



## HYPOGLYCEMIA AND HEART FAILURE

**Khusainova Munira Alisherovna**  
**Hamrayeva Nasiba Abdurasulovna**  
**Bekmuradova Maxsuda Salhiddinovna**  
**Hayitov Safarali Maxammadiyevich**  
Samarkand State Medical University

<b>Article history:</b>	<b>Abstract:</b>
<p><b>Received:</b> June 28<sup>th</sup> 2023 <b>Accepted:</b> July 28<sup>th</sup> 2023 <b>Published:</b> August 30<sup>th</sup> 2023</p>	<p>In the Recommendations of the European Society of Cardiology and the European Society for the Study of Diabetes 2007 it is emphasized that the use of angiotensin converting enzyme inhibitors (ACE inhibitors) and adrenergic blockers (BAB) is the basis for the treatment of chronic heart failure (CHF) in patients with diabetes mellitus (DM). For the first time, doctors' attention is drawn to the fact that the appointment of ACE inhibitors to DM patients receiving hypoglycemic therapy may increase the risk of hypoglycemic conditions. Attention to this side of the action of ACE inhibitors is due to the fact that hypoglycemia is an independent risk factor for cardiovascular mortality. The above Recommendations emphasize the urgent need for careful monitoring of the level of glycemia when prescribing ACE inhibitors to patients with diabetes. This is especially necessary in the initial period of combined cardiac and hypoglycemic therapy. The risk of hypoglycemia depends on many factors and, apparently, varies in different contingents of patients with diabetes. According to available data, patients with CHF have an increased tendency to hypoglycemia due to a decrease in the body's tolerance to a decrease in blood glucose levels. Such functional insufficiency is largely determined by a violation of the processes of gluconeogenesis in the liver and the secretion of glucagon by the pancreas, which are normally included in the body's defense system against a pronounced decrease in blood glucose.</p>

**Keywords:** diabetes mellitus, chronic heart failure, hypoglycemia, carvedilol

### INTRODUCTION

Potential danger of hypoglycemia in patients DM and CHF receiving ACE inhibitors may increase with the addition of BAB to therapy.

Firstly, BAB, suppressing the clinical symptoms of hyperglycemia, complicate its timely diagnosis and, as a consequence, relief. This effect is especially pronounced in non-selective BAB.

Secondly, non-selective BAB, blocking 2-adrenoreceptors, prevent the stimulation of gluconeogenesis and glycogenolysis in the liver, which reduces the flow of glucose from the liver into the bloodstream. In addition, the use of BAB in diabetes is associated with a number of other undesirable shifts in carbohydrate metabolism. The deterioration of carbohydrate metabolism compensation occurs due to a decrease in insulin secretion and an increase in insulin resistance.

Nevertheless, the use of BAB in patients with diabetes and CHF, as a rule, improves the prognosis of patients, reduces the clinical manifestations of heart failure and improves their quality of life.

One of the drugs recommended for use in patients with diabetes with CHF is carvedilol. Unfortunately, there is practically no adequate information about the

effect of carvedilol on the incidence of hypoglycemia in patients with DM with heart failure.

**GOAL.** The aim of this work was to evaluate the effect of carvedilol on the risk of hypoglycemia in patients with DM Type 2 (SD2) with CHF, receiving ACE.

### MATERIALS AND METHODS

The study included 13 patients with DM2 with CHF due to the presence of coronary heart disease. Inclusion criteria there was a left ventricular ejection fraction of less than 45% and the presence of clinical signs of CHF.

