

ARTERIAL GIPERTONIYADA KARDIORENAL SINDROM RIVOJLANISH MEXANIZMLARI: KLINIK-LABORATOR VA INSTRUMENTAL TAHLIL

Xursanov Asliddin Murat o'g'li,
Xalikova Nigina Ravshanovna,
Kenjayev Yodgor Mamatqulovich,

Termiz iqtisodiyot va servis universiteti, Tibbiyot fakulteti, Tibbiy fundamental fanlar
kafedrası

ANNOTATSIYA:

Maqsad: Arterial gipertoniya (AG) bilan kasallangan bemorlarda kardioresnal sindrom (KRS) rivojlanishining patogenetik mexanizmlarini klinik, laborator va instrumental ko'rsatkichlar asosida baholash hamda erta diagnostik biomarkerlarni aniqlash.

Metodlar: 2024–2025-yillarda prospektiv kuzatuv tarzida o'tkazilgan tadqiqotga AG tashxisi qo'yilgan 142 nafar bemor va 30 nafar sog'lom nazorat guruhi jalb qilindi. Bemorlar AG darajasi (Grade 1–3) va KRS mavjudligiga qarab 3 guruhga ajratildi. Barcha ishtirokchilarda sutkalik arterial bosim monitoringi (SABM), elektrokardiografiya (EKG), exokardiografiya (EchoKG), buyrak ultratovush tekshiruvi, kreatinin, mochevina, GFR (CKD-EPI), albuminuriya, C-reaktiv oqsil (CRP) va NT-proBNP darajalari aniqlandi. Statistik tahlil SPSS 26.0 dasturida (ANOVA, Student t-test, Pearson korrelyatsiyasi, multivariat logistik regressiya, ROC-tahlil) amalga oshirildi.

Natijalar: AG davomiyligi va darajasi oshishi bilan KRS rivojlanish chastotasi sezilarli ortgan ($p < 0,05$). 3-guruhda kreatinin $156,3 \pm 6,8$ mkmol/l, NT-proBNP 964 ± 42 pg/ml va CRP $16,4 \pm 0,9$ mg/l gacha oshgan, GFR esa $46,2 \pm 2,9$ ml/min/1,73m² gacha pasaygan. EchoKGda chap qorincha gipertrofiyasi (77,5%) va diastolik disfunktsiya (68,0%) qayd etildi. NT-proBNP va albuminuriya o'rtasida kuchli musbat korrelyatsiya aniqlandi ($r = 0,71$; $p < 0,01$). ROC-tahlil NT-proBNP (AUC=0,89) va albuminuriya (AUC=0,84) yuqori diagnostik ahamiyatga ega ekanligini ko'rsatdi.

Xulosa: AG fonida KRS rivojlanishida renin-angiotenzin-aldosteron tizimi faollashuvi, surunkali yallig'lanish, endotelial disfunktsiya va oksidlovchi stress asosiy patogenetik mexanizmlar hisoblanadi. NT-proBNP, albuminuriya va GFR ko'rsatkichlari KRSni erta aniqlashda yuqori diagnostik ahamiyatga ega.

Kalit so'zlar: arterial gipertoniya, kardioresnal sindrom, NT-proBNP, albuminuriya, GFR, RAAS, endotelial disfunktsiya.

KIRISH: Arterial gipertoniya bugungi kunda global sog'liqni saqlash tizimining eng muhim muammolaridan biri bo'lib, yurak-qon tomir kasalliklari, insult,

surunkali yurak yetishmovchiligi (SY) va surunkali buyrak kasalligi (SBK) rivojlanishining asosiy xavf omili hisoblanadi. JSST ma