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## Modulation of Hormonal Homeostasis and Blood Biochemical Markers by Non-Hormonal Drugs

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### ABSTRACT

The physiological processes within an organism, along with external influences, inevitably change the composition of the blood to varying extents. Accurate biochemical and hematological analysis of blood parameters is very important for proper diagnosis and the selection of therapeutic interventions. When administering various drugs, especially protein-mineral complexes and essential micro- and macroelements, it is necessary to understand their overall effect on the body. This study examines the effects of a non-hormonal complex aimed at regulating hormonal balance, using sheep as a model. Over 50 days, animals in the experimental group received a daily dose of 5 ml of an iodine-amylodextrin preparation, along with injections of 1.5 ml of E-selenium and 0.5 ml of a tissue-based preparation mixed with 1 milliliter of a 0.5% solution of novocaine. After the study, protein metabolism and the dynamics of carbohydrate-lipid metabolism were analyzed. The findings indicate that the non-hormonal agents administered do not harm the body and instead contribute to a more efficient recovery process.

**Keywords:** Hormonal regulation, Non-hormonal agents Protein metabolism markers, Carbohydrate-lipid metabolism markers

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### Introduction

The composition of blood serves as a fundamental indicator of metabolic activity within the body. As it circulates through an extensive network of vessels and capillaries, blood interacts with the cells of various tissues and organs, ensuring their nourishment, oxygen supply, and the delivery of essential hormones enzymes, and other vital substances necessary for normal physiological function. Any internal or external influence on the body inevitably affects blood composition to some extent. This is why biochemical and hematological analyses are widely used in both medical diagnostics and scientific research [1-6]. These assessments play a crucial role in diagnosing

conditions, selecting appropriate treatments, preventing diseases, and evaluating the physiological effects of different pharmaceutical interventions. The insights gained from such investigations enable faster and more effective decision-making in medical practice [5-8].

In efforts to regulate hormonal balance, many specialists incorporate a range of therapeutic agents, including non-hormonal options such as vitamin-mineral complexes and essential micro- and macroelements. These substances contribute to overall physiological stability, enhance sperm quality in men, and improve egg quality in women. However, there is limited focus on understanding how these compounds influence metabolic processes within the body [9-14]. Questions remain regarding their impact on carbohydrate-lipid and protein-mineral metabolism, the speed at which metabolic reactions are activated, and the potential for hidden adverse effects [15-21].

This study aims to explore the influence of non-hormonal agents on biochemical blood parameters, using laboratory animals as a model to assess their effects on metabolic processes.

## Materials and Methods

This study investigated the effects of non-hormonal hormonal correction on biochemical blood parameters using laboratory animals as a model.

All experiments were conducted following the “Rules of Laboratory Practice in the Russian Federation” (Order No. 708n of the Ministry of Health of the Russian Federation, dated August 23, 2010). Additionally, the study adhered to the ethical guidelines established by the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes.

The research involved two groups of 25 young rams, all of which were clinically healthy, within the age range of 1.5-2.5 years, and of similar weight and size. Both groups were maintained under identical environmental conditions and fed the same diet throughout the study.

For 50 days, animals in the experimental group received a daily dose of 5 milliliters of a preparation containing iodine with amyloextrin, mixed with their feed. Additionally, they were administered intramuscular injections of 1.5 ml of E-selenium, along with 0.5 ml of tissue preparation combined with 1 ml of a 0.5% novocaine solution. In contrast, the control group did not receive any treatment. Blood samples were collected from all animals at the beginning of the research and again after the experiment.

To assess physiological and biochemical changes, blood samples were analyzed for protein metabolism and carbohydrate-lipid metabolism parameters using standard laboratory techniques. Clinical evaluations were also conducted by monitoring body temperature, pulse rate, respiratory rate, and overall health and behavior of the animals.

## Results and Discussion

The results obtained were statistically processed and summarized in **Tables 1 and 2**.

**Table 1.** Indicators

Indicator	Standard	Groups	Numerical value	
			At the beginning of the experience	At the beginning of the experience
Total protein (g/l)	42-97	Test	20.37 ± 0.67	43.59 ± 5.80
		Control	28.11 ± 2.30	54.18 ± 13.75
Albumins (g/l)	22.6-40.4	Test	17.02 ± 1.20	20.13 ± 2.03
		Control	24.77 ± 3.19	23.23 ± 0.22
Globulins (g/l)	35-49	Test	3.35 ± 1.26	23.46 ± 7.84
		Control	3.34 ± 0.89	30.96 ± 13.53
Creatinine (mmol/l)	53-174	Test	154.41 ± 57.22	169.27 ± 22.57
		Control	181.33 ± 58.14	194.04 ± 49.45
Urea (mmol/l)	3.3-9.3	Test	4.02 ± 0.91	5.103 ± 1.66
		Control	2.75 ± 0.23	3.24 ± 0.65

During the study, initial biochemical assessments revealed that animals in both groups exhibited hypoproteinemia, hypoalbuminemia, and hypoglobulinemia at the start of the experiment. However, the levels of creatinine and urea were found to be within the normal range. These findings suggested that the animals' diet had been imbalanced for some time before the experiment commenced. As a result, dietary adjustments were made before proceeding with the study to ensure an accurate evaluation of the effects of non-hormonal correction [22].