The group consisted of 10 men and 3 women, whose age ranged from 51 to 70 years, the average age was 59.8±6.7 years. Arterial hypertension (AH) of 2-3 degrees was observed in 10 patients. In 3 patients, an increase in blood pressure (BP) was associated with the presence of diabetic nephropathy. None of the patients showed signs of renal insufficiency. Among the examined patients, obesity was noted in 10 patients (grade I – 8 people, grade II – 2 people). All patients before inclusion in the study received ACE inhibitors (perindopril – 2 people and enalapril – 11 people) and BAB (atenolol – 9 people, metoprolol – 3



people, bisoprolol – 1 person). Therapy with oral hypoglycemic drugs (PSP) was carried out in 2 patients (sulfonylurea derivatives – in 1 person, biguanides + sulfonylurea derivatives – in 1 person). Seven people were on insulin therapy; combination therapy (PSP + insulin therapy) was received by 4 people. The average level of glycemia when included in the study was  $7.1 \pm 2.1$  mmol/l, glycosylated hemoglobin (HbA1c) –  $8.4 \pm 1.4\%$ . Anamnesis of hypoglycemia was observed in 4 patients. None of the patients had a history of severe hypoglycemia, which caused their hospitalization or emergency assistance from third parties.

The study protocol provided for 3 stages of follow-up: the period of the initial examination when switched on; examination after replacement of the outgoing BAB with carvedilol (Talliton, EGIS). The average duration of therapy was  $62.0 \pm 17.4$  days, the average dose of carvedilol was  $25 \pm 12.5$  mg / day. The final examination was performed after the withdrawal of carvedilol and the return to the initial therapy (the average duration was  $56.5 \pm 21.8$  days).

The following studies were carried out at each stage:

1. Echocardiography by the Simpson method on the "HDI-5000c" device of ATL (USA) using a transthoracic multi-frequency sensor P4-2.
2. Assessment of diastolic myocardial dysfunction in the pulse-wave mode of Doppler echocardiographic examination, taking into account the National Recommendations of the IOC and OSS for diagnosis and treatment HSN (second revision, 2002). The measurement was carried out peak of early diastolic filling of the left ventricle (E), peak of late atrial diastolic filling of the left ventricle (A), calculation of their E/A ratio. The peak ratios  $E/A > 1$  were taken as normal values.
3. Control of HELL. Blood pressure was measured by the auscultative Korotkov method in accordance with the recommendations of the American Heart Association ((American Heart Association, 1981) and WHO (1993). In obese individuals with a shoulder circumference of more than 32 cm, a wide cuff was used to measure pressure sphygmomanometer company "Omron Healthcare, Inc." (USA).
4. Continuous glucose monitoring by the system CGMS Gold, Medtronic MiniMed USA. The principle of operation of the sensor is based on an electrochemical reaction with glucose contained in the interstitial fluid of the patient. The enzyme glucose oxidase is used to transform glucose on the sensor surface into electronic signals. The sensor continuously sends these signals via a cable to the monitor. The monitor records the average signal every

5 minutes, creating 288 records in 24 hours. All data is stored in the monitor's memory. The study was conducted for three days. As a result of monitoring, the following indicators were calculated: the average level of fasting glycemia; the average level of glycemia 2 hours after food; the number of episodes of glycemic reduction below the physiological level ( $< 4.5$  mmol / l); the total duration of episodes of glycemic reduction  $< 4.5$  mmol / l per minute; the number of severe hypoglycemic episodes (glycemia  $< 2.5$  mmol / l).

5. Determination of the HbA1c level. Determination of HbA1c in capillary blood by cation chromatography was carried out on the DiaStat device of the company "Bio-Rad" (Germany).

Statistical data processing was carried out using the SPSS 12 application software package. The data are presented as mean  $\pm$  standard deviations (M $\pm$ SD). The differences were considered significant at  $p < 0.05$ .

## RESULTS

At the first, second and third examinations, there were no statistically significant differences in the levels of systolic and diastolic blood pressure (Table 1).

The average indicators of glycemia on an empty stomach and 2 hours after meals in patients with DM2 with CHF before, during and after treatment with carvedilol did not change ( $p > 0.05$ ). At all stages of the survey, no reliable dynamics of HbA1c was recorded (Table 2).

