ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Functional Parameters Of Platelets In Young Men Practicing In The Football Section.

Medvedev IN*.

Russian State Social University, st. V. Pika, 4, Moscow, Russia, 129226.

ABSTRACT

In modern biological science, more and more information appears on the close relationship between the level of human physiological development and the degree of activity of platelet hemostasis. It becomes obvious that the normal morphofunctional state of the body is largely determined by the rheological properties of blood, which are closely related to the level of platelet activity. Physical activity can affect platelet function. Of particular interest are the features of their influence in healthy young people who regularly exercise physically in the football section. The physical training in the football section of young people aged 18-22 years revealed the stability of the functional activity of platelets. During this age, platelet aggregation in them was at a low level, without experiencing significant fluctuations, which is apparently due to the constancy of their sensitivity to exogenous influences. The optimally low platelet activity causes a small amount of circulating aggregates of various sizes in their bloodstream, which has a positive effect on tissue microcirculation in the body of a young person who is physically trained in the football section. This provides a physiological level of the number of circulating aggregates of various sizes and optimal rheological properties of their blood in the capillaries, regardless of the level and nature of environmental influences on the body.
Keywords: platelets, adolescence, physical training, football section, blood rheology, microcirculatory features of platelets.

Corresponding author

ISSN: 0975-8585

INTRODUCTION

In modern biological science, more and more information appears about the close relationship between the level of human physiological development and the degree of activity of platelet hemostasis [1,2,3]. It becomes obvious that the normal morphofunctional state of the body is largely determined by the rheological properties of blood [4,5], which are closely related to the level of platelet activity [6-10]. At the same time, it is known that physical activity is capable of influencing the indicators of platelet functions [11-13].

In healthy young people regularly practicing, the activity of lipid peroxidation (LPO) in platelets, the level of their antioxidant enzymes, the degree of functional readiness of blood platelets to the influence of physiological inductors and their combinations, and the severity of platelet morphological activity in vessels have not been fully clarified. In this regard, the purpose of the present study was defined: to determine the activity of platelet functions in healthy young people who do not have bad habits and regularly train physically using the example of the football section.

MATERIAL AND METHODS

The research was approved by the Ethics Committee of Russian State Social University (record №5 from 12.05.2014).

The study group included 134 healthy young people of college age who were training in the football section at the time of taking observation for at least 1 year (26 people 18 years old, 27 people 19 years old, 28 people 20 years old, 25 people 21 years old and 28 people aged 22 years old). The level of intraplatelet LPO was determined in all patients by concentration of the basal level of malondialdehyde (MDA) in the reduction reaction of thiobarbituric acid and by the level of acyl hydroperoxides (AHP). The activity of intra-platelet antioxidant enzymes was established for catalase and superoxide dismutase.

The number of platelets in the capillary blood in the Goryaev chamber was counted. The products of platelet-induced phospholipid-coagulation activators (F3-platelets) were evaluated by the traditional method with the calculation of the platelet activity index. The duration of platelet aggregation (AP) was determined by a visual micromethod using as inducers ADP (0.5×10^{-4} M), collagen (dilution 1:2 of the main suspension), thrombin (0.125 U/ml), ristomycin (0.8 mg/ml), adrenaline (5×10^{-6} M), as well as combinations of ADP and adrenaline, ADP and collagen, adrenaline and collagen to simulate real blood flow conditions. The intravascular activity of platelets was determined visually using a phase contrast microscope. Statistical processing of the results obtained by the t-student criterion.

RESEARCH RESULTS

All young people included in the study group were under constant observation. Before evaluating hemostasis, they evaluated the main physiological parameters, carried out morphological and biochemical blood tests, which showed that the total functional and biochemical values (temperature, heart rate, respiration rate, general blood and urine tests, biochemical blood tests) were in all limits of physiological norm.

The concentration of the initially formed lipid peroxidation products of acylhydroperoxides in the platelets of healthy 18-year-old young people training in the football section was 1.92±0.12 $D_{233}/10^9$ platelets, not changing significantly by 22 years (1.93±0.10 $D_{233}/10^9$ platelets). At the same time, the content of MDA in platelets - the final product of lipid peroxidation in 18 year old football players was 0.42±0.10 nmol/10^9 platelets, unchanged until 22 years of age (0.47±0.11 nmol/10^9 platelets).

