ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Physiological State Of Intravascular Platelet Activity In Young Men Who Had High Normal Blood Pressure, Overweight Or A Combination Of Them And Started Regular Exercise.

Medvedev IN*.

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

ABSTRACT

In developed countries, a high prevalence of metabolic syndrome and its main elements - arterial hypertension and abdominal obesity. They manifest at a young age and negatively affect the working ability of the population. Among the early predictors of these diseases are high normal blood pressure, overweight, and their combination. Prove that arterial hypertension, abdominal obesity and metabolic syndrome cause platelet activation, which is the basis for the development of subsequent intravascular thrombosis. However, despite the high scientific and practical significance of the problem of thrombocytopathy formation in adolescents with high normal blood pressure and / or overweight, threatened by the onset of arterial hypertension, abdominal obesity or metabolic syndrome, the intravascular activity of platelets and approaches to its correction identified very insufficiently. Surveyed 95 people 18 years of age with high normal blood pressure and / or overweight. All surveyed were prescribed regular dosed physical training according to the scheme developed by the authors. Their use in the examined normalized their cardiovascular reactivity, body weight, blood pressure level and lipid peroxidation. The use of rational physical exertion for 12 months. fully optimized the increased intravascular activity of platelets, consolidating the achieved results with continued training. It becomes clear that prolonged physical exertion reinforces the achieved optimization of the indicators taken into account in adolescents with high normal blood pressure and / or overweight, helping to reduce their risk of arterial hypertension, abdominal obesity and metabolic syndrome and prevent the possible increase in the future of vascular thrombocyte activity and risk of thrombosis.

Keywords: blood pressure, overweight, exercise, intravascular platelet activity, adolescence, health.

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Despite the success of modern medical science in developed countries, the prevalence of metabolic syndrome (MS) [1-3] and its main elements - arterial hypertension (AH) [4,5] and abdominal obesity (AO) [6,7] tend to increase , manifesting already at a fairly young age and adversely affecting the working capacity of the working population [8-10]. Early predictors of these diseases include high normal blood pressure [11], overweight [12], and a combination thereof [13]. Numerous studies have allowed to prove that hypertension, AO and MS cause platelet activation [14,15], which is the basis for the development of subsequent intravascular thrombus formation [16,17]. However, despite the high scientific and practical significance of the problem of thrombocytopathy formation in adolescents with high normal blood pressure and / or overweight, threatened by the occurrence of hypertension, AO or MS, the intravascular activity of platelets and the approaches to its correction are determined very not enough. In previous studies on the correction of manifestations of thrombocytopathy in arterial hypertension and varying severity of overweight, a sufficiently high efficiency of regular static and dynamic exercise has been shown [18,19]. However, the possibility of using them for the functional activity of platelets in adolescents with high normal blood pressure and overweight and their combination remains insufficiently evaluated.

Taking into account these gaps in the system of scientific knowledge, the goal of the present study was set: to determine the effect of measured physical activity on the severity of intravascular platelet activity in adolescents with high normal arterial pressure and/or overweight.

MATERIAL AND METHODS

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

The study included 95 people of 18 years of age with high normal blood pressure and / or overweight (34 people with high normal blood pressure, 34 people with overweight and 27 people with a combination of high normal blood pressure and overweight). Those included in the study had a hereditary predisposition to cardiovascular and metabolic diseases, including hypertension, AO, MS and, in some cases, smoking. The control group consisted of 147 healthy people of adolescence, who do not have bad habits and hereditary burden, who regularly exercise physically as part of general physical training.

In all the observed, a number of anthropometric indices were determined: body mass, body mass index, waist circumference, hip circumference with calculation of the ratio waist circumference / hip circumference.