**Table 1. Comparative characteristics of the blood pressure level in the examined patients with DM before, during and after treatment with carvedilol.**

Indicator	Initially	On the background of therapy	After cancellations
SAP, mmHg	134,6 $\pm$ 8,0	134,5 $\pm$ 8,5	135,6 $\pm$ 5,0
DAP, mmHg	86,5 $\pm$ 4,7	84,1 $\pm$ 3,8	83,1 $\pm$ 4,6

**Table 2. Indicators of carbohydrate metabolism in patients before, during and after treatment with carvedilol**

Indicator	Initially	On the background of therapy	After cancellations
Fasting glycemia,	7,1 $\pm$ 2,1	8,3 $\pm$ 1,2	8,6 $\pm$ 2,3



mmol/l			
Glycemia 2 hours after meals, mmol/l	9,3±2,4	10,2±2,8	10,1±2,4

The average indicators of glycemia on an empty stomach and 2 hours after meals in patients with DM2 with CHF before, during and after treatment with carvedilol did not change ( $p > 0.05$ ). At all stages of the examination, no reliable dynamics of HbA1c was recorded (Table 2). The data obtained indicate that the change in the type of BAB was not accompanied by a significant change in the indicators of compensation of carbohydrate metabolism in patients SD with CHF.

Replacement of the initial BAB with carvedilol was accompanied by a statistically significant decrease in the average number of episodes of glycemic decrease  $< 4.5$

mmol / l (initially –  $2.1 \pm 1.9$  episodes / person; against the background of carvedilol intake –  $0.2 \pm 0.4$  episodes / person,  $p < 0.05$ ). After the withdrawal of carvedilol, there was an increase in cases of hypoglycemia ( $0.8 \pm 0.9$  episodes / person,  $p < 0.05$ ).

Before the appointment of carvedilol, the total time of glycemia  $< 4.5$  mmol/l was  $80.6 \pm 105.4$  min. Against the background of carvedilol therapy, there was a significant decrease in the total duration of such episodes to  $0.9 \pm 2.0$  minutes. When returning to the initial therapy, a statistically significant increase in the duration of these periods to  $31.3 \pm 51.4$  minutes was recorded.

Episodes of severe hypoglycemia ( $< 2.5$  mmol / L) were observed before taking carvedilol ( $1.2 \pm 1.6$  episodes / person) and after its withdrawal ( $0.5 \pm 0.8$  episodes / person). No cases of severe hypoglycemia have been reported against the background of carvedilol therapy.

## DISCUSSION

The results of the study were quite unexpected for us. It could be assumed that the effect of carvedilol on the level of glycemia due to the additional 1- blocking effect will either decrease or will not differ significantly from that of selective women. However, the replacement of selective women with carvedilol was accompanied by a significant decrease in the frequency of occurrence and a decrease in the duration of episodes of hypoglycemia. Moreover, when using carvedilol, severe forms of hypoglycemic conditions that occurred before taking it completely disappeared. For the first time, the data of our study were reported at the Russian Congress of Cardiologists in September 2006. A year later, data were published

comparing the effects of carvedilol and metoprolol on hypoglycemia in patients with DM2 treated with ACE inhibitors and/or angiotensin II B receptor antagonists (ARA). These results were obtained as part of the largest controlled clinical trial "Glycemic control in diabetes mellitus comparison of carvedilol and metoprolol in patients with arterial hypertension" (The Glycemic Effect in Diabetes Mellitus: Carvedilol-Metoprolol Comparison in Hypertensives – GEMINI). The study compared the metabolic effect of adding the above-mentioned BAB to the treatment of patients with DM2 and hypertension receiving ACE/ARA. The study included 1210 patients, of whom 726 received metoprolol after randomization (average dose 104.7 mg / day), and 424 – carvedilol (average dose 15.6 mg / day).