By the conclusion of the experiment, significant changes in albumin, protein, and globulin levels were observed in both groups. While total protein levels normalized in both groups, the experimental group exhibited a 21.24% greater increase in protein compared to the control group. Specifically, total protein concentration reached 43.59 g/l in the test group and 54.18 g/l in the control group. These variations were closely linked to an increase in creatinine and urea levels, suggesting a more efficient recovery process in the test group following dietary correction [23].

Albumin levels showed contrasting trends between the groups. In the test group, albumin increased by 17%, whereas in the control group, it declined by 5.8%. Despite these differences, finely dispersed proteins—primarily albumins—comprised approximately 50% of the total protein in both groups by the end of the test, indicating favorable tissue hydrophilicity. Additionally, an increase in globulin levels was recorded, reflecting an enhanced specific humoral immune response [24]. However, the experimental group demonstrated a 31% lower increase in globulin levels compared to the control group. This discrepancy suggests a reduced demand for immune globulin synthesis, likely due to the beneficial effects of essential trace elements such as E-selenium and iodine, which played a role in strengthening immunity during the experiment.

Creatinine, a metabolic byproduct of creatine phosphate breakdown in muscles, is a key marker in evaluating energy metabolism and muscle function [25].

Since creatinine production is closely tied to overall body weight, particularly muscle mass, the fluctuations in creatinine levels observed in this study likely reflect the rate of muscle recovery following the winter period when the rams were housed indoors. In the test group, creatinine levels rose by 8.77%, whereas in the control group, the increase was 6.55%. This suggests that muscle mass regeneration occurred more rapidly in the test group.

Urea serves as a key indicator of protein hydrolysis within the body [26]. At the start of the study, biochemical analyses revealed that urea concentration was higher in the test group compared to the control group, where levels were slightly below the minimum normal threshold. The elevated urea levels in the test group indicate a higher rate of protein breakdown from feed [27]. This suggests that effective hydrolysis of plant proteins into amino acids took place in the rumen, followed by protein deamination into ammonia.

By the end of the test, both groups exhibited increased urea levels, reflecting enhanced cicatricial hydrolysis of feed proteins and improved feed conversion efficiency. However, the improvement was more pronounced in the test group, where urea levels rose by 26%, compared to a 17.8% increase in the control group.

**Table 2.** Indicators of carbohydrate-lipid metabolism in rams.

Indicator	Standard	Groups	Numerical value	
			At the beginning of the experience	At the end of the experience
Glucose (mmol/l)	2.5-3.3	Test	3.13 ± 0.43	4.52 ± 1.12
		Control	3.6 ± 0.69	4.715 ± 0.55
Triglycerides (mmol/l)	0.66-0.88	Test	0.29 ± 0.16	1.59 ± 0.93
		Control	0.087 ± 0.0017	0.77 ± 0.16
Cholesterol (mmol/l)	1.1-2.3	Test	0.78 ± 0.113	1.91 ± 0.07
		Control	0.28 ± 0.103	2.05 ± 0.27

Carbohydrate metabolism was assessed by monitoring changes in blood serum glucose levels. At the outset of the study, glucose concentrations fell within the normal range, though in the control group, they were a little above the upper threshold of normal. Throughout the experiment, glucose levels increased in both groups, but the rise in the test group was 13% greater than in the control group.

In terms of lipid metabolism, triglyceride levels—one of its key indicators—were initially below the lower normal limit in both groups [28]. This was likely due to an imbalanced winter diet. Once the diet was adjusted during the study, triglyceride levels returned to physiological norms. However, in the test group, the level of triglycerides

after recovery was 1.6 times less than in the control group. Triglycerides are not only obtained through diet but are also synthesized in the liver from carbohydrates. Since glucose levels were higher in the test group, this lower triglyceride level suggests a reduced conversion of glucose into triglycerides. This pattern indicates that the animals in the test group underwent a faster recovery by the end of the test.

Further supporting this, cholesterol levels—an essential lipid source for cell membrane formation, including spermatozoa membranes—followed a similar trend [29]. Initially, cholesterol levels were low in both groups, but during the study, they increased significantly, reaching approximately 2 mmol/L by the end of the test in both groups [30]. However, in the test group, cholesterol restoration occurred at a rate 2.98 times lower than in the control group. This suggests that in the test group, lipids were prioritized for cell wall synthesis, while triglycerides were utilized for other metabolic functions. Notably, all physiological processes in the test group progressed more efficiently, with less strain on the immune system, as the rams prepared for the breeding season.

## Conclusion

This study explored the impact of a non-hormonal complex formulated to regulate the body's hormonal balance, using sheep as a model. For 50 consecutive days, the experimental group received a daily dose of 5 milliliters of a preparation containing iodine with amylopectin, along with intramuscular injections of 1.5 milliliters of E-selenium and 0.5 ml of a tissue preparation combined with 1 milliliter of a 0.5% novocaine solution. Upon completion of the experiment, changes in protein metabolism and carbohydrate-lipid metabolism were analyzed in the test animals. The results confirmed that the administered non-hormonal agents had no negative effects and facilitated a more efficient physiological recovery process.

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**Ethics Statement:** None

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