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Angiopathy in Rheumatoid Arthritis

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Abstract: Relevance. Among all rheumatological diseases, rheumatoid arthritis (RA) accounts for 3% of cases, and the number of such patients is growing. RA is characterized by systemic vascular lesion (angiopathy), characterized by the international Chapel Hill classification as "vasculitis associated with a systemic disease". The purpose of the work: to improve the quality of diagnosis, to establish new links in pathogenesis and to identify prognostic criteria for the course of vascular lesions in RA. Materials and methods. 131 RA patients were under observation. The ratio of men and women was 1: 2, the minimum, moderate and high degrees of disease activity were 1: 2: 1, respectively, the average age of the examined patients was 45.70 ± 1.02 years, the duration of clinical manifestation was 9.40 ± 0.68 years, stages I, II, III and IV were diagnosed in 8, 40, 34 and 19% of the number of patients, respectively. Echocardiography, sonography and ultrasound dopplerography of vessels, biomicroscopy were performed conjunctiva, morphological examination of nephrobiopaths, determined integral indices of clinical and instrumental vascular pathology. Results. Systemic angiopathy was observed in 61%of RA patients, more often in cases of high activity in the presence of osteoporosis, while the development of skin vasculitis and peripheral vasoneuropathy was closely related to the level of antibodies to cyclic citrulline peptide in the blood serum, which, along with the concentration of C-reactive protein, has negative prognostic significance for vascular pathology. Appearance digital arteritis is determined by the activity of articular syndrome, glomerulonephritis — a high content of circulating immune complexes in the blood, and the presence of angiopathy reflects an increase in pressure in the small circle of blood circulation. Conclusions. Patients with RA develop mesangioproliferative or mesangiocapillary glomerulonephritis in a ratio of 2: 1 with a regular tubulointerstitialcomponent and a deposit of immunoglobulins and complement components (in stroma → glomeruli → tubules → vessels), while structural changes in renal vessels are closely related to clinical and instrumental manifestations of systemic rheumatoid angiopathy. Blood counts of C-reactive protein are more than 25 mg/l and anti-citrulline antibodies over 40 E/ml are predictive criteria for systemic vascular pathology and damage to the renal stroma, and severe changes in the renal tubules are risk factors for high rates of progression of articular syndrome.

Keywords: rheumatoid arthritis; angiopathy; clinic; pathogenesis.

Introduction

Rheumatoid arthritis (RA) is included in the group of systemic autoimmune rheumatic diseases, and among all rheumatological diseases it accounts for about 3%, and the number of such patients is growing everywhere. One of the main manifestations of RA is vascular lesion (angiopathy), which according to the international Chapel Hill classification is characterized as "vasculitis associated with a

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systemic disease" and the clinical and pathogenetic features of which have not been sufficiently studied.

The aim of the study: to improve the quality of diagnosis, to establish new links in pathogenesis and to identify prognostic criteria for the course of vascular lesions in RA.

Materials and methods

131 RA patients aged 18 to 69 years (on average 45.70 ± 1.02 years), among which there were 26.0% of men and 74.1% of women. The duration of the disease was 9.40 ± 0.68 years, the I degree of its activity was established in 26.7% of cases, II — in 42.8%, III — in 30.5%. The arthritis activity index for 28 joints (DAS) was 4.50 ± 0.10 rel. units; I, II, III and IV X-ray stages of the pathological process were detected in 7.6, 39.7, 33.6 and 19.1% of cases, respectively; rheumatoid factor seropositivity (RF) at the time of examination — in 55.7%, for antibodies to cyclic citrulline peptide (aSSR) — in 82.5% of cases. The visceral systemic form of the disease occurred in 25.9% of the number of patients, the eitonic type of the autonomic nervous system was detected in 72.5% of cases, sympathotonic — in 18.3%, vagotonic — in 9.2%, the vegetative index (the logarithm of the quadratic Kerdo index) was 5.00 ± 0.17 units.