The GEMINI study lasted 5 months. The first results were published back in 2004. The addition of metoprolol and carvedilol reduced systolic and diastolic pressure to the same extent. However, the metabolic effects of the addition of these BAB were different. Thus, when taking carvedilol, in contrast to metoprolol, a significantly more stable level of HbA1c was observed (0.02% on carvedilol,  $p = 0.65$ ; 0.15% on metoprolol,  $p < 0.001$ ). There was also a significant decrease in insulin resistance (carvedilol resistance decreased by 9.1%,  $p = 0.004$ ; on metoprolol – by 2%,  $p = 0.48$ ). In addition, there was a significantly more pronounced decrease in microalbuminuria (on carvedilol – by 14%,  $p < 0.01$ ; on metoprolol by 2.5%) and a significantly slower appearance of new cases of microalbuminuria (40% less when taking carvedilol compared with metoprolol;  $p = 0.04$ ).

In addition, a special questionnaire was used to assess the severity of clinical symptoms in DM, reflecting the mental state, neurological, cardiovascular and ophthalmological complications, as well as manifestations of hyper- and hypoglycemia. This particular piece of research was published in 2007.

According to the GEMINI questionnaire, the addition of carvedilol to the therapy of patients with DM2 led to a significant decrease in the frequency of symptoms of hypoglycemia ( $p = 0.02$ ). When metoprolol was added, no significant shifts in the frequency of hypoglycemia symptoms were detected. At the same time, when using self-monitoring data on the level of glycemia, no significant differences in the frequency of hypoglycemia were obtained. Thus, asymptomatic hypoglycemia was observed in 11.6% of patients taking carvedilol and in 10.3% taking metoprolol ( $p = 0.46$ ). Objectively confirmed symptoms of hypoglycemia on the background of carvedilol administration, 8.4% of patients were observed, and on the background of metoprolol – in 8.8% ( $p = 0.81$ ). Despite the fact that the authors of the GEMINI study emphasize the imperfection of the methodology for



assessing episodes of hypoglycemia, it is obvious that carvedilol is at least no more dangerous in relation to hypoglycemia than metoprolol. This is fundamentally important, since non-selective drugs are traditionally considered as drugs that worsen the prognosis in patients with diabetes.

The conclusions of our study do not contradict the GEMINI data. Of course, carvedilol turned out to be safer in the studied aspect than metoprolol. The difference in the formulation of conclusions most likely follows from the difference in the methods used to assess hypoglycemia.

Carvedilol differs from other BAB in a number of additional properties that are likely to have clinical significance. It has an  $\alpha_1$ -adrenoblocking effect, is characterized by high lipophilicity, prevents the development of tolerance to nitrates and exhibits pronounced antioxidant activity. According to the degree of lipophilicity, it surpasses all lipophilic substances: acebutolol, betaxolol, bisoprolol, metoprolol, timolol. It has been proven that lipophilic BAB, able to more easily penetrate the blood-brain barrier, increase the activity of N. vagus, which reduces the likelihood of ventricular fibrillation and the risk of sudden death.

There are several mechanisms of "hypoglycemic" safety of carvedilol. Glucose delivery to the brain centers increases due to an increase in cerebral blood flow under its influence. In addition, the compensatory reaction of the central nervous system to a decrease in blood glucose levels increases, as well as the secretion of glucagon in response to hypoglycemic stimulation of blood flow.

## CONCLUSION

In conclusion, I would like to remind you that only carvedilol significantly improves the prognosis of patients with CHF in combination with DM. Neither bisoprolol nor metoprolol CR/XL have a significant effect on the course of CHF in patients with DM. At the same time, such patients account for up to 20-30% of all CHF patients. It is difficult to get rid of the idea that the above-described "hypoglycemic" safety of carvedilol plays one of the leading roles.