In all the observed individuals, the functional reactivity of the cardiovascular system was evaluated. According to the value of its increment against the background of psycho-emotional load, the type of reactivity of the cardiovascular system was assessed: when the value of the functional reactivity index was more than 20 standard units. reactivity was considered hyperfunctional, with the value of the functional reactivity index less than 10 conventional units. the response to the load was assessed as hypofunctional, with values of the functional reactivity index from 10 to 20 used units. type of functional reactivity was considered normal. The subjects recorded the plasma lipid peroxidation (LPO) intensity according to the thiobarbituric acid content of the active products with the Agat-Med kit, the antioxidant potential of the liquid part of the blood, the intraplatelet lipid peroxidation activity of the basal malondialdehyde (MDA) in the recovery reaction of thio barbitrate). . The number of platelets in the capillary blood in the Goryaev chamber was counted. Intravascular platelet activity was determined visually using a phase contrast microscope. All adolescents under high observation with high normal blood pressure and / or overweight were recommended to do regular regular physical exercises, including morning hygienic gymnastics, therapeutic and preventive gymnastics and fractional exercise during the day. The initial assessment of the indicators taken into account and their dynamics were made after 1 (19 years), 2 (20 years) and 4 (22 years) years of regular physical activity, as well as after another 3 years (25 years) with their irregular implementation. Statistical processing of the results obtained was carried out using Student's t-test.

ISSN: 0975-8585

RESEARCH RESULTS

In the observed individuals with high normal blood pressure in the initial state, the systolic blood pressure was 138.4±2.16 mm. Hg Art., diastolic - 88.9 ± 2.01 mm. Hg Art., heart rate - 88.4±2.69 beats in 1 min The increment of the functional reactivity index on the load was 30.1 ± 2.60 used units, which was regarded as a manifestation of hyperfunction of the cardiovascular system. In the study with overweight, before the test with psychoemotional stress, systolic and diastolic blood pressure was 128.6±2.20 mm. Hg st. and 84.2±1.54 mm. Hg Art., respectively. At the same time, the increment of the functional reactivity index at the load was 31.7±1.49 conditional units, indicating an excessively high functional activity of the cardiovascular system of this cohort examined. When included in the study in individuals with high normal blood pressure and overweight, systolic blood pressure reached 137.6±1.84 mm. Hg Art., diastolic - 89.0±1.96 mm. Hg Art., heart rate - 90.1±2.12 beats in 1 min The increment of the functional reactivity index on the load was 40.7 ± 1.46 used units, which indicated the presence of a marked hyperfunction of the cardiovascular system in the examined.

After 12 months of correction in those included in the study with high normal blood pressure, the systolic blood pressure steadily decreased to 130.2±2.74 mm. Hg Art., diastolic - up to 85.2±1.25 mm. Hg Art., heart rate decreased to 84.0±1.93 beats per 1 min. When executing the load, a decrease in the increments of the functional reactivity index to 11.5±2.24 conventional units was observed, which indicated a stable elimination of the hyperfunction of the cardiovascular system, an increase in its tolerance to psycho-emotional stress and the economization of cardiac activity. Regular training in obese people with overweight resulted in a stable normalization of the functional reactivity of the cardiovascular system by the age of 19, which was due to the normal increment of the functional reactivity of the cardiovascular system (17.2±1.91 services). As a result of 12 months of correction in patients with high normal blood pressure and overweight, systolic blood pressure dropped to 131.3 ± 1.92 mm. Hg Art., diastolic - up to 84.6 ± 2.07 mm. Hg Art., heart rate up to 82.0±1.38 beats per 1 min. When executing the load, a decrease in the increment of the values of the functional reactivity index by 20.1±1.16 conventional units was observed, which indicated the elimination of the pronounced hyperfunction of the cardiovascular system. At the same time, the complete stable normalization of reactivity in their cardiovascular system was achieved only after 2 years of training (the increment value of the functional reactivity index reached 16.4±2.07 conventional units), which lasts until the end of observation.

