
ANIMAL HUSBANDRY

DOI: <https://doi.org/10.23649/jae.2022.27.7.002>

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Received: 20.09.2022; Accepted: 24.10.2022; Published: 18.11.2022

INDICATORS OF BIOCHEMICAL BLOOD PARAMETERS OF MINKS (*MUSTELA VISON*) WITH SHED KEEPING IN THE TVER REGION CLIMATE

Research article

Abstract

Laboratory blood tests are a convenient and reliable way to assess organ function and metabolic characteristics. Biochemical research is an extensive section of laboratory research, including the determination of the content of various organic and non-organic substances forming during biochemical reactions, as well as the measurement of enzyme activity in serum, plasma, blood, urine, cerebrospinal fluid and other biological fluids. The main purpose of the study is to conduct a biochemical analysis of blood in minks in order to search for possible pathologies. A biochemical analysis of venous blood of 200 minks was performed. As a result of a clinical study of mink blood, no significant pathological changes were revealed. The data obtained make it possible to refer the examined animals to the category of "clinically healthy" for further studies.

Keywords: blood test, biochemical test, mink, hematology.

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Получена: 20.09.2022; Доработана: 24.10.2022; Опубликована: 18.11.2022

ПОКАЗАТЕЛИ БИОХИМИЧЕСКИХ ПАРАМЕТРОВ КРОВИ НОРОК (*MUSTELA VISON*) ПРИ ШЕДОВОМ СОДЕРЖАНИИ В ПРИРОДНО- КЛИМАТИЧЕСКИХ УСЛОВИЯХ ТВЕРСКОЙ ОБЛАСТИ

Научная статья

Аннотация

Лабораторные исследования крови являются удобным и надежным способом оценки функции органов и особенностей метаболизма. Биохимические исследования – обширный раздел лабораторных исследований, включающий определение содержания различных органических и неорганических веществ, образующихся в результате биохимических реакций, а также измерение активности ферментов в сыворотке, плазме, крови, моче, ликворе и других биологических жидкостях. Основная цель исследования - произвести исследование биохимического анализа крови у норок с целью скрининга возможных патологий. Был произведен биохимический анализ венозной крови 200 норок. В результате клинического исследования крови норок значительных патологических изменений выявлено не было. Полученные данные позволяют отнести вышеуказанных животных к категории «клинически здоровых» для проведения дальнейших поисковых исследований.

Ключевые слова: анализ крови, биохимический тест, норки, гематология.

1. Introduction

Biochemistry is a fundamental science that studies the chemical composition and properties of substances that make up living systems, their interconversions in the metabolic process, as well as the role of metabolic processes in the functioning of various organs and tissues in normal and pathological conditions. Changes in biochemical parameters can be both pathological and adaptive age (physiological) in nature.

At present, the importance of determining the physiological and biochemical status of an animal in determining the processes of development and vital activity of its organs, tissues, systems and the body as a whole is becoming more and more obvious. The physiological and biochemical status of an animal is determined by the concentrations of lipids, proteins, and other biologically active compounds in the blood, tissues, and organs that fit within a certain period.

Laboratory blood tests are a convenient and reliable way to assess organ function and metabolic characteristics. Quite often there is a need to conduct several analyzes at once, allowing you to get an overall picture of the state of health. In such a situation, the best solution is a comprehensive blood test, including all the main clinical and biochemical parameters [1], [2].

Biochemical research is an extensive section of laboratory research, including the determination of the content of various organic and non-organic substances forming during biochemical reactions, as well as the measurement of enzyme activity in serum, plasma, blood, urine, cerebrospinal fluid and other biological fluids [3], [4].

The main purpose of the study is to conduct a biochemical analysis of blood in minks in order to search for possible pathologies.

2. Methods

As part of the scientific research work, venous blood was taken from experimental animals (minks, females - 100 heads, males - 100 heads, age - 1 year) in the fur farm "Mermeriny" (Tver region, Kalinin district, Mermeriny village). The main selection criterion is the absence of clinical manifestations of liver pathologies [5].

Blood sampling was carried out according to the rules of asepsis and antiseptics by cutting the tip of the tail into vacuum test tubes for biochemical studies "Improvacuter" with a coagulation activator [6].

Analysis of biochemical parameters was carried out on a DIRUI CS-300B automatic biochemical analyzer, which is an open reagent system consisting of an operating system with specially developed software, an optical part, a system of mechanisms, a liquid system, and an accurate electronic system. The instrument automatically performs sampling and reagent, mixing in the reaction liquid, measurement, washing, calculation, and displays the result on the screen or print.

Replacing manual work with automatic test execution allows not only increasing work efficiency, but also reduces errors in test execution, thereby increasing the accuracy of the results. The analyzer performs various clinical tests for enzymes, sugars, proteins, lipids, immunoglobulins and other tests. Using its capabilities, the following indicators were determined: AST, ALT, urea, creatinine, glucose, cholesterol, triglycerides, high and low density lipoproteins [7], [8].

