



CHANGES IN IMMUNE INDICATORS AND FORMATION OF ADAPTATION CAPABILITIES OF ATHLETES' BODY

Alieva D.A.¹, Sadikov A.A.²

¹Samarkand State Medical University

²National Anti-Doping Agency of Uzbekistan

Article DOI: <https://doi.org/10.36713/epra13865>

DOI No: 10.36713/epra13865

SUMMARY

A comparative analysis and experimental study of the possibility of using immunological indicators to determine the activation of adaptation processes was carried out. Preliminary studies show the presence of a close relationship between the ongoing biochemical and immunological processes, which makes it possible to use them as predictors in assessing the adaptive capabilities of the body in athletes involved in various sports.

KEYWORDS: *immunological parameters, adaptation, athletes, antibodies, endogenous bioregulators.*

The study of the specific mechanisms of adaptation of the body under the influence of various extreme factors, including physical, mental, social, is an urgent task that requires a comprehensive scientific study. Even the most general knowledge about the patterns of adaptive processes of the body have strategic importance for understanding the biological essence of this phenomenon, substantiating the theory and methodology of adaptive physical culture [3,6]. For a professional athlete, adaptation is determined by the need for his body to adapt to physical loads in a relatively short period of time [1,4,5].

Achievements in sports and conquering the heights of Olympus are the result of persistent, sometimes exhausting training, requiring the athlete, his body to turn on adaptive adaptation mechanisms. Increased demands on the systems of the body are due to ever-increasing physical activity over a short period of time [2,7,8,9]. The development of adaptive mechanisms determines the further physical performance, the general condition of the athlete and his success.

The formation of the adaptive mechanisms of the athlete's body is due to an increase in the functional activity of biochemical processes - endogenous bioregulators (EB). Emerging excessive loads, increased physical activity lead to active metabolic rearrangements, with changes in the levels of endogenous mediators related to various humoral regulatory systems [8,11,12].

As literature sources show [10,12], the levels of concentration and functional activity of endogenous bioregulators during the formation of adaptive mechanisms can be determined by changes in immunological parameters, which include natural antibodies (AT), which serve as early markers of emerging maladaptive processes in the body. The study of the dynamics of the level of change in these indicators makes it possible to assess the processes of recovery after exercise, with subsequent recommendations on the normalization of training processes that determine the prognosis and further success of athletes' achievements.

The goal is to determine the level of antibodies as endogenous bioregulators involved in maintaining body homeostasis in athletes, to study the diagnostic significance of immunological parameters as markers for predicting the formation of adaptive mechanisms.

MATERIALS AND METHODS OF RESEARCH

A study was made of blood serum samples obtained from athletes: 18 judokas and 15 football players aged 16-18, who have been involved in sections for no more than 4 years. Blood serum sampling was carried out before the sports load and after it. The control group included healthy volunteers who do not go in for sports professionally, but are equal in age (n=18). Stress testing was carried out on a bicycle ergometer with an increasing load of 50 W up to a pulse of 170 beats/min, followed by ELISA to determine the level of antibodies to endogenous bioregulators in the blood serum, with statistical processing of the results obtained.



RESEARCH RESULTS

The level of antibodies to serotonin, histamine, dopamine, glutamate, GABA, angiotensin in the blood serum of athletes involved in judo and football was studied. The data of endogenous bioregulators have been studied due to the fact that they ensure the maintenance of homeostasis in the body of athletes and determine the development of adaptive mechanisms resulting from increased physical activity (Table 1).

Table 1
Changes in the levels of antibodies to the main mediators of endogenous bioregulators

| Antibodies | Antibody values | | | | |
|-------------|------------------|-------------------|-------------------|-------------------|-------------------|
| | Control (n =18) | Football (n =15) | | Judo (n =18) | |
| | | at rest | under load | at rest | under load |
| serotonin | 0.78±0.05 | 0.97±0.387 | 0.87±0.26 | 0.78±0.05 | 0.80±0.14 |
| histamine | 0.76±0.13 | 0.87±0.25 | 0.83±0.18 | 0.68±0.10* | 0.70±0.12 |
| dopamine | 0.71±0.05 | 0.78±0.16 | 0.88±0.15 | 0.67±0.11 | 0.69±0.10 |
| glutamate | 0.78±0.18 | 1.18±0.28* | 1.06±0.22* | 0.97±0.13* | 1.07±0.18* |
| GABA | 0.74±0.10 | 0.98±0.20 | 0.99±0.20* | 1.08±0.21* | 1.09±0.25* |
| angiotensin | 0.67±0.18 | 0.83±0.21 | 0.77±0.16 | 0.98±0.16* | 1.07±0.20* |

* $p < 0.05 =$ relative to control

As can be seen from the results obtained, for athletes involved in football, in comparison with the control group, an increase in the level of antibodies to glutamate before exercise was found. Other indicators practically remained within the normal range. The use of a stress test led to an increase in the content of antibodies to GABA, while maintaining an elevated level of antibodies to glutamate. In the group of athletes involved in judo, in contrast to football players, the levels of antibodies were increased to histamine, glutamate and GABA, which increased after exercise.