## LITERATURE

1. Akramovna, I. K., & Zaynobiddin o'g'li, F. J. (2023). RISK FACTORS OF EARLY DEVELOPED OSTEOARTHRITIS. *IMRAS*, 2(1), 28-35.
2. Alisherovna, K. M. (2022). PSYCHOSOMATIC CHARACTERISTICS OF PATIENTS WITH RHEUMATOID ARTHRITIS AND GOUT. *Galaxy International Interdisciplinary Research Journal*, 10(5), 665-671.
3. Alisherovna, K. M., Alisherovich, B. Z., Ilyosxonovich, K. I., & Oybekovna, E. E. (2022). Changes In Hemodynamics Of The Cardiovascular System In Patients With Fibrosis Alveolitis. *Spectrum Journal of Innovation, Reforms and Development*, 4, 203-209.
4. Alisherovna, K. M., Jamshedovna, K. D., Totlibayevich, Y. S., & Xudoyberdiyevich, G. X. (2022). FEATURES OF THE QUALITY OF LIFE OF PATIENTS WITH CHRONIC RENAL FAILURE IN THE TREATMENT OF HEMODIALYSIS. *Spectrum Journal of Innovation, Reforms and Development*, 7, 76-81.
5. Alisherovna, K. M., Kulmuxammadovich, Y. U., Boymamatovna, E. F., & Shokirovich, S. A. (2023). THE STATE OF NEUROPEPTIDE-CYTOKINE STATUS IN ISCHEMIC HEART DISEASE. *Spectrum Journal of Innovation, Reforms and Development*, 11, 42-50.
6. Alisherovna, K. M., Nizamitdinovich, K. S., Rustamovich, T. D., & Haqnazarovich, K. S. (2022). Mental Status and Quality of Life in Patients With Sinus Node Weakness Syndrome and Chronic Coronary Heart Failure of Ischemic Etiology. *Texas Journal of Medical Science*, 15, 78-82.
7. Alisherovna, K. M., Rustamovich, T. D., & Baxtiyorovich, U. J. (2022). The Use of Trimetazidine in Patients with Type 2 Diabetes Mellitus Who Have Suffered a Myocardial Infarction. *Czech Journal of Multidisciplinary Innovations*, 10, 35-41.
8. Alisherovna, K. M., Rustamovich, T. D., Baxtiyorovich, U. J., & Sobirovna, S. M. (2022). Diabetes Mellitus and Hyperglycemia in Patients with Rheumatoid Arthritis. *Texas Journal of Medical Science*, 13, 99-103.
9. Alisherovna, K. M., Sherzodovna, M. D., Tursunboyevna, I. K., & Uktamovna, U. U. (2023). LEFT VENTRICULAR HYPERTROPHY IN PERSONS WITHOUT ARTERIAL HYPERTENSION: PSYCHOSOMATIC APPROACH TO THE STUDY OF THIS PHENOMENON.
10. Alisherovna, K. M., Tatlibayevich, Y. S., Toshtemirovna, E. M. M., & Nizamitdinovich, H. S. (2021). Diagnostic Significance Daily Monitoring of Blood Pressure in Young Women (Under 40 Years Old) with Arterial Hypertension. *Central Asian Journal of Medical and Natural Science*, 2(5), 461-465.
11. Alisherovna, K. M., Toshtemirovna, E. M. M., & Oybekovna, E. E. (2022). QUALITY OF LIFE OF PATIENTS WITH CIRRHOSIS OF THE