For overweight individuals, the body weight was 84.1±0.17 kg, the body mass index was 29.5±0.15 kg/m^2 with a waist size/hip volume of 1.05±0.015, respectively. After 1 year of regular dosed physical training, their body weight steadily decreased to 71.2±0.17 kg, with a decrease in body mass index to 24.9±0.11 kg/m^2 and waist volume/hips to 0.96±0.09. In the initial state, in individuals with high normal blood pressure and overweight, the body weight averaged 82.9±0.15 kg, body mass index 29.8±0.11 kg/m^2, with a waist / hip ratio of 1.06±0,006. At the same time, those who had a high normal arterial pressure and overweight, had a body weight at the age of 18, these indicators after a year of training consistently decreased to 72.4±0.11 kg, 26.0±0.06 kg/m^2 and 0.85±0.006, respectively.

A significant increase in plasma lipid peroxidation was observed in the observed individuals with high normal blood pressure in the outcome. Thus, the concentration of thiobarbituric acid-active products in their plasma was 3.46±0.16 µmol/l, in the control - 3.21±0.81 µmol/l ($p<0.05$). The MDA level in platelets was also increased (0.64±0.25 nmol/10^9 platelets, in the control - 0.49±0.16 nmol/10^9 platelets ($p<0.01$). Activation of free-radical oxidation in they became possible due to the weakening of the antioxidant activity of their body up to 32.2±0.20% against 38.8±0.22% in control ($p<0.01$). In the group of overweight people, the concentration is thiobarbituric acid-active products in plasma was 3.38±0.12 µmol/l, with the MDA level in platelets 0.60±0.17 nmol/10^9 platelets and the level of their body's antioxidant activity 34.0±0.15%. Have those with a combination of high normal blood pressure and overweight showed a significantly more pronounced increase in thiobarbituric acid-active products in plasma (3.61±0.19 µmol/l) and the concentration of MDA in platelets (0.69±0.09 nmol/10^9 platelets) against the background of a more significant weakening of the antioxidant activity of their body (30.6±0.12%).

Appointment to persons with high normal blood pressure rationally dosed physical exertion after a year of workouts consistently normalized plasma lipid peroxidation (3.23±0.15 µmol/l) with an increase in its antioxidant activity of 36.9±0.16%. Against the background of regular workouts, a decrease in the activity of

lipid peroxidation in platelets was achieved in the observed ones - their basal MDA was 0.50±0.17 nmol/10^9 platelets. In the group of overweight people, physical exercise after a year of training normalized plasma lipid peroxidation (3.24±0.12 µmol/l) as a result of a steady increase in its antioxidant activity (38.2±0.09%) until the end of observation. This was combined with a decrease in the intensity of lipid peroxidation in their platelets (0.50±0.21 nmol/10^9 platelets). In the group of individuals with high normal blood pressure and overweight, as a result of a year of regular physical training, stable normalization of plasma lipid peroxidation and platelet oxidation was achieved: thiobarbituric acid-active plasma products 3.32±0.10 µmol/l, plasma antioxidant activity 37.8±0.17%, MDA of platelets 0.50±0.12 nmol/10^9 platelets.

The content of platelets in the blood of individuals who made up all three groups of observables was within the normal range before and during physical exertion.

The level of discocytes in the blood of 18 year olds with high normal arterial pressure before the start of physical activity was 79.2±0.16%, significantly increasing by the age of 19 to 84.7±0.16% and remaining unchanged with continued training (at 22 years - 84.9±0.07%). The termination of regular morning gymnastics, treatment-and-prophylactic gymnastics and fractional exercise during the day did not affect this indicator in the examined 25 years of age (84.6±0.07%). The number of disco-echinocytes, spherocytes, sphero-echinocytes and bipolar forms of platelets in their bloodstream decreased by 19 years, also remaining stable during regular training and after the transition to irregular exercises until the final age taken into account. As a result, the initially increased amount of active forms of platelets was optimized already after a year of regular classes, without undergoing significant changes in subsequent years and amounted to 15.4±0.17% in 22 years. Termination of regular physical activities with the transition to irregular workouts maintained over the next 3 years the amount of the active forms of platelets at the same level as for adolescence (25 years old - 15.4±0.17s). In the bloodstream of people with high normal blood pressure, regularly experiencing physical exertion at the age of 18-22, the levels of freely circulating small and large platelet aggregates by the age of 19 decreased to optimal values: 2.9±0.10 and 0.07±0.011 per 100 free-standing platelets, remaining at this level throughout the entire youthful age (at 22 years old 2.9±0.05 and 0.06±0.003 per 100 free-lying platelets). The termination of regular physical activities with the transition to irregular workouts did not affect their level until the end of observation. The number of platelets involved in the process of aggregation in individuals with high normal blood pressure, regularly experiencing physical exertion, decreased during the year of observation to normal values, not experiencing further significant fluctuations and at 19 years of age 6.0±0.10% and 5.7±0.07% at 22 years. When switching to irregular physical training, this indicator in the observables remained at the level similar to that of youth (25 years old - 5.8±0.05%).