The level of activity of catalase and superoxide dismutase in the blood plates that control the activity of lipid peroxidation in them in the observed healthy young people at 18 were very high (9600.0±126.2 IU/10^9 platelets and 1750.0±15.3 IU/10^9 platelets, respectively). For older football players of student age, there were no changes in catalase and superoxide dismutase activity (at 19 years 9750.0±234.2 IU/10^9 platelets, 1720.0±18.2 IU/10^9 platelets, 20 years - 9600.0±154.1 IU/10^9 platelets, 1680.0±20.3 IU/10^9 platelets, 21 years old - 9620.0±176.1 IU/10^9 platelets, 1650.0±14.7 IU/10^9 platelets, 22 years old – 9670.0±146.1 IU/10^9 platelets, 1680.0±18.6 IU/10^9 platelets, respectively).

The level of the platelet activity index at 18 years in the examined corresponded to 20.1±0.14%, remaining at this level in the older surveyed. This proved stability in the blood plates of 18-22 year old healthy young people who regularly train in the football section, the level of labilization products of platelet phospholipids - blood clotting activators.

In 18 year old football players, the time of AP development under the influence of a collagen inducer was 34.1±0.19s, being at a similar level in the older patients as well. Low AP activity in healthy 18 flight trained young people was observed under the influence of ADP (44.8±0.16 s) and ristomycin (48.9±0.16s). Later, thrombin and adrenaline AP developed, at 58 years of age being 58.1±0.20 s and 102.9±0.12s, respectively, not changing significantly in the older patients. With the combined use of inductors, the AP people trained in the 18-year-old football section for the combination ADP + adrenaline - 36.2±0.11 s, for ADP + collagen - 26.4±0.14s, for adrenaline + collagen - 29.2± 0.09s, remaining at a similar level until the age of 22.

The content in the blood of 18 year old football players amounted to 85.2±0.16% of discocytes, not significantly different from the values in the older age groups included in the observation group. The number of disco-echinocytes, spherocytes, sphero-echinocytes and bipolar forms of platelets also remained stable in their bloodstream from 18 to 22 years. As a result, the sum of the active forms of platelets also did not undergo significant changes, averaging 14.9 ± 0.14% among the patients. In the blood of young people who are trained in the football section, the levels of free-circulating small and large platelet aggregates did not have reliable dynamics, averaging 2.7±0.15 and 0.06±0.014 per 100 free platelets, respectively. The number of platelets involved in the process of aggregation also did not change between 18 and 22 years in the examined, averaging 5.7±0.13%.

DISCUSSION

Physical development and functional activity of the human body are formed, developed and maintained by an adequate level of blood rheology, depending on a large number of environmental factors [14,15], including the presence of regular moderate physical exertion [16-20]. A serious influence on the state of microcirculation is exerted by activity in the blood circulation of blood plates, which is largely dependent on the level of lipid peroxidation in them [21,22].

It was found that in healthy young people 18–22 years of age regularly exercising physically in the football section, persistently low lipid peroxidation rates are registered against the activation of the antioxidant system of platelets, which largely determines their stable low blood platelet activity [23,24].

Young people who regularly train in the sports section for football revealed the stability of the functional activity of platelets [25], which is probably largely related to the constancy of their receptor sensitivity to exogenous influences while maintaining the number of receptors on them on the surface of blood plates [26]. The constancy of receptor activity on the membranes of the blood platelets in response to an increase in the physical activity of the organism as a whole, are the result of complex adaptive reactions in the examined, leading ultimately to the adaptation of platelet hemostasis to the prevailing conditions of functioning [27,28].

Evaluation of AP with a number of inductors and their combinations in people of college age practicing in the football section revealed the ability of platelets to aggregate at the age of 18-22 years. At the same time, AP activity under the action of strong agonists of aggregation - collagen and thrombin causes the activity of phospholipase C to be constant [29], ensuring the functioning of the phosphoinositol pathway through diacylglycerol [30] and protein kinase C [31] with phospholation of the contractile system proteins [32-34]. Inositol triphosphate released at the same time from membranes stimulates an adequate level of Ca^{2+} release from intrathrombocyte depots, providing the necessary level of actomyosin contractility [35]. It is obvious that in maintaining a low AP, the stability of the activity of thromboxane formation, which causes the low ability of blood platelets to aggregate, is of great importance [36,37].

A decrease in the response of platelets to weak aggregation inducers, ADP and adrenaline, was also noted in the surveyed youth contingent. At the same time, in view of other mechanisms for the implementation of this AT, we can speak about the dynamics of the activity of these mechanisms when playing football [38]. The level of expression of fibrinogen receptors (GPIIv-IIIa), stimulating phospholipase A_2,

regulates the release of arachidonic acid phospholipids with increased formation of thromboxane A_2 [39]. The simultaneous use of several inductors showed their mutually potentiating action, confirming the patterns found in the study of antibodies with isolated agonists [39,40].