- LIVER. *Spectrum Journal of Innovation, Reforms and Development*, 4, 197-202.
12. Alisherovna, K. M., Toshtemirovna, E. M. M., Djamsheodovna, K. D., & Maxammadiyevich, K. S. (2022). Endothelial Dysfunction in Patients with Chronic Heart Failure. *Miasto Przyszłości*, 30, 218-220.
  13. Alisherovna, K. M., Totlibayevich, Y. S., Xudoyberdiyevich, G. X., & Jamsheodovna, K. D. (2022). PSYCHOSOMATIC FEATURES AND THE LEVEL OF DEPRESSION WITH CHRONIC HEART FAILURE IN PATIENTS WITH ARTERIAL HYPERTENSION AND CORONARY HEART DISEASE. *Spectrum Journal of Innovation, Reforms and Development*, 7, 89-95.
  14. Baxtiyorovich, U. J., Alisherovna, K. M., & Mamasoliyevna, D. N. (2023). FEATURES OF COGNITIVE IMPAIRMENT IN PATIENTS WITH CHRONIC KIDNEY DISEASE AT PREDIALYSIS STAGES. *World Bulletin of Public Health*, 22, 49-54.
  15. Islamova, K. A. (2022, November). Semizlik bor bemorlarda osteoartroz kasalligining klinik xususiyatlari. In *international conferences* (Vol. 1, No. 10, pp. 299-301).
  16. Islamova, K. A., Olimdjanova, F. J. Q., Ziyadullaev, S. K., & Kamalov, Z. S. (2022). RISK FACTORS FOR EARLY DEVELOPMENT OF OSTEOARTHRITIS.
  17. Khabibovna, Y. S., Alisherovna, K. M., Nizamitdinovich, K. S., & Totlibayevich, Y. S. (2023). FEATURES OF HEART FAILURE IN PATIENTS WITH THYROTOXICOSIS. *Journal of new century innovations*, 29(1), 89-97.
  18. Khabibovna, Y. S., Alisherovna, K. M., Tashtemirovna, E. M. M., & Baxtiyorovich, U. J. (2023). THE EFFECTIVENESS OF THYROSTATICS IN THE TREATMENT OF. *Journal of new century innovations*, 29(1), 79-88.
  19. Khabibovna, Y. S., Alisherovna, K. M., Tashtemirovna, E. M. M., Totlibayevich, Y. S., Nizamitdinovich, K. S., & Baxtiyorovich, U. J. (2023). DIAGNOSTIC VALUE OF CYSTATIN C IN PATIENTS WITH HYPERTENSION AND OBESITY. *World Bulletin of Public Health*, 22, 55-59.
  20. Khabibovna, Y. S., Alisherovna, K. M., Totlibayevich, Y. S., & Davranovna, M. K. (2023). PAINLESS CARDIAC ISCHEMIA AND RHEUMATOID ARTHRITIS. *Journal of new century innovations*, 29(1), 98-105.
  21. Khusainova, M. A. (2023). Comorbidity thyrotoxicosis with coronary heart disease. *Science and Education*, 4(5), 205-213.
  22. Khusainova, M. A., & Yarmatov, S. T. (2021). CARDIAC ARRHYTHMIAS AND CARDIOHEMODYNAMIC DISORDERS IN PATIENTS VIRAL CIRRHOSIS OF THE LIVER. *Scientific progress*, 2(2), 196-202.
  23. Khusainova, M. A., Ergashova, M. M., Eshmamatova, F. B., & Khayitov, S. M. (2023). Features of quality of life indicators in patients with pneumonia. *Science and Education*, 4(2), 138-144.
  24. Khusainova, M. A., Gafforov, X. X., Eshmamatova, F. B., & Khayitov, S. M. (2023). Assessment of the quality of life in patients with exogenous allergic alveolitis. *Science and Education*, 4(2), 145-152.
  25. Khusainova, M. A., Toirov, D. R., Khaydarov, S. N., & Kamolova, D. D. (2023). MORPHOFUNCTIONAL PARAMETERS OF THE HEART IN WOMEN SUFFERING FROM ESSENTIAL ARTERIAL HYPERTENSION IN POSTMENOPAUSE AND ON THE BACKGROUND OF TREATMENT. *Oriental renaissance: Innovative, educational, natural and social sciences*, 3(1), 322-330.
  26. O'G'Li, F. J. Z., & Akramovna, I. K. (2022). Qandli diabet kasalligi fonida yurak qon tomir tizimi kasalliklarining klinik kechuv xususiyatlari. *Talqin va tadqiqotlar ilmiy-uslubiy jurnali*, 1(1), 108-111.
  27. Salhiddinovna, B. M., Alisherovna, K. M., Tashtemirovna, E. M. M., & Tatlibayevich, Y. S. (2023). Hepatic Encephalopathy and Quality of Life of Patients With Viral Cirrhosis of the Liver. *Miasto Przyszłości*, 35, 1-5.
  28. Totlibayevich, Y. S., Alisherovna, K. M., & Mamasoliyevna, D. N. (2023). STUDY OF QUALITY OF LIFE INDICATORS IN PATIENTS WITH CORONARY HEART DISEASE USING THE SF-36 QUESTIONNAIRE. *IQRO*, 3(1), 264-268.
  29. Totlibayevich, Y. S., Alisherovna, K. M., Rustamovich, T. D., & Xudoyberdiyevich, G. X. (2023). Quality of Life in the Pathology of the Cardiovascular System. *Miasto Przyszłości*, 33, 222-228.
  30. Totlibayevich, Y. S., Alisherovna, K. M., Rustamovich, T. D., & Xudoyberdiyevich, G. X. (2023). Quality of Life in the Pathology of the Cardiovascular System. *Miasto Przyszłości*, 33, 222-228.
  31. Uzokov, J. B., Khusainova, M. A., Bekmuradova, M. S., & Makhmudova, K. D. (2023). Dynamics of quality of life indicators during personalized rehabilitation of patients