Apparently, the determination of antibodies to GABA and glutamate has a diagnostic value, because these endogenous bioregulators cause and determine the reactions of inhibition and excitation in the nervous system. In the groups of studied athletes, their synchronous increase in both antibodies to glutamate and GABA was noted, which indicates the activation of processes in the central nervous system, which are the result of the intensification of physical activity.

Changes in the level of antibodies to histamine in the group of judokas may be associated with the occurrence of post-training hypotension with increasing loads, and the activation of histamine causes a change in glucose delivery to the muscles.

CONCLUSION

Conducted preliminary studies among athletes involved in football, judo show the need to determine their immunological parameters - antibodies to endogenous bioregulators, which are markers of the activation of adaptive processes that occur in response to an increasing volume of physical activity, ensuring the maintenance of homeostasis in the body. The results of the study can be of practical use, because the study of antibodies to endogenous bioregulators can later become a diagnostic test that will allow to identify early biochemical disorders that occur as a response to increasing physical activity and the development of adaptive mechanisms for the sports and training process, which requires further research among athletes involved in various sports.

LITERATURE

- Vinnichuk Yu. D., Gunina L. M. Predictors and markers of the functional state of athletes during training in the middle mountains // *Health for everyone*. 2014. no. 2.
- Spassky A. A. et al. Methodology for a comprehensive assessment of the athlete's adaptive potential to the load // *Sports medicine: science and practice*. 2020. Vol. 9. No. 3. S. 49-61.
- Sashenkov S. L. et al. Features of the parameters of the immune system depending on the sport // *Russian Journal of Immunology*. – 2017. Vol. 11. No. 2. S. 221-223.
- Marinich T. V., Marinich V. V. Personalized approach to assessing the physiological status of young athletes. – 2013.
- Kirillova N.P., Mezentsev V.V., Kirillov S.V. The study of the immune status of athletes during influenza vaccination // *Uchenye zapiski universiteta im. P.F. Lesgafta*, No. 5 (123), 2015, pp. 91-93.
- Sternin Yu.I., Sizyakina L.P. Immunological aspects of sports activities // *Bulletin of sports science*, No. 2, 2007, pp. 16-20.
- Golokova V.S., Golderova A.S., Nikolaeva I.N. and others. The state of immunity in young combatants of the Republic of Sakha (Yakutia) // *Acta biomedica Scientifica*, No. 5, 2010, pp. 157-159.
- Petrushkina N.P., Simonova N.A., Bykov E.V., Kolomiets O.I. Immunology of sports (literature review) // *Zh. Scientific and sports bulletin of the Urals and Siberia* No. 3 (23) Year: 2019, pp. 21-37
- Kamilova R. T. et al. Sports engagement and the level of physical activity of students // *Sports medicine: science and practice*. - 2017. - T. 7. - No. 3. - S. 86-91.



10. Tolstoy O.A. *Dysfunction of the immune system and its correction during intense physical exertion (experimental clinical study)*. Diss *Candidate of Medical Sciences* . St. Petersburg, 2020, pp. 33-40.
11. Khudoykulova F. V. et al. *THE STRUCTURE, AGE FEATURES, AND FUNCTIONS OF HORMONES //PEDAGOG.* - 2023. - T. 6. - no. 1. - S. 681-688.
12. Kamilova R. T. et al. *The influence of systematic sports on the physical development of young athletes in the Khorezm region // Bukovinsky medical bulletin* . - 2016. - T. 20. - No. 1 (77). - S. 34-37.
13. Lee EC, Fragala MS, Kavouras SA et al. *Biomarkers in sports and exercise: tracking health, performance, and recovery in athletes // J. Strength Cond Res.* 2017;31(10):2920-37
14. Maddock RJ, Casazza GA, Fernandez DH, et al. *Acute modulation of cortical glutamate and GABA content by physical activity // J. Neurosci* . 2016;36(8):2449-57
15. Kamilova R. T. et al. *Evaluation of the influence of systematic training by various groups of sports on the harmony of the physical development of the organism of young athletes of Uzbekistan // Sports medicine: science and practice.* - 2017. - T. 7. - No. 1. - S. 86-91.
16. Mavlyanova Z. et al. *The role of nutrition and drinking regimen in the preparation of young athletes training in hot climates.* – 2021.