

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Functional State Of Primary Hemostasis In Newborns Calves With Dyspepsia.

Zavalishina S Yu*.

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

ABSTRACT

The study of disorders of primary hemostasis in newborn calves with dyspepsia is of practical importance, as its condition plays a leading role in enhancing hemostasis in general, increasing viscosity and worsening blood rheology with a tendency to intravascular thrombosis. At the same time, impaired platelet aggregation capacity, vascular wall antiaggregation activity and blood platelet intravascular activity in newborn calves with dyspepsia are poorly understood. In newborn calves with dyspepsia, an increase in platelet aggregation function was found in vitro and in vivo. These disorders are based on deep changes in the lipid composition of platelet membranes, an increase in the level of medium molecules in plasma and blood plates, activation of lipid peroxidation in them, increased synthesis in the vascular wall of von Willebrand factor and intensification of thromboxane formation in blood plates. The resulting activation of thromboplastin formation is the leading cause of increased blood coagulation in newborn calves with dyspepsia. In this regard, the correction of disorders of platelet hemostasis in these calves should include a pathogenetically determined complex that can reduce the level of middle molecules in the body and eliminate dyspepsia.

Keywords: platelets, newborn calves, dyspepsia, physiology, hemostasis.

**Corresponding author*

INTRODUCTION

The work of primary hemostasis is extremely important for the whole organism at all stages of ontogenesis [1,2,3]. The study of disorders of primary hemostasis in newborn calves with dyspepsia is of practical importance [4,5], since it is the activation of primary hemostasis that plays a leading role in the activation of hemostasis in general [6,7], increase of viscosity and deterioration of blood rheology [8,9] with a tendency to intravascular thrombosis [10-15]. At the same time, violations of the aggregation ability of platelets, the antiaggregation activity of the vascular wall, and the intravascular activity of platelets in newborn calves with dyspepsia have been very poorly studied [16,17]. The degree of disturbance in platelet dysfunction in newborn calves with dyspepsia of the lipid composition of their membranes, the level of peroxidation and antioxidant protection of platelets, as well as the level of arachidonic acid exchange in them is not determined. There is fragmentary information that dyspepsia is accompanied in newborn calves by an increase in the plasma level of medium molecules capable of disrupting many functions of the body. The extent of the increase in average molecules in platelets, contributing in many ways to the formation of thrombocytopeny, has not been elucidated.

The aim of the work is to investigate the features of the violation of primary hemostasis in newborn calves with dyspepsia.

MATERIALS AND METHODS

Research was conducted in strict accordance with ethical principles established by the European Convention on protection of the vertebrata used for experimental and other scientific purposes (adopted in Strasbourg March 18, 1986, and confirmed in Strasbourg June 15, 2006) and approved by the local ethic committee of Russian State Social University (Record №12 dated December 3, 2015).

Under the supervision there were 153 newborn calves with dyspepsia for a period of 1-3 days from healthy cows 1-2 calves. Feeding and maintenance was carried out in standard calf conditions. The control group consisted of 267 healthy newborn calves. Blood sampling was carried out in the morning. The survey included the following indicators. The level of middle molecules in plasma and washed and resuspended platelets was determined. Plasma lipid peroxidation (LPO) activity was determined by the content of thiobarbituric acid-active products by the Agat-Med company kit, acyl hydroperoxides (AHP), and the intraplatelet lipid peroxidation by the concentration of the basal level of malondialdehyde (MDA) in the reduction of heartbroken pattern. The intra-platelet antioxidant system characterized the activity of catalase and superoxide dismutase.

The cholesterol level in washed and resuspended platelets was determined by an enzymatic colorimetric method using Vital Diagnosticum and phospholipids using phosphorus. The activity and time of formation of endogenous thromboplastin were also investigated. For indirect assessment of arachidonic acid metabolism in platelets, as well as the activity of cyclooxygenase and thromboxane synthetase in them, 3 transfer samples with registration of platelet aggregation (AP) using a photoelectrocolorimeter were used. The number of platelets in capillary blood in the Goryaev chamber was counted. The aggregation ability of platelets was studied by a visual micromethod using as inducers ADP (0.5×10^{-4} M), collagen (dilution 1: 2 of the main suspension), thrombin (0.125 units/ml), ristomycin (0.8 mg/ml), adrenaline (5×10^{-6} M) to simulate real blood flow conditions, combinations of inductors ADP + adrenaline, ADP + collagen and adrenaline + collagen are used. The morphological intravascular activity of platelets was determined using a phase contrast microscope. The antiaggregation activity of the vessel wall with all inductors used was evaluated against the background of a temporary venous occlusion with the calculation of the index of antiaggregatory activity of the vascular wall (IAAVW). Statistical processing of the results obtained was carried out using Student's t-test. Results are presented as $M \pm m$.

RESULTS

In calves with dyspepsia, an increase in plasma LPO was noted. Thus, the concentration of thiobarbituric acid-active products in plasma was 5.10 ± 0.02 $\mu\text{mol/l}$, in the control - 3.92 ± 0.06 $\mu\text{mol/l}$. The level of MDA in platelets was also increased (1.54 ± 0.004 nmol/ 10^9 platelets) And in the control (0.89 ± 0.02 nmol/ 10^9 platelets), which indicate the activation of free-radical oxidation in them due to weakening

intraplatelet antioxidant activity. The content of AHP in the plasma of sick calves was 3.50 ± 0.01 D₂₃₃/1 ml (in the control 1.92 ± 0.02 D₂₃₃/1 ml. In the platelets of patients with AHP (3.49 ± 0.01 D₂₃₃/10⁹ platelets) also significantly exceeded the control values (2.87 ± 0.04 D₂₃₃/10⁹ platelets).

Activation of free-radical oxidation in platelets in sick calves became possible as a result of a significant weakening of the antioxidant enzymes of the blood platelets - superoxide dismutase - 1250.0 ± 4.36 IU/10⁹ platelets (in healthy calves, 1780.0 ± 2.06 IU/10⁹ platelets) and catalase - 5690.0 ± 21.0 IU/10⁹ platelets (in the comparison group 10500.0 ± 11.05 IU/10⁹ platelets). The level of medium molecules in plasma at 280 nanomol amounted to 0.49 ± 0.01 conventional units, with 254 nanomol - 0.32 ± 0.02 conventional units, against the control of 0.32 ± 0.002 conventional units and 0.24 ± 0.03 conventional units, respectively. In platelets, calves with medium molecules dyspepsia were at 280 nanomol - 0.061 ± 0.02 conventional units/10⁹ platelets, with 254 nanomol - 0.069 ± 0.03 conventional units/10⁹ platelets (in the control 0.050 ± 0.04 conventional units/10⁹ platelets and 0.055 ± 0.04 conventional units/10⁹ platelets, respectively).

Determination of the lipid composition of platelet membranes in calf patients revealed a decrease in total phospholipid content in them to 0.38 ± 0.001 $\mu\text{mol}/10^9$ platelets and an increase in cholesterol level to 0.82 ± 0.001 $\mu\text{mol}/10^9$ platelets. In the control, the analogous indices were 0.49 ± 0.002 $\mu\text{mol}/10^9$ platelets and 0.73 ± 0.001 $\mu\text{mol}/10^9$ platelets, respectively. In sick animals, an increase in thromboplastin formation was noted. The time of formation of active thromboplastin in them was 2.95 ± 0.01 min, activity - 9.6 ± 0.02 sec. In the control group, thromboplastin was formed in 2.40 ± 0.01 min, and its activity was 14.0 ± 0.05 s.

The combination of biochemical changes in platelets characterized the increased exchange of arachidonic acid in them and the increase in thromboxane formation. In a simple transfer test, the level of thromboxane in the blood plates of calves was indirectly estimated at $74.3 \pm 0.03\%$ (in the control, $39.2 \pm 0.02\%$). These figures indicate the activation of cyclooxygenase, detected by the reduction of AP in the collagen-aspirin test - $96.8 \pm 0.05\%$ and thromboxane synthetase, determined by the restoration of AP in the collagen-imidazole test - $54.6 \pm 0.02\%$. In healthy animals, similar indicators were 78.4 ± 0.19 and $30.3 \pm 0.01\%$, respectively.

The concentration of platelets in the blood of patients was within the normal range. AP acceleration was noted, especially under the influence of collagen - 25.3 ± 0.20 s. (in the control - 30.0 ± 0.12 s). Slightly slower AP developed in calves under the influence of ADP (33.0 ± 0.12 s.) And ristomycin (26.2 ± 0.13 s), in control - 39.0 ± 0.28 s and 41.0 ± 0.26 s, respectively. Thrombin and adrenaline antibodies also developed faster than in controls and were equal in calves to 42.4 ± 0.11 s and 75.6 ± 0.16 s, respectively ($p < 0.01$). The time of AP development under the influence of combined use of inductors was also accelerated. ADP + adrenaline - 20.0 ± 0.12 s, ADP + collagen - 18.0 ± 0.09 s, adrenaline + collagen - 20.3 ± 0.07 s.

In patients with calves on the background of venous occlusion, there was a slowdown in AP, especially pronounced for adrenaline - IAAVW 1.30 ± 0.06 s (in the control - 1.65 ± 0.02 s). A slightly smaller IAAVW is registered for H₂O₂ (1.27 ± 0.07), ristomycin (1.28 ± 0.06) and ADP (1.22 ± 0.05). IAAVW for thrombin and collagen AP were further reduced - 1.18 ± 0.12 and 1.17 ± 0.11 , respectively. The indices of the aggregation activity of the vascular wall with the combination of inductors were also lower than in the control: for ADP + epinephrine 1.25 ± 0.03 s, ADP+collagen - 1.24 ± 0.01 s, epinephrine + collagen - 1.16 ± 0.07 c.

The intravascular activity of platelets of sick animals was characterized by its increase. Discocytes in the blood of sick calves amounted to $62.0 \pm 0.20\%$ (in the control - $82.0 \pm 0.16\%$). The number of disco-echinocytes increased ($18.0 \pm 0.40\%$). The contents of spherocytes, sphero-echinocytes and bipolar forms of platelets also significantly exceeded the control values and reached $12.0 \pm 0.03\%$, $6.0 \pm 0.02\%$ and $2.0 \pm 0.01\%$ in sick calves, respectively. The sum of the active forms of patients' platelets was $38.0 \pm 0.30\%$, in the control - $18.0 \pm 0.20\%$, small and large aggregates contained 15.2 ± 0.06 and 4.7 ± 0.03 , control - 3.6 ± 0.04 and 0.12 ± 0.01 , respectively, with the number of platelets in the aggregates in sick animals reached $14.6 \pm 0.02\%$, against $5.0 \pm 0.20\%$ in the control.

DISCUSSION

Dyspepsia in calves is complex and is accompanied by the development of thrombocytopeny and the activation of the blood coagulation process [18,19]. The pathogenesis of dyspepsia causes shifts in the cholesterol / phospholipid ratio in platelet membranes [20–25], which, together with digestive disorders [26]

and absorption, increases in the bloodstream [27–30] and then in platelets CM content [31] causing a weakening of the antioxidant protection of blood plates and an increase in the concentration of primary and secondary POL products in them [32,33]. Under these conditions, calves activate platelets and thromboplastin formation [34-37]. An increase in the thrombogenic potential of blood plasma during dyspepsia is associated primarily with the activation of platelet functions [38-40], and not with an increase in the levels of various coagulation factors, including fibrinogen [41]. Fibrin formation, undoubtedly occurring during dyspepsia, occurs primarily on the surface of activated platelets and is always secondary in relation to their adhesion and aggregation [42,43].

A combination of metabolic disorders, changes in the composition of platelet membranes, an increase in the content of medium molecules in them and an increase in intraplatelet lipid peroxidation resulting in dyspepsia increases the intravascular activity of platelets, increasing the content of active platelets in the bloodstream [44]. The high intravascular activity of platelets causes an increase in platelet aggregation under the influence of various inducers [45]. Possible mechanisms of this enhancement include activation of arachidonic acid exchange with an increase in thromboxane formation in them, registered in transfer samples, and an increase in the concentration of von Willebrand factor participating in the aggregation process, indirectly assessed by acceleration of AP with ristomycin [46,47].

In all cases, sick animals showed a significant decrease in IAAVW compared with healthy people, which is explained by a reduction in the production of antiplatelet agents in the vascular walls, primarily prostacyclin [48].

Disturbances in dyspepsia are complex and are accompanied not only by the development of thrombocytopeny, but also by a weakening of the functions of the vascular wall [49]. Changes in the lipid composition of platelet membranes entail activation of platelets, which, together with other components of dyspepsia, contribute to the weakening of the antiaggregatory activity of the vascular wall, leading to an increase in intravascular AP [50,51]. High platelet aggregation activity under the influence of various inductors indicates an increased activity of platelets in vivo. In this case, arachidonic acid metabolism is weakened in the vessel wall, where its main metabolite is a vasodilator and antiplatelet agent - prostacyclin - the main thromboxane antagonist [52,53].

The study of the combined effect of inductors on the AP process without venous occlusion and on its background in sick calves showed a potentiating effect of agonists on platelets with a low sensitivity of the latter to disaggregating signals of the vascular wall under actual blood flow conditions. The registration of AP against the background of temporary ischemia and without it under the influence of a combination of inductors allows one to come closer to understanding the actual conditions of blood flow in newborn calves with dyspepsia and indicates a high risk of thrombosis in them.

The revealed violations of platelet hemostasis in calves with dyspepsia require adequate correction aimed at breaking the “vicious circles” developing in dyspepsia.

CONCLUSION

In newborn calves with dyspepsia, an increase in platelet aggregation function was found in vitro and in vivo. These disorders are based on changes in the lipid spectrum of platelet membranes, an increase in the level of medium molecules in them, activation of plasma lipid peroxidation and platelets, increased von Willebrand factor synthesis in the vascular wall with weakening of prostacyclin formation and intensification of thromboxane formation in blood plates. Activation of thromboplastin formation is the leading cause of increased blood coagulation in newborn calves with dyspepsia. Correction of disorders of platelet hemostasis should include a pathogenetically determined complex that can treat dyspepsia and optimize blood rheology simultaneously.

REFERENCES

- [1] Medvedev IN. (2018) Aggregational Properties Of Erythrocytes In Patients With Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1803-1808.

- [2] Medvedev IN. (2018) Aggregational Capacity Of Platelets In Patients With Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) :1830-1835.
- [3] Medvedev IN. (2018) The Ability To Aggregate Neutrophils In Patients With Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1861-1866.
- [4] Medvedev IN. (2018) Severity Of Erythrocyte Aggregation In Patients With Hyperuricemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 2025-2030.
- [5] Medvedev IN. (2018) Activity Of Aggregation Properties Of Neutrophils In Patients With Arterial Hypertension With Type 2 Diabetes Mellitus. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 2043-2047.
- [6] Medvedev IN. (2018) Intensity Of Spontaneous Aggregation Of Erythrocytes In Patients With Impaired Glucose Tolerance And Abdominal Obesity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 2173-2178.
- [7] 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.
- [8] Maloletko AN, Yudina TN.(2017) (Un)Making Europe: Capitalism, Solidarities, Subjectivities. Contemporary problems of social work. 3 (3-11) : 4-5.
- [9] 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.
- [10] 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.
- [11] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological features of platelet aggregation in calves of Ayrshire breed during the phase of plant nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1008-1013.
- [12] 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.
- [13] Bikbulatova AA. (2018) Technology Implementation Of Competitions Of Professional Skill. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 407-419.
- [14] Makhova AV. (2018) Physiology Of The Hypothalamus In The Human Body. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 478-484.
- [15] Makhov AS. (2018) Perspectives Of Rink-Bendi Development Among People With Hearing Impairment In Russia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 139-146.
- [16] Makhov AS. (2018) Specificity Of Requirements Of Russian And Foreign Hockey Players With Hearing Impairment To The Process Of Training And Competition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 157-163.
- [17] Makhov AS. (2018) Motivational Field Of Disabled People With Musculoskeletal Injury To Participation In Training On Russian Press. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 211-217.
- [18] Bespalov DV, Medvedev IN, Mal GS, Polyakova OV. (2018) Physiological Capabilities Of The Vascular Endothelium With The Developing Arterial Hypertension In People Of Different Ages Who Had Long Had Low Physical Activity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 972-976.
- [19] Bespalov DV, Medvedev IN, Mal GS, Makurina ON. (2018) Functional activity of the vascular endothelium in patients with initial signs of atherosclerosis against the background of regularly dose-related exercise stress. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1020-1024.
- [20] Bikbulatova AA, Andreeva EG, Medvedev IN. (2018) Hematological Features Of Patients With Osteochondrosis Of The Spine. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2018; 9(3) : 1089-1095.
- [21] Medvedev IN. (2018) Aggregation Of Thrombocytes In Patients With Arterial Hypertension And Impaired Glucose Tolerance. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1604-1609.

- [22] Medvedev IN. (2018) Severity Of Neutrophil Aggregation In Patients With Arterial Hypertension With Impaired Glucose Tolerance. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :1647-1651.
- [23] Medvedev IN. (2018) Aggregation Of Erythrocytes In Patients With Abdominal Obesity. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 1676-1681.
- [24] Medvedev IN. (2018) Platelet Aggregation Activity In Patients With Abdominal Obesity. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :1738-1743.
- [25] Medvedev IN. (2018) Intensity Of Neutrophil Aggregation In Patients With Abdominal Obesity. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :1778-1783.
- [26] Medvedev IN. (2018) Intensity Of Spontaneous Aggregation Of Erythrocytes In Patients With Abdominal Obesity And Dyslipidemia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :1919-1924.
- [27] Medvedev IN. (2018) Expression Of Aggregation Capacity Of Platelets In Abdominal Obesity And Dyslipidemia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :1941-1946.
- [28] Medvedev IN. (2018) The State Of Aggregation Properties Of Neutrophils In Patients With Abdominal Obesity And Dyslipidemia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 1985-1989.
- [29] Medvedev IN. (2018) Increased Aggregation Properties Of Platelets In Patients With Hyperuricemia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :2048-2053.
- [30] Medvedev IN. (2018) Severity Of Aggregation Properties Of Neutrophils In Patients With Hyperuricemia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 2088-2093.
- [31] Medvedev IN. (2018) The Level Of Erythrocyte Aggregation In Patients With Type 2 Diabetes Mellitus. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 2115-2120.
- [32] Medvedev IN. (2018) Aggregational Activity Of Thrombocytes In Patients With Type 2 Diabetes Mellitus. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :2137-2142.
- [33] Medvedev IN. (2018) Severity Of Aggregation Neutrophils In Patients With Type 2 Diabetes Mellitus. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :2162-2167.
- [34] Medvedev IN. (2018) Activity Of Platelet Aggregation In Patients With Impaired Glucose Tolerance And Abdominal Obesity. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 2183-2188.
- [35] Medvedev IN. (2018) Severity Of Aggregation By Neutrophils In Patients With Impaired Glucose Tolerance And Abdominal Obesity. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 2194-2199.
- [36] Medvedev IN. (2018) Features Of Erythrocyte Aggregation In Patients With Impaired Glucose Tolerance. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :2210-2215.
- [37] Medvedev IN. (2018) Aggregation Of Platelets In Patients With Impaired Glucose Tolerance. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) :2226-2231.
- [38] Medvedev IN. (2018) Aggregational Capabilities Of Neutrophils In Patients With Impaired Glucose Tolerance. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 2248-2253.
- [39] Medvedev IN. (2018) Spontaneous Aggregation Of Erythrocytes In Patients With Arterial Hypertension With Impaired Glucose Tolerance. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 2275-2280.
- [40] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological Indices of Platelet-Coagulation Hemostasis in Purebred Irishire Cows in The Course of Lactation. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 419-426.
- [41] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological features of platelet aggregation in calves of Ayrshire breed during the phase of plant nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 1008-1013.
- [42] Oshurkova JuL, Medvedev IN, Tkacheva ES. (2018) Functional Features Of Platelet Aggregation In Heifers Of The Ayrshire Breed, Which Are Being Prepared For Insemination. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(3) : 1155-1160.
- [43] Glagoleva TI, Medvedev IN. (2018) Physiological Features Of Anti-aggregational Control Of Blood Vessels Over The Shaped Elements Of Blood In Calves At The Onset Of Ontogenesis. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 440-447.
- [44] 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.
- [45] 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.
- [46] 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.
- [47] Bikbulatova AA, Kartoshkin SA, Pochinok NB. (2018) Schemes Of Competitions Of Professional Skills Among People With Disabilities In Russia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 357-362.
- [48] 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.
- [49] 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
- [50] Makhov AS. (2018) The Importance Of The Needs Arising In People When Organizing Classes Rink Bandy (Mini Hockey). Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 96-101.
- [51] Makhov AS. (2018) The Basic Needs Of Hearing Impaired People In Organizing Football Training. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 121-126.
- [52] Bikbulatova AA, Karplyuk AV, Medvedev IN. (2018) Methodical Bases Of The Help To Young Invalids In A Choice Of Sphere Of Their Future Professional Activity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 571-577.
- [53] Bikbulatova AA, Karplyuk AV, Medvedev IN. (2018) The Problem Of Vocational Guidance Work With Young People, Who Have Limited Health Opportunities In Modern Russia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 586-590.