Eurasia Specialized Veterinary Publication

International Journal of Veterinary Research and Allied Sciences

ISSN:3062-357X

2023, Volume 3, Issue 2, Page No: 14-19

Available online at: www.esvpub.com/

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

Cristina Mennitti[1], Gabriele Farina[2], Antonio Imperatore[1], Giulia De Fonzo[1], Alessandro Gentile[1], Evelina La Civita[3], Gianluigi Carbone[3], Rosa Redenta De Simone[1,4], Maria Rosaria Di Iorio[4], Nadia Tinto[1,4], Giulia Frisso[1,4], Valeria D'Argenio[4,5], Barbara Lombardo[1,4], Daniela Terracciano[3], Clara Crescioli[2*],Olga Scudiero[1,4,6]

[1]Department of Molecular Medicine and Medical Biotechnologies, Federico II University, Via Sergio Pansini 5, 80131 Napoli, Italy.
[2]Department of Human Exercise and Health Sciences, University of Rome "Foro Italico" Piazza L. de Bosis 6, 00135 Rome, Italy.
[3]Department of Translational Medical Sciences, University of Naples Federico II, 80138 Naples, Italy.
[4]CEINGE-Biotecnologie Avanzate Franco Salvatore, Via G. Salvatore 486, 80145 Napoli, Italy.
[5]Department of Human Sciences and Quality of Life Promotion, San Raffaele Open University, 00166 Rome, Italy.
[6]Task Force on Microbiome Studies, University of Naples Federico II, 80100 Naples, Italy.

***E-mail** ✉ clara.crescioli@uniroma4.it

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

Received: 06 June 2023
Revised: 08 September 2023
Accepted: 10 September 2023

How to Cite This Article: Mennitti C, Farina G, Imperatore A, De Fonzo G, Gentile A, La Civita E, et al. Modulation of Hormonal Homeostasis and Blood Biochemical Markers by Non-Hormonal Drugs. Int J Vet Res Allied Sci. 2023;3(2):14-19. https://doi.org/10.51847/NKfo8NgwNv

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 amylodextrin, 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 amylodextrin, 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.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

References

1. Nobandegani AS, Motamedifar M. Antibiotic sensitivity profile of the bacterial isolates from the blood samples of the patients in different wards of a major referral hospital, Shiraz, Iran 2015-2016. Pharmacophore. 2019;10(2):30-6.
2. Van Ta T, Nguyen HB, Tran HT. Evaluating the association of red blood cell parameters and glycemic control in type 2 diabetic patients at Tien Giang general hospital. Arch Pharma Pract. 2019;10(4):153-9.
3. Yusransyah, Halimah E, Suwantika AA. Effect of pharmacist counseling on adherence and blood pressure of hypertensive Prolanis patients in sixteen primary healthcare centers. J Adv Pharm Educ Res. 2020;10(4):8-14.
4. Murrant CL, Fletcher NM. Capillary communication: the role of capillaries in sensing the tissue environment, coordinating the microvascular, and controlling blood flow. Am J Physiol Heart Circ Physiol. 2022;323(5):H1019-36. doi:10.1152/ajpheart.00088.2022
5. Mračková J, Růžičková T, Ševčík P, Karlíková M, Mraček J, Polívka J. Role of blood biomarkers in spontaneous intracerebral hemorrhage - a prospectively studied cohort of patients. Cas Lek Cesk. 2020;159(5):185-91.
6. Jørgensen HL, Lind BS. Blood tests - too much of a good thing. Scand J Prim Health Care. 2022;40(2):165-6. doi:10.1080/02813432.2022.2104436
7. Racaru-Honciuc V, Betea D, Scheen AJ. Hormonal deficiencies in the elderly: is there a role for replacement therapy? Rev Med Suisse. 2014;10(439):1555-6, 1558-61. [In French].
8. Orsaeva AT, Tamrieva LA, Mischvelov AE, Osadchiy SS, Osipchuk GV, Povetkin SN, et al. Digital clinic "smart ward. Pharmacophore. 2020;11(1):142-6.