The content of discocytes in the blood of 18 year olds with a combination of high normal blood pressure and overweight prior to the start of physical training was 78.1±0.20%, significantly increasing by the age of 19 to 84.5±0.19% and remaining unchanged at continuation of training (at 22 years old - 85.0±0.10%). The refusal of regular physical exertion and the transition to irregular classes did not affect this indicator in the examined after 22 years (25 years - 84.8±0.06%). Initially, the increased amount of active forms of platelets after a year of regular training also returned to normal, without undergoing significant changes in the following and making up at 22 years old 15.0±0.10%. The transition to irregular workouts did not affect the number of active forms of platelets in their bloodstream over the next 3 years (at 25 years old - 15.2±0.07 s). At the same time, in the blood of this category of observables on the background of regular physical training in 18-22 years, the levels of freely circulating small and large platelet aggregates decreased already by the age of 19 to the optimum values: 2.9±0.17 and 0.08±0.010 per 100 free-standing platelets, remaining at this level during the entire youthful age (at 22 years old 2.9±0.07 and 0.06±0.004 per 100 free-lying platelets). Refusal from regular physical activities with the transition to their irregular performance did not affect their level at the beginning of I mature age. The level of platelet involvement in the process of aggregation, among people who had high normal blood pressure and overweight at the age of 18, on the background of regular training, significantly decreased after a year of their performance (at 19 years old 5.9±0.12% and 5.8±0.05% at 22 years old), without changing after the termination of regular physical activities (at 25 years old - 5.9±0.03%).

DISCUSSION

Under the conditions of modernity, overweight, high normal arterial pressure and their combination are spreading among young people, which subsequently can lead to the formation of a number of socially

significant diseases, including hypertension and MS [20-25]. It becomes clear that overweight, high normal arterial pressure and their combination are accompanied by the development of platelet dysfunctions causing difficulty in blood rheology, the occurrence of hypoxia and metabolic disorders in tissues, worsening subsequent health and creating thrombosis [26,27]. At the same time, it is known that timely corrective action on the body, including through the use of physical exertion, is able to remove platelets from a hypersensitive status, causing a decrease in their activity. However, until now, the selection of means and methods for the correction of overweight, high blood pressure and their combination in adolescents does not sufficiently take into account the possibility of long-term regular physical training in terms of their positive effect on platelet hemostasis dysfunction in order to resist normalization [28, 29].

The lack of clarity of possible platelet function in adolescents with deviations from homeostasis under the program of general physical training, including regular classes from 18 years of age with the transition to irregular training after 22 years of age, emphasizes the unresolved problem of the effect of ordered muscle activity on platelet functional activity in preclinical conditions that can not satisfy modern cardiology [30].

The author found that regular dosed physical exertion in adolescence in persons who had high normal blood pressure and/or overweight in 18 years of age can ensure the normalization of hemodynamics and metabolic processes, reducing the stimulation of platelets from the outside.

It was found that with regular physical training in adolescents with high normal blood pressure and / or overweight it is possible to achieve stable normalization of blood pressure and lowering to normal body weight values, proving the possibility of a pronounced positive effect of physical training on sympathetic tone and metabolism. At the same time, all observed individuals with high normal blood pressure and / or overweight showed stable suppression of plasma lipid peroxidation, which manifested itself as a maximum of physical activity for the year and persists not only until the end of regular training (22 years), but also until the end of observation, that is, against the background of irregular physical exertion between 22 and 25 years. Probably, this is largely due to the stable increase in plasma antioxidant activity during the depression of NADPH / NADH oxidase that develops during exercise [31]. Reducing the formation of MDA by platelets in physically trained people suggests that they have a stable normalization of arachidonate metabolism in the blood plates with the optimization of thromboxane formation during the year of training [32].