The average values of the Lansbury index (LI) were 131.40 ± 4.46 points, the integral severity of arthritis (SAI) — 89.00 ± 1.85 rel. units, the rate of its progression (PAI) — 1.80 ± 0.20 rel.units, RF parameters in the blood — 15.20 ± 2.04 iU/ml, aCCP — 24.30 ± 1.01 E/ml, C-reactive protein (CRP) — 14.30 ± 0.71 mg/l, immunoglobulin (Ig) G — 17.20 ± 0.26 mmol/L, IgM — 2.40 ± 0.04 mmol/L, circulating immune complexes (CIC) — 131.50 ± 5.37 standard units. Systemic osteoporosis was detected in 74.1% of the patients, tendovaginitis — in 42.0%, spondylopathy — in 38.9%. The nature of vascular changes in nephrobioptates of 17 RA patients (5 men and 12 women) was analyzed with chronic kidney disease (rheumatoid glomerulonephritis) aged 32 to 68 years (on average 50.10 ± 2.33 years). Patients with secondary AA-amyloidosis of the kidneys were excluded from the analysis.

SAI was calculated using the formula: SAI = LI × DAS. In turn, DAS was determined by the formula: DAS = [(RI × 0.54) + (J × 0.065) + (lnQ × 0,33) + 0,224] × 1,072 + 0,94, where RI is the Ritchie index, J is the number of painful joints, Q is the erythrocyte sedimentation rate. PAI was evaluated by the formula: PAI = [(Rg)2 + S]: T, where Rg — the radiological stage of the disease, S is the sum of the radiographic signs of the articular syndrome, T is the duration of the clinical manifestation of the disease. The integral instrumental index of vascular pathology (Y) was determined. At the same time, each average indicator in the patient < M + SD was estimated at 1 point, M + SD ↔ M + 2SD — at 2 points, M + 2SD ↔ M + 3SD — at 3 points, > M + 3SD — at 4 points. Y was calculated per patient according to the formula: Y = (A + 2B + 3C + 4D): E, where A, B, C, D are the number of patients with 1, 2, 3 and 4 points, respectively, E is the number of indicators. Among the clinical signs angiopathies in RA patients took into account the presence of skin purpura, Raynaud's syndrome, telangiectasia, capillaries of the hands and feet, digital arteritis, uveitis, cheilitis, leukocytoclastic enanthema, antiphospholipid syndrome (AFLS), dyscirculatory encephalopathy, peripheral vasoneuropathy, glomerulonephritis, arterial peripheral and pulmonary hypertension. The integral index of clinical severity of the course of vascular pathology of the disease (W) was studied according to the formula: W = (S : N) × S , where S is the sum of the scores of all clinical signs of the disease, N is the number of signs, S is the degree of activity of the disease. Patients underwent echocardiography ("AcusonAspen-Siemens", Germany and "HD-11-XE-Philips", the Netherlands), X-ray examination of the joints ("Multix-Compact-Siemeps", Germany), sonography of vessels, musculoskeletal system and internal organs (scanner "Envisor-Philips", Netherlands), ultrasound dopplerography of vessels (angiograph "Aplia-XG-Toshiba", Japan), biomicroscopy conjunctival vessels (slit lamp "Haag-StreitBern-900", Switzerland). The mean pressure in the pulmonary artery (LAD), peripheral and pulmonary vascular resistance (respectively, PSS) were determined and LSS), intravasal (IVI), total vassal (OVI) and extravasal indices (EVI), initial diameter of the brachial artery (DI), degree of vasodilation (VD), diameter during vasodilation (DV) and vascular stress index (ISN) according to the formula: ISN = PSS: VD. Vascular vegetative index (SVI) was evaluated by the formula: SVI = VI × PSS. Using the Olympus-AU-640 analyzer (Japan), the levels of RF, CRP, IgG, IgM and CIC in the

