – thyrocytes; 3 – colloid; 4 – capillary

The histological picture of the thyroid gland of five-day piglets of the control and experimental groups was characterized as heterogeneous. In the control, the connective tissue capsule is moderately developed, while in the experimental group it is thickened by 24.83%. In the control of the thyroid follicles of piglets had ovoid form, in piglets-hypotrophics in the center of the body there was an intensive process of folliculogenesis, with the formation of mainly small spherical follicles, which on the periphery of the parenchyma of the body took ovoid form and their average diameter slightly increased in relation to the control by 8.45% (Fig. 2). Colloid in both groups acquired red-pink color, uniform consistency, with a small number of foci of resorption. Thyroid epithelial cells in the control group are low-prismatic, the cytoplasm is weakly oxyphilic. In the parenchyma of the thyroid gland of hypotrophic piglets, flattened thyrocytes were observed, whose height decreased by 36.0% ($p \leq 0.001$) relative to the control. The spherical nuclei of thyrocytes pigs-normochromic hypochromic, opposite the piglets of lipotropics nuclei hyperchromatic and flattened on 54,27% ($p \leq 0.001$) relative to the control nucleoli were visualized only in the control group. The hemo-tissue microcirculation narrowing of blood vessels (microvasculature) and weak content was observed in the thyroid gland of piglets lipotropics in the control vessels hemo-tissue microcirculation moderately krovenapolnenia (Rice 2).



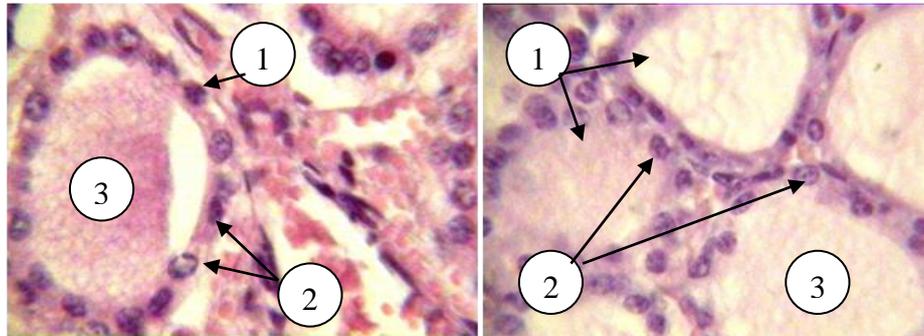
Rice 2: Thyroid gland of five-day piglets of control (A) and experimental (B) groups. Increase 15 * 100; color Mayer hematoxylin and eosin: 1-follicles; 2-thyrocytes;3-colloid; 4 – foci of resorption in the colloid

On the fifth day the amount of thyroid stimulating hormone in the serum of piglets lipotropics increased 3.0 times in comparison with the control group ($p \leq 0.05$). The level of triiodothyronine in the experimental group of animals increased by 3.5%, on the contrary, the amount of thyroxine decreased significantly by 57.6% ($p \leq 0.001$) when compared with the control group.

On the fifteenth day of the histological structure of the thyroid gland of piglets and pigs normotrophic-lipotropics relatively isomorphic. The connective tissue capsule of the thyroid gland of the hypotrophic piglets is relief throughout, its thickness is reduced by 14.65% in relation to the control. The follicles of the thyroid gland in both groups are spherical or ovoid, the diameter of which differed slightly. For the parenchyma of both groups, the presence of a pink colloid having a "foamy" consistency with resorption zones is characteristic, in addition, follicles with half-empty or empty gaps were observed (Rice 3). Thyrocytes

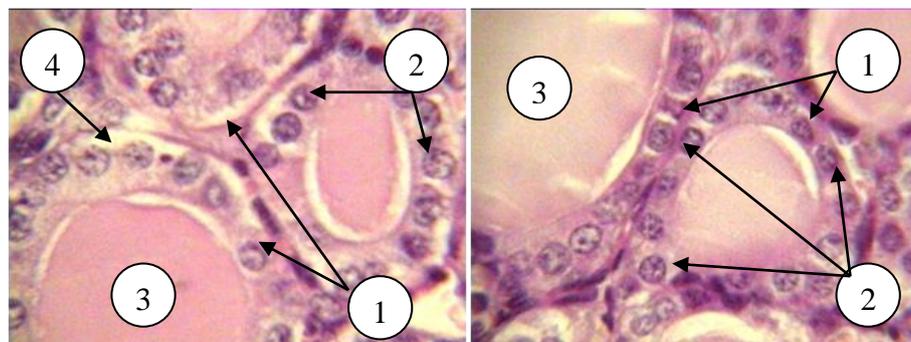
in the control and experimental group are variable in form, but overwhelmingly flattened, in the weakly oxyphilic vacuolated cytoplasm, hypochromic nuclei of spherical and flattened form were observed, in which nucleoli were viewed. Vessels moderately krovenapolnenia hemo-tissue microcirculation.