The basis of all the positive effects of regular workouts on platelet hemostasis in vivo in 18 year olds with deviations from homeostasis is stable normalization of hemodynamics [33], cardiovascular reactivity [34], optimization of humoral effects and achieving a balance between catabolism and anabolism in adipose tissue [35]. Receptor rearrangements of the membranes of the blood platelets lead to a decrease in the number of activated platelets and their aggregates of all sizes freely moving along the bloodstream [36]. This contributes to the reduction of damage to their endothelium, leveling the expression of subendothelial structures and their contact with blood, reducing the severity of intravascular platelet activity. At the same time, a decrease in the intravascular activity of platelets facilitates microcirculation, including in vasa vasorum, reducing the risk of atherogenesis at an older age [37].

In the mechanisms of lowering the functional activity of platelets against the background of regular physical exertion, an important place should be given to lowering the effect on the blood plates of decreasing levels of catecholamines, glucocorticoid and thyroid hormones [38]. The weakening of their joint action on the functional activity of platelets largely contributes to the return of indicators of their adhesion and aggregation to the level of the physiological norm. In addition, dosed hypoxia has a significant positive effect on the state of platelet hemostasis, which regulates lipid peroxidation processes in platelet membranes, thereby normalizing the level of intravascular platelet activity in the process of adaptation to the action of regular feasible exercise [39].

The degree of correction of intravascular platelet activity through regular training in general physical training suggests its use is preferable in people who have had high normal blood pressure and / or overweight in age 18 to reduce the risk of microthrombosis [40]. In the absence of a direct disaggregating action, dosed physical training reduces the intravascular activity of platelets by stabilizing hemodynamics, cardiovascular reactivity, enhancing lipid catabolism in their depot, and weakening overdose in the body with microcirculation optimization.

Considering the continued positive effects of regular physical activity on platelet hemostasis in observed individuals who at 18 had high normal blood pressure and / or overweight, after their transition to irregular exercise from the age of 22, there is reason to widely recommend that regular physical exercise be observed adolescence.

CONCLUSION

For 18 year olds with high normal blood pressure and / or overweight, high reactivity of the cardiovascular system, activated lipid peroxidation in the liquid part of the blood and platelets and increased intravascular platelet activity are characteristic. As a result of regular physical training throughout the year, individuals who have had high normal blood pressure and / or overweight in 18 years have normalized blood pressure, body weight and intravascular platelet activity. The continuation of physical activity fixes the achieved optimization of the considered parameters in adolescents with high normal blood pressure and / or overweight, helping to reduce their risk of forming hypertension, AO and MS and preventing the possible increase in the future of intravascular platelet activity.

REFERENCES

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

[2] 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.

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

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.
[15] 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.
[16] 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.
[17] Maloletko AN, Yudina TN.(2017) (Un)Making Europe: Capitalism, Solidarities, Subjectivities. Contemporary problems of social work. 3 (3-11) : 4-5.
[18] 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.
[19] 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.
[20] 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.
[21] 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.
[22] 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.
[23] Zavalishina SYu. (2018) Physiological Features Of Coagulation In Calves Of Plant Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 899-904.
[24] Zavalishina SYu. (2018) Functional Activity Of Thrombocytes In Newborn Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 919-924.
[25] Zavalishina SYu. (2018) Physiology Of Vascular Hemostasis In Newborn Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1037-1044.
[26] 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.
[27] 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.
[28] 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.
[29] 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.
[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] 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.
[33] 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.
[34] 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.

[35] 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.
[36] 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.
[37] 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.
[38] 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.
[39] Makhova AV. (2018) Physiology Of The Hypothalamus In The Human Body. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 478-484.
[40] 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.