blood serum were studied, the content of aCCP was studied by the enzyme immunoassay method (reader "PR2100 Sanofi diagnostic pasteur", France). Nephrobiopsy was performed against the background of ataralgesia under the control of ultrasound examination of the kidney. The True Cut technique was used ("real slice") using a high-speed gun "Biopty-Bard", and histological sections of kidney tissues were stained with hematoxylin and eosin, alcyan blue (for glycoproteins) and by Van Gieson (collagen and elastic fibers), a PAS reaction was set. In addition, enzyme immunoassay (with a peroxidase label) and immunofluorescence methods were used to study kidney tissues. Deposits of IgA, IgG, IgM, C3 and Cq1 components of the complement were evaluated (Olympus X40 and Olympus-AX70-Provis microscopes, Olympus-DP50 digital video camera). In an immunohistochemical study with the above markers , we studied fields of view. Vascular damage and other renal structures (glomeruli, tubules, stroma) were evaluated in points (from 0 to 3). At the same time, the average damage index (J) was calculated using the formula: J = (a + 2b + 3c) : (a + b + c + d), where a, b, c are the number of patients with 1, 2 and 3 points, respectively, and d is the number of patients with the absence of this trait.

Statistical processing of the obtained research results was carried out by computer variational, nonparametric, correlation, regression, single- (ANOVA) and multivariate (ANOVA/MANOVA) analysis of variance (programs "Microsoft Excel" and "Statistica-Stat-Soft", USA). The mean values (M), their standard deviations (SD) and errors, the coefficients of parametric Pearson correlation and nonparametric correlation were evaluated. Kendall, Brown-Forsyth, Wilcoxon-Rao variance criteria, multiple regression, differences Student and McNemar-Fisher, reliability of statistical indicators.

Results

61.1% of the RA patients have an integral angiopathy syndrome. These patients are included in the main group of examined, and the restn38.9% were in the control group. Brown—Forsyth single-factor analysis of variance and Kendall nonparametric correlation revealed that angiopathy in RA is directly related to the visceral form of the disease, the presence of systemic osteoporosis and the level of CRP. In this regard, it can be assumed that the blood value of CRP is > 24 mg/l(> M + SD of RA patients with angiopathy) is a prognosticative criterion for vascular pathology. According to the McNemar-Fisher criterion, in the main group of patients there was greater activity of the pathological process, but less — the degree of bone and joint destruction (radiological stage) of RA. Patients of both groups did not differ in the frequency of seropositivity by RF and aSSR. It should be noted that in cases of angiopathy, the visceral form of RA was diagnosed 2.7 times more often and osteoporosis was reliably detected 30% more often.

Glomerulonephritis was diagnosed in 26.3% of patients, uveitis — in 23.8%, peripheral neuropathy and pulmonary hypertension (mean pressure > 15 mmHg) — respectively in 21.3%, skin lesions — in 20.0%, Raynaud's syndrome — in 18.8%, arterial hypertension (mean pressure > 115 mmHg) — in 16.3%, digital arteritis — in 12.5%, AFLS — in 8.8%, dyscirculatory encephalopathy — in 6.3%. The W index was equal to 12.70 ± 0.46 rel. units, and the average number of vascular signs per patient was 1,760 ± 0.101 abs. units. The main group of RA patients with angiopathy differed from the control group by significantly higher (by 17%) DAS indicators, blood level of aCCP (by 22%), The concentration of CRP (by 25%), IgG and IgM, respectively (by 9%). In RA patients of the main group, peripheral blood pressure (PAD) indicators were 104.40 ± 1.28 mmHg, LAD — 13.00 ± 0.34 mmHg, LAD/PAD — 12.50 ± 0.34 %, PSS — 2.40 ± 0.08 din × s × cm–8, LSS — 232.90 ± 8.12 din × s × cm–5, LSS/PSS — 10.80 ± 0.53 %, SVI — 11.70 ± 0.66 rel. units, IVI — 2.10 ± 0.07 points, OVI — 8.20 ± 0.20 points, EVI — 5.10 ± 0.16 points, DI — 4.30 ± 0.03 mm, VD — 15.10 ± 0.72 %, DV — 5.50 ± 0.04 mm, ISN — 1.00 ± 0.072 rel.units. Compared to the control group turned out to be significantly large — by 14% — the values of the FRET and by 9% — the level of the ratio LAD/PAD.