The constancy of the level of intravascular platelet activity in young people who regularly train in the football section indicates that the physiological level of aggregation inducers (primarily thrombin, ADP, adrenaline) remains in the blood with a low constant level of platelet sensitivity to them. At the same time, in healthy football players aged 18–22 years, a high number of intact discoid platelet forms remains in the bloodstream, which also indicates an unexpressed activity of their receptors. The stability of the disco-echinocytes and other active platelet forms is undoubtedly primarily due to the constancy of the reduced expression of fibrinogen receptors on their membrane (GP IIb - IIIa).

CONCLUSION

In the period from 18 to 22 years young people practicing in the football section maintain low platelet activity, providing a low content of their active forms in the bloodstream, providing a physiological level of the number of circulating aggregates of various sizes and optimal rheological properties of their blood, regardless of the level and nature of environmental influences on the body.

REFERENCES

[1] Zavalishina SYu. (2018) Physiology Of Vascular Hemostasis In Newborn Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1037-1044.

[2] Zavalishina SYu. (2018) Functional Properties Of Anticoagulation And Fibrinolysis In Calves Of Plant Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1082-1087.

[3] Zavalishina SYu. (2018) Functional Antiaggregatory Properties Of Blood Vessels In Calves During Transition From Dairy To Plant Type Of Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1110-1116.

[4] Bikbulatova AA, Matraeva LV, Erokhin SG, Makeeva DR, Karplyuk AV. (2018) Methodical Foundations Of Carrying Out Competitions Of Professional Skill Among People With Disabilities. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 243-247.

[5] Vorobyeva NV, Mal GS, Skripleva EV, Skriplev AV, Skoblikova TV. (2018) The Combined Impact Of Amlodipin And Regular Physical Exercises On Platelet And Inflammatory Markers In Patients With Arterial Hypertension. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 1186-1192.

[6] Maksimov VI, Zavalishina SYu, Parakhnevich AV, Klimova EN, Garbart NA, Zabolotnaya AA, Kovalev YuI, Nikiforova TYu, Sizoreva EI. (2018) Physiological Dynamics Of Microrheological Characteristics Of Erythrocytes In Piglets During The Phase Of Milk Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 454-459.

[7] Bikbulatova AA, Pochinok NB, Soldatov AA, Matraeva LV, Erokhin SG. (2018) Organization Of International Competitions Of Professional Skill Among People With Disabilities. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 379-387.

[8] Maksimov VI, Zavalishina SYu, Parakhnevich AV, Klimova EN, Garbart NA, Zabolotnaya AA, Kovalev YuI, Nikiforova TYu, Sizoreva EI. (2018) Functional Activity Of The Blood Coagulation System Against The Background Of The Influence Of Krezacin And Gamavit In Newborn Piglets WhoUnderwent Acute Hypoxia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 2037-2042.

[9] Tkacheva ES, Zavalishina SYu. (2018) Physiological Aspects Of Platelet Aggregation In Piglets Of Milk Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 74-80.

[10] Tkacheva ES, Zavalishina SYu. (2018) Physiology Of Platelet Hemostasis In Piglets During The Phase Of Newborns. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1912-1918.

[11] Skorjatina IA (2018) Therapeutic Possibilities Of Rosuvastatin In The Medical Complex In Relation To Disaggregation Vascular Control Over Erythrocytes In Persons With Arterial Hypertension And Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 977-983.

[12] Apanasyuk LA, Soldatov AA. (2017) Socio-Psychological Conditions for Optimizing Intercultural Interaction in the Educational Space of the University. Scientific Notes of Russian State Social University. 16(5-144) : 143-150. doi: 10.17922/2071-5323- 2017-16-5-143-150.

[13] Bikbulatova AA, Andreeva EG. (2018) Achievement of psychological comfort in 5-6-Year-Old children with scoliosis against the background of daily medicinal-prophylactic clothes' wearing for half a year. Bali Medical Journal. 7(3): 706-711. DOI:10.15562/bmj.v7i3.947.

[14] Bikbulatova AA, Andreeva EG. (2018) Restoration Of The Profile Of Bioregulators Of Blood Plasma In People Of Second Adulthood With Osteochondrosis Of The Spine Against The Background Of Daily Wearing Of Medical And Preventive Clothing. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 413-419.

[15] Pozdnyakova ML, Soldatov AA. (2017) The Essential and Forms of the Approaches to Control the Documents Execution. Contemporary problems of social work. 3 (1-9): 39-46. doi: 10.17922/2412-5466-2017-3-1-39-46.