On the fifteenth day of postnatal ontogenesis, the level of thyroid-stimulating hormone in the blood serum of piglets in the state of hypotrophy increased 6.0 times ($p \leq 0.1$) compared with the control. The concentration of triiodothyronine and thyroxine in the blood serum of hypotrophic pigs increased by 20.7% and 6.6% compared to the control group ($p \leq 0.001$).



Rice 3: Thyroid gland of five-day piglets of control (A) and experimental (B) groups. Increase 15 * 100; color Mayer hematoxylin and eosin: 1-follicles; 2-thyrocytes; 3 - "foamy" colloid

On the thirtieth day of his to architectonics of the thyroid parenchyma of piglets of the control and experimental groups are characterized by heteromorphism. The connective tissue capsule surrounding the thyroid parenchyma is well developed, its thickness is $306.42 \pm 26.45 \mu\text{m}$, while the hypotrophic piglets are moderately developed, however, the capsule thickness exceeded the control group by 22.0%. A common feature discernible in the description of the shape of the follicles in both groups were observed in the variability of their configurations, it was observed ovoid, spherical, sometimes, vizualizer were followed by triangular and cubic forms. In addition, there was a decrease in the diameter of thyroid follicles in the experimental group by 39.0% ($p \leq 0.001$) in relation to the control. The processes of formation of new follicles were observed in the parenchyma of the organs of the studied groups of animals. In the control group, the cavities of the Central follicles were filled with a pale pink colloid, the texture of which is homogeneous, with foci of resorption in the peripheral follicles. In the experimental group, when compared with the control, the colloidal mass acquired a red-pink color, homogeneous consistency, stratification, with small areas of resorption along the periphery of the follicle. The form of thyrocytes in the control is cubic, in the experimental – thyrocytes from the flattened to the cubic form, the height of the latter decreased by 11.76% relative to the control group. In suboccipital vacuolated cytoplasm of the epithelium of the thyroid was noted hypochromic nuclei having spherical shape, with well visible nucleoli (Rice 4). In the control group in the parenchyma of the thyroid gland was noted moderate hyperemia of the vascular component of hemo-tissue microcirculation, sometimes traced the pattern of narrowing gaps of the microvasculature. The piglets lipotropics in the thyroid gland was observed painting intensive exchange hepatocarcinoma link.



Rice 4: Thyroid gland of thirty-day piglets of control (A) and experimental (B) groups. Increase 15 * 100; color Mayer hematoxylin and eosin: 1-follicles; 2-thyrocytes; 3-colloid; 4-vacuolation in the cytoplasm

On the thirtieth day, thyroid-stimulating hormone in the experimental group of animals decreased by 56.5% relative to the control ($p \leq 0.5$). In hypotrophic piglets, an increase in triiodothyronine and thyroxine levels by 2.0 and 4.0 times was observed, respectively, with respect to the control group ($p \leq 0.001$).

SUMMARY

Thus, the histo architectonics of the thyroid gland of piglets-normotrophics in the period of newborn, five-, fifteen - and thirty-day age is morphologically formed, the structural components are clearly differentiated. From the first to the thirtieth day of the study of the thyroid follicle of the correct round shape, thyrocytes-cubic, in the colloid there are significant areas of resorption, indicating the coordinated processes of secretion of thyroid hormones, the concentration of which was high in the neonatal period and decreased to the thirtieth day of postnatal development, the results are consistent with the data of a number of researchers [5,8].

In histophysiology thyroid daily and ParisTech pigs-lipotropics showed signs of hypofunction of the organ: minor resorption of the colloid, flattened thyrocytes and their nucleus, the narrowing of the lumen of a vascular channel. Low levels of thyroid-stimulating hormone on the first day had no effect on the synthesis and secretion of thyroid hormones. An increase in the number of TSH in the five-day age did not affect the micromorphology of the thyroid gland and, accordingly, the synthesis of OT3 and OT4. Changes in the histoarchitectonics of the thyroid gland of piglets-hypotrophs at the age of 15 and 30 days on the background of the increase in TSH levels, contributed to the active synthesis and excretion of thyroid hormones.

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