Discussion

According to the Brown-Foresight analysis of variance and Kendall's nonparametric correlation analysis, a relationship was found with the content of aSSR in the blood of the severity of skin and

peripheral nervous system lesions, with the parameters of DAS — development of digital arteritis, with the concentration of CIS — glomerulonephritis. In 31.3% of the patients of the main group, changes in the aorta were found, in 11.3% — common carotid arteries, in 5.0% — internal carotid arteries, the degree of narrowing of which is influenced by the severity of the course of the articular process. The LAD/PAD indicator directly depends on DAS parameter, SVI — from the content of CRP in the blood, OVI — from the RF level. The values of DSI and W are directly correlated with each other, while there is a significant Brown-Foresight dispersion effect on the level of W concentrations in the blood of aSSR, IgG and IgM. There is a direct correlation of Pearson values of W with the content of aSSR in the blood. Taking into account the presented data, it can be assumed that the aSSR index is > 40 E/ml (> M + SD of patients with angiopathy) is a risk factor for the development of severe vascular disorders in RA. The ratio of mesangioproliferative and mesangiocapillary variants of rheumatoid glomerulonephritis was 2 : 1. J of the glomeruli was equal to 0.70 ± 0.058 rel. units, stroma — 1.240 ± 0.067 rel. units, tubules — 0.830 ± 0.079 rel. units, vessels — 0.430 ± 0.050 rel. units. In the interstitium, glomeruli, tubules, vessels, the frequency of localization of immune deposits was noted, the reliability of the differences of which was confirmed by McNemar's nonparametric analysis — Fischer. The ratio of deposits of IgA, IgG, IgM, C3 and C1q in the glomeruli was 8 : 7 : 7 : 3 : 1, in stroma — 3 : 3 : 3 : 2 : 1, tubules — 2 : 3 : 1 : 2 : 1, vessels — 4 : 4 : 1 : 1 : 1. According to the multifactorial dispersion analysis of Wilcoxon — Rao, the morphological signs of vascular lesions are influenced by the seropositivity of the disease by RF. To assess the influence of individual factors of the course of RA on certain morphological vascular signs of glomerulonephritis, we selected parameters that simultaneously met reliable criteria Brown—Foresight analysis of variance and Kendall's nonparametric correlation analysis. It turned out that fibrinoid swelling of the vascular wall directly depends on the duration of the disease, on the stage of RA — hyalinosis of arterioles, on the seropositivity of the aSSR — IgG deposit in the vessels.

The vascular J index directly correlates with the duration of the disease, the radiological stage of arthritis and the presence of tendovaginitis, as demonstrated by Kendall's analysis. As shown by the Brown criterion — Foresight, the degree of lymphohistiocytic vascular infiltration has a direct effect on the parameters of the PSS, and the severity of IgM deposition in the vessels is inversely correlated with the glomerular filtration rate. Additionally, the relationship of morphological signs of vasculopathy in the kidneys with general clinical and instrumental signs of vascular pathology is analyzed. Thus, the level of fibrinoid swelling of the walls of arterioles depends on the CI indicator, the formation of arteriosclerosis depends on the ISN, the proliferation of vascular endothelium depends on the VI, lymphohistiocytic infiltration and IgA deposit depend on the SVI.

Conclusions

1. Systemic angiopathy is observed in 61% of RA patients, more often in cases of a high degree of visceral activity with the presence of osteoporosis.
2. The development of skin vasculitis and peripheral vasoneuropathy is closely related to the level of aSSR in the blood serum, which, along with the concentration of CRP, has negative prognostic significance in relation to vascular pathology, while the appearance of digital arteritis is determined by the activity of articular syndrome, glomerulonephritis — a high content of CIC in the blood, and the presence of angiopathy reflects an increase in pressure in the small circle of blood circulation.
3. Patients with RA develop mesangioproliferative or mesangiocapillary glomerulonephritis in a ratio of 2: 1 with a regular tubulointerstitial component and vascular deposition of IgA, IgG, IgM, C3 and C1q; at the same time, structural changes in renal vessels are closely related to clinical and instrumental manifestations of systemic rheumatoid angiopathy.
4. In the future, timely diagnosis of angiopathy and further prediction of its course in RA patients will be relevant for subsequent rehabilitation measures, and the assessment of the nature of vascular pathology may have practical significance as risk factors for certain extravasal signs of the disease.