[16] Bikbulatova AA, Karplyuk AA, Parshin GN, Dzhafar-Zade DA, Serebryakov AG. (2018) Technique for Measuring Vocational Interests and Inclinations in High-School Students with Disabilities. Psikhologicheskaya nauka i obrazovanie-psychological science and education. 23(2) : 50-58.doi: 10.17759/pse.2018230206.

[17] Makhova AV. (2018) Physiology Of The Hypothalamus In The Human Body. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 478-484.

[18] Zavalishina SYu. (2018) Functional Properties Of Coagulation Hemostasis In Calves During The Phase Of Dairy-Vegetative Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 784-790.

[19] Zavalishina SYu. (2018) Functioning Of Mechanisms Of Hemocoagulation Restriction In Calves At Change Of Methods Of Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 800-806.

[20] Zavalishina SYu. (2018) Functional Activity Of Anticoagulant System In Calves During Early Ontogeny. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 837-843.

[21] Zavalishina SYu. (2018) Functional Properties Of Fibrinolysis In Calves Of The First Year Of Life. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 870-876.

[22] Zavalishina SYu. (2018) Physiological Features Of Coagulation In Calves Of Plant Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 899-904.

[23] Zavalishina SYu. (2018) Functional Activity Of Thrombocytes In Newborn Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 919-924.

[24] Zavalishina SYu. (2018) Functioning Of Platelets In Milk And Vegetable Nutrition Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 943-949.

[25] Zavalishina SYu. (2018) Deficiency Of Iron As A Cause Of Dysfunction In Calves And Piglets. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 978-983.

[26] Zavalishina SYu. (2018) Functional Properties Of Hemocoagulation In Calves Of Dairy Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) :1016-1022.

[27] Zavalishina SYu. (2018) Physiological Features Of Vascular Hemostasis In Calves Of Dairy-Vegetative Food. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1137-1143.

[28] Zavalishina SYu. (2018) Functional Features Of Platelets In Newborn Calves With Iron Deficiency. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1153-1158.

[29] Zavalishina SYu. (2018) Functional Activity Of Plasma Hemostasis In Neonatal Calves With Iron Deficiency, Who Received Ferroglucin And Glycopin. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1186-1191.

[30] Tkacheva ES, Zavalishina SYu. (2018) Physiological Features Of Platelet Aggregation In Newborn Piglets. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 36-42.

[31] Bikbulatova AA, Pochinok NB, Matraeva LV, Erokhin SG, Makeeva DR, Karplyuk AV.(2018) Formation Of International Practice Of Holding Competitions Of Professional Skills Among Professionals With Disabilities. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 296-302.

[32] Bikbulatova AA, Pochinok NB, Matraeva LV, Erokhin SG, Makeeva DR, Karplyuk AV. (2018) The Russian Historical Aspect Of The Development Of The International Federation Of Abilimpix. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) :329-335.

[33] Skoryatina IA, Zavalishina SYu. (2017) Ability to aggregation of basic regular blood elements of patients with hypertension anddyslipidemia receiving non-medication andsimvastatin. Bali Medical Journal. 6(3):514-520. DOI:10.15562/bmj.v6i3.553.

[34] Bikbulatova AA. (2018) Peculiarities of abnormalities of locomotor apparatus of children at preschool age with scoliosis of I-II degree living in Central Russia. Bali Medical Journal. 7(3): 693-697. DOI:10.15562/bmj.v7i3.738.
[35] Bespalov DV, Kharitonov EL, Zavalishina SYu, Mal GS, Makurina ON. (2018) Physiological Basis For The Distribution Of Functions In The Cerebral Cortex. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5): 605-612.
[36] Bikbulatova AA. (2018) Bioregulatory Effects Of The Daily Wearing Of Medical And Preventive Pants On The Body Of Pregnant Women Suffering From Habitual Miscarriages Of The Fetus. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 889-896.
[37] Bikbulatova AA, Karplyuk AV. (2018) Professional And Labor Orientation Of Persons With Disabilities In The Resource Educational And Methodological Center Of The Russian State Social University. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 1648-1655.
[38] Maloletko AN, Yudina TN.(2017) (Un)Making Europe: Capitalism, Solidarities, Subjectivities. Contemporary problems of social work. 3 (3-11) : 4-5.
[39] Glagoleva TI, Zavalishina SYu, Mal GS, Makurina ON, Skorjatina IA. (2018) Physiological Features Of Hemo-coagulation In Sows During Sucking. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4):29-33.
[40] Zavalishina SYu, Makurina ON, Vorobyeva NV, Mal GS, Glagoleva TI. (2018) Physiological Features Of Surface Properties Of The Erythrocyte Membrane In Newborn Piglets. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4):34-38.