9. Raevskaya AI, Belyalova AA, Shevchenko PP, Karpov SM, Mishvelov AE, Simonov AN, et al. Cognitive impairments in a range of somatic diseases diagnostics, modern approach to therapy. Pharmacophore. 2020;11(1):136-41.
10. Osipchuk GV, Povetkin SN, Simonov AN, Verevkina MN, Karatunov VA, Yakovets MG. On the issue of non-hormonal stimulation of the reproductive function of rams. Pharmacophore. 2020;11(2):73-6.
11. Ziruk IV, Egunova AV, Kopchekchi ME, Frolov VV, Babina KI, Povetkin SN, et al. Morphometric of pig livers under different doses of minerals in feed allowance. Int Trans J Eng, Manag, Appl Sci Technol. 2020;11(14):11A14L, 1-10. doi:10.14456/ITJEMAST.2020.277
12. Maslova AY, Tskaeva AA, Ashurova ZA, Abazova A, Ismailov MM, Ismailova MM, et al. Study of the effect of baricitinib on the course of COVID-19. J Pharm Res Int. 2021;33(35A):204-13.
13. Bertolla RP. Sperm biology and male reproductive health. Sci Rep. 2020;10(1):21879. doi:10.1038/s41598-020-78861-7
14. Yoshimura Y, Barua A. Female reproductive system, and immunology. Adv Exp Med Biol. 2017;1001:33-57. doi:10.1007/978-981-10-3975-1_3
15. Nazar FN, Magnoli AP, Dalcero AM, Marin RH. Effect of feed contamination with aflatoxin B1 and administration of exogenous corticosterone on Japanese quail biochemical and immunological parameters. Poult Sci. 2012;91(1):47-54. doi:10.3382/ps.2011-01658
16. Brinkworth GD, Noakes M, Keogh JB, Luscombe ND, Wittert GA, Clifton PM. Long-term effects of a high-protein, low-carbohydrate diet on weight control and cardiovascular risk markers in obese hyperinsulinemic subjects. Int J Obes Relat Metab Disord. 2004;28(5):661-70. doi:10.1038/sj.ijo.0802617
17. Maslova AY, Mishvelov AE, Dudusheva MJ, Blejyants GA, Minaev SV, Shchetinin EV, et al. Using a decision tree with a feedback function to select therapeutic tactics for viral infection of the respiratory tract in the medical expert system. Int Trans J Eng Manag Appl Sci Technol. 2022;13(8):13A8F, 1-10.
18. Galabueva AI, Biragova AK, Kotsoyeva GA, Borukayeva ZK, Yesiev RK, Dzgoeva ZG. Optimization of modern methods of treating chronic generalized periodontitis of mild severity. Pharmacophore. 2020;11(1):47-51.
19. Blinov AV, Nagdalian AA, Povetkin SN, Gvozdenko AA, Verevkina MN, Rzhepakovsky IV, et al. Surface-oxidized polymer-stabilized silver nanoparticles as a covering component of suture materials. Micromachines. 2022;13(7):1105. doi:10.3390/mi13071105
20. Cheprasova AA, Popov SS, Pashkov AN, Verevkin AN, Krylâ ED, Mittova VO. Oxidative status, carbohydrate, and lipid metabolism indicators in saliva and blood serum of type 1 diabetes mellitus patients. Biomed Res Ther. 2022;9(8):5233-40. doi:10.15419/bmrat.v9i8.761
21. Chen W, Chen G. The roles of vitamin A in the regulation of carbohydrate, lipid, and protein metabolism. J Clin Med. 2014;3(2):453-79. doi:10.3390/jcm3020453
22. Bachinina KN, Povetkin SN, Simonov AN, Pushkin SV, Blinova AA, Sukhanova ED, et al. Effects of selenium preparation on morphological and biochemical parameters of quail meat. Int Trans J Eng Manag Appl Sci Technol. 2021;12(13):1-7.
23. Ilyasov KK, Demchenkov EL, Chernyshkov AS, Rodin IA, Pushkin SV, Povetkin SN, et al. Features of the phytopharmacological preparations in the metaphylaxis of urolithiasis. Pharmacophore. 2020;11(5):66-71.
24. Bartsch YC, Fischinger S, Siddiqui SM, Chen Z, Yu J, Gebre M, et al. Discrete SARS-CoV-2 antibody titers track with functional humoral stability. Nat Commun. 2021;12(1):1018. doi:10.1038/s41467-021-21336-8
25. Pandhi P, Streng KW, Anker SD, Cleland JG, Damman K, Dickstein K, et al. The value of spot urinary creatinine as a marker of muscle wasting in patients with new-onset or worsening heart failure. J Cachexia Sarcopenia Muscle. 2021;12(3):555-67. doi:10.1002/jcsm.12690
26. Vitolo M. Notes on urea hydrolysis by urease. World J Pharm Pharm Sci. 2022;11(3):96-135. doi:10.20959/wjpps20223-21380
27. Liu M, Li M, Liu J, Wang H, Zhong D, Zhou H, et al. Elevated urinary urea by high-protein diet could be one of the inducements of bladder disorders. J Transl Med. 2016;14:1-7. doi:10.1186/s12967-016-0809-9
28. Dzhabrailova US, Vagabov VM, Akhaeva ZN, Kasimova ZZ, Kolesnikov SP, Bondarenko NG. Characterization of physico-chemical parameters and toxicological properties of Neocytin. Pharmacophore. 2022;13(5):44-50. doi:10.51847/igW0BabCma

29. Bernabò N, Machado-Simoes J, Valbonetti L, Ramal-Sanchez M, Capacchietti G, Fontana A, et al. Graphene oxide increases mammalian spermatozoa fertilizing ability by extracting cholesterol from their membranes and promoting capacitation. Sci Rep. 2019;9(1):8155. doi:10.1038/s41598-019-44702-5
30. Tanigawa K, Luo Y, Kawashima A, Kiriya M, Nakamura Y, Karasawa K, et al. Essential roles of PPARs in lipid metabolism during mycobacterial infection. Int J Mol Sci. 2021;22(14):7597. doi:10.3390/ijms22147597