Total protein was determined by the biuret method (based on a color reaction with copper sulfate (LenReaktiv, Russia) in an alkaline medium), albumins - by the colorimetric method using bromocresol green (LenReaktiv, Russia), total bilirubin - by the colorimetric diazomethod (according to Yendrashik-Cleggorn-Grof with sodium nitrate (JSC "LenReaktiv", Russia)), the de Ritis coefficient was calculated as the ratio of the activity of serum aspartate aminotransferase and alanine aminotransferase. Glucose was determined by the standard glucose oxidant method (manufacturer of glucose oxidase - LLC "BioPreparat", Russia), cholesterol - by the method of Ilka (manufacturer of the reagent Ilka - JSC "LenReaktiv", Russia).

Statistical research methods were not used due to the exploratory nature of the studies and the lack of control groups [9], [10].

3. Results

Model biochemical parameters are presented in Table 1. The lack of reliability calculation is due to the exploratory nature of the study and the absence of control groups.

Table 1 – Results of biochemical analysis of the blood of mink males and females

Parameters	Males, n=100	Female, n=100	References
Total protein, g/l	76,68 ± 2,14	80,09 ± 1,02	50-81
Albumins, g/l	34,75 ± 0,71	33,32 ± 0,56	20,0-50,0
De Ritis ratio, ACT/ALT	0,92	0,86	0,85-1,75
Alkaline Phosphatase, IU/L	66,45 ± 2,31	76,88 ± 4,12	25,58-147,69
Glucose, mmol/l	2,87 ± 0,11	2,99 ± 0,17	6,5-12,1
Cholesterol, mmol/l	5,9 ± 0,1	6,94 ± 0,23	3,7-7,02
Bilirubin total, µmol/l	5,09 ± 0,32	5,37 ± 0,43	3,42-26,06

In the course of the study, we revealed the absence of statistically significant differences between the main biochemical parameters of blood in females and males. The ratio of the activity of serum AST (aspartate aminotransferase) and ALT (alanine aminotransferase) (de Ritis coefficient) is within the reference (confidence) intervals, which indicates the absence of any pathological processes of various etiologies in hepatocytes. The total bilirubin in this study refers to the sum of the intermediate products of hemoglobin metabolism contained in the blood serum: indirect and direct bilirubin. A blood test for total bilirubin is included in the list of basic biochemical tests and serves as an important marker for assessing liver function. As can be seen from the presented table, the state of protein, fat, carbohydrate and pigment metabolism, which are indicators of the functional state of the liver, can be characterized as a variant of the physiological norm, since the indicators did not go beyond the confidence intervals. The conclusion of the biochemical blood test we conducted did not allow us to detect metabolic disorders and pathologies in the functioning of various organ systems.

In the animals we studied, it can be noted that the total blood serum protein passes along the upper limit of the reference values, while not going beyond its borders. Taking into account other clinical and biochemical data, this condition was assessed as mild hyperproteinemia associated with a decrease in fluid intake due to the season of the year (winter period) and temperature and humidity conditions.

Also, paying attention to the level of glucose in the blood serum, hypoglycemia can be noted, which, based on other clinical and biochemical indicators (primarily the absence of vegetative and neuroglycopenic clinical manifestations), can also be explained by hypohydria.

Thus, the results of a biochemical analysis of the blood of animals reflect the functional state of various organs and systems, give an idea of the state of metabolism.

4. Conclusion

Biochemical analysis occupies an important place in assessing the functional state of the body, the work of internal organs (especially the liver, pancreas, kidneys), protein, fat and carbohydrate metabolism.

Biochemical analysis of blood is one of the most important integral predictor indicators, which, if used correctly, can contribute to adequate monitoring of the health of animals. Biochemical analysis of blood may include various parameters in order to determine the metabolic status of the studied animal. All laboratory tests within the framework of biochemical screening are carried out for the purpose of primary diagnosis of metabolic disorders, and various organs and organ systems. All ongoing biochemical studies must be highly sensitive and specific, which will determine the final result.

As a result of a clinical study of mink blood, no significant pathological changes were revealed.

Changes in some indicators compared to the reference values do not indicate pathological processes and are probably associated with the nature of feeding and water consumption, are reversible.

The data obtained make it possible to refer the above animals to the category of "clinically healthy" for further exploratory studies. Thus, the results of the conducted studies can be used in the future for the biochemical diagnosis of systemic metabolic changes during various manipulations.

Funding

This work was supported by the Russian Science Foundation (Project No. 22-26-00158).

Финансирование

Работа выполнена при поддержке Российского научного фонда (проект № 22-26-00158).

Conflict of Interest

None declared.

Конфликт интересов

Не указан.

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