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., & Erkinovna, K. Z. (2022). Assessment of the Immune-Inflammatory Relationship in Patients with Chronic Heart Failure with Rheumatoid Arthritis. *Central Asian Journal of Medical and Natural Science*, *3*(2), 373-377.
4. Alisherovna, K. M., & Tatlibayevich, Y. S. (2021). Assessment Of Risk Factors For Arterial Hypertension Hypertension In Pregnant Women. *Central Asian Journal of Medical and Natural Science*, *2*(3), 214-217.
5. Alisherovna, K. M., & Xamroyevna, O. S. (2023). STUDY THE INFLUENCE OF CARDIOVASCULAR SYSTEM PATHOLOGY TO THE QUALITY OF LIFE. *Journal of new century innovations*, *36*(1), 148-155.
6. Alisherovna, K. M., & Xudoyberdiyevich, G. X. FEATURES OF HEART DAMAGE IN PATIENTS WITH VIRAL CIRRHOSIS OF THE LIVER.
7. 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.
8. Alisherovna, K. M., Boymamatovna, E. F., Tursunboyevna, I. K., & Mashrabovna, M. M. METABOLIC SYNDROME IN RHEUMATOID ARTHRITIS AS A CRITERION OF CARDIOVASCULAR RISK.
9. Alisherovna, K. M., Djamshedovna, K. D., Totlibayevich, Y. S., & Boymamatovna, E. F. (2022). The Effectiveness of the Original Drug Trimetazidine MV in Patients with Stable Ischemic Heart Disease and Persistent Angina Attacks Against the Background of the Use of Trimetazidine Generics. *Miasto Przyszłości*, *30*, 235-238.
10. Alisherovna, K. M., Erkinovna, K. Z., Davranovna, M. K., & Pulotovna, Z. D. (2022). Positive Effect of Sorbitol in Patients with Chronic Renal Insufficiency. *Miasto Przyszłości*, *30*, 214-217.
11. Alisherovna, K. M., Erkinovna, K. Z., Djamshedovna, K. D., & Nizamitdinovich, K. S. (2023). QUALITY OF LIFE PATIENTS WITH OSTEOARTHRITIS. *Journal of new century innovations*, *36*(1), 164-175.
12. Alisherovna, K. M., Erkinovna, K. Z., Jamshedovna, K. D., & Toshtemirovna, E. M. M. (2022). Study of qualityof life indicators in patients with coronary heart disease using the sf-36 questionnaire.
13. 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.
14. Alisherovna, K. M., Khabibovna, Y. S., Nizamitdinovich, K. S., & Bakhtiyorovich, U. J. (2023). CYSTATIN and KIDNEY FUNCTION. *Journal of new century innovations*, *38*(2), 220-225.
15. Alisherovna, K. M., Kulmuxammatovich, 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.
16. Alisherovna, K. M., Nizamitdinovich, K. S., Davranovna, M. K., & Erkinovna, K. Z. (2022). Kidney Condition in Patients with Myocardial Infarction. *Texas Journal of Medical Science*, *13*, 85-90.

17. 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.

18. 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.

19. Alisherovna, K. M., Rustamovich, T. D., Nizamitdinovich, K. S., & Xamroyevna, O. S. (2022). ASSESSMENT OF QUALITY OF LIFE IN PATIENTS WITH CHRONIC HEART FAILURE WITH PRESERVED CARDIAC OUTPUT. *Spectrum Journal of Innovation, Reforms and Development*, *9*, 467-474.

20. Alisherovna, K. M., Rustamovich, T. D., Nizamitdinovich, K. S., & Djamshedovna, K. D. MORPHOFUNCTIONAL PARAMETERS OF THE HEART IN WOMEN SUFFERING FROM ESSENTIAL ARTERIAL HYPERTENSION IN POSTMENOPAUSE AND ON THE BACKGROUND OF TREATMENT.

21. 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.

22. 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.

23. 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.

24. Alisherovna, K. M., Toshtemirovna, E. M., Jamshedovna, K. D., & Xudoyberdiyevich, G. X. (2022). Assessment of renal dysfunction in patients with chronic heart failure.