- with rheumatoid arthritis with arterial hypertension. *Science and Education*, 4(5), 196-204.
32. Yarmatov, S., Khusainova, M., & Djabbarova, N. (2023). STUDY OF QUALITY OF LIFE INDICATORS IN PATIENTS WITH CORONARY HEART DISEASE USING THE SF-36 QUESTIONNAIRE. *Бюллетень студентов нового Узбекистана*, 1(7), 58-64.
33. Yarmukhamedova, S. K., Alisherovna, K. M., Tashtemirovna, E. M. M., & Nizamitdinovich, K. S. (2023). The Effectiveness of Trimetazidine in Arrhythmias. *Miasto Przyszłości*, 33, 215-221.
34. Ибадова, О. А., & Шодикулова, Г. З. (2022). ОЦЕНКА ПРОГНОСТИЧЕСКОЙ ЗНАЧИМОСТИ ИНТЕНСИВНОСТИ И ЧАСТОТЫ КАШЛЯ У ПАЦИЕНТОВ С ИНТЕРСТИЦИАЛЬНЫМ ПОРАЖЕНИЕМ ЛЕГКИХ. *Journal of cardiorespiratory research*, 1(2), 56-61.
35. Ибадова, О. А., & Шодикулова, Г. З. (2022). РОЛЬ СУРФАКТАНТНОГО ПРОТЕИНА А (SP-A) В ПРОГНОЗЕ ПРОГРЕССИРОВАНИЯ И ИСХОДА НЕСПЕЦИФИЧЕСКОЙ ИНТЕРСТИЦИАЛЬНОЙ ПНЕВМОНИИ. *Достижения науки и образования*, 1(81), 66-72.
36. Ибадова, О. А., Курбанова, З. П., & Шодиев, О. О. (2021). ФАКТОРЫ РИСКА В ПРОГРЕССИРОВАНИИ НЕСПЕЦИФИЧЕСКОЙ ИНТЕРСТИЦИАЛЬНОЙ ПНЕВМОНИИ. *Достижения науки и образования*, 8(80), 101-107.
37. Ибадова, О. А., Шодикулова, Г. З., & Нажмиддинов, А. Ш. (2021). ТРУДНОСТИ Дифференциальной Диагностики Неспецифической Интерстициальной Пневмонии. *Достижения науки и образования*, 8(80), 50-55.
38. Исламова, К. А., & Тоиров, Э. С. (2019). Значение факторов риска на качество жизни больных остеоартрозом. In *Актуальные вопросы современной медицинской науки и здравоохранения: сборник статей IV Международной научно-практической конференции молодых учёных и студентов, IV Всероссийского форума медицинских и фармацевтических вузов «За качественное образование»*, (Екатеринбург, 10-12 апреля 2019): в 3-х т.-Екатеринбург: УГМУ, CD-ROM.. Федеральное государственное бюджетное образовательное учреждение высшего образования «Уральский государственный медицинский

университет»

Министерства  
здравоохранения Российской Федерации.