25. Alisherovna, K. M., Totlibayevich, Y. S., Xudoyberdiyevich, G. X., & Jamshedovna, K. D. (2022). CLINICAL FEATURES OF HEART FAILURE IN PATIENTS WITH ISCHEMIC HEART DISEASE AND THYROTOXICOSIS. *Spectrum Journal of Innovation, Reforms and Development*, *7*, 108-115.

26. Alisherovna, K. M., Totlibayevich, Y. S., Xudoyberdiyevich, G. X., & Jamshedovna, K. D. (2022). EFFICACY OF DRUG-FREE THERAPY OF HYPERTENSION DISEASES IN THE EARLY STAGE OF THE DISEASE. *Spectrum Journal of Innovation, Reforms and Development*, *7*, 82-88.

27. Islamova, K. A. (2022, November). Semizlik bor bemorlarda osteoartroz kasalligining klinik xususiyatlari. In *international conferences* (Vol. 1, No. 10, pp. 299-301).

28. Islamova, K. A., Olimdjanova, F. J. Q., Ziyadullaev, S. K., & Kamalov, Z. S. (2022). RISK FACTORS FOR EARLY DEVELOPMENT OF OSTEOARTHROSIS.

29. 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.

30. Khabibovna, Y. S., Alisherovna, K. M., Nizamitdinovich, K. S., & Bakhtiyorovich, U. J. (2023). FEATURES OF OSTEOPOROSIS AND SARCOPENIA SYNDROMES IN RHEUMATOID ARTHRITIS. *Journal of new century innovations*, *38*(2), 212-219.

31. 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.

32. 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.

33. Khabibovna, Y. S., Alisherovna, K. M., Totlibayevich, Y. S., & Davranovna, M. K. (2023). PAINLESS CARDIAC ISCHEMIA AND RHEUMATOID ARTHRIT. *Journal of new century innovations*, *29*(1), 98-105.

34. Khaydarov, S. N., Khusainova, M. A., Uzokov, J. B., & Makhmudova, K. D. (2023). Heart failure and the risk of hypoglycemia. *Science and Education*, *4*(5), 222-231.

35. Khusainova, M. A. (2023). Comorbidity thyrotoxicosis with coronary heart disease. *Science and Education*, *4*(5), 205-213.

36. 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.

37. Khusainova, M. A., Bekmuradova, M. S., Makhmudova, K. D., & Uzokov, J. B. (2023). Echocardiographic changes of the left ventricle in bronchial asthma. *Science and Education*, *4*(5), 214-221.

38. 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.

39. 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.

40. Khusainova, M. A., Khaydarov, S. N., Makhmudova, K. D., & Nayimov, A. S. (2023). Prevalence of bronchiolitis in patients with Rheumatoid arthritis. *Science and Education*, *4*(5), 232-241.

41. Khusainova, M. A., Khaydarov, S. N., Makhmudova, K. D., & Ortikova, S. X. (2023). Features of prevention of chronic kidney diseases and chronic heart failure. *Science and Education*, *4*(5), 242-250.

42. 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.

43. Nizamitdinovich, K. S., & Alisherovna, K. M. (2022). Quality of Life in Patients with Chronic Heart Failure, After Cardiac Resynchronization Therapy. *Texas Journal of Medical Science*, *14*, 168-173.

44. Toshtemirovna, E. M. M., Alisherovna, K. M., Totlibayevich, Y. S., & Duskobilovich, B. S. (2022). THE VALUE OF XANTHINE IN CHRONIC HEART FAILURE. *Spectrum Journal of Innovation, Reforms and Development*, *4*, 24-29.

45. Toshtemirovna, E. M. M., Alisherovna, K. M., Totlibayevich, Y. S., & Muxtorovna, E. M. (2022). Hearts In Rheumatoid Arthritis: The Relationship With Immunological Disorders. *Spectrum Journal of Innovation, Reforms and Development*, *4*, 34-41.

46. 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.

47. 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.

48. Xudoyberdiyevich, G. X., Alisherovna, K. M., Rustamovich, T. D., & Djamshedovna, K. D. (2023). QUALITY OF LIFE IN PATIENTS WITH GOUT. *Spectrum Journal of Innovation, Reforms and Development*, *12*, 156-164.

49. 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.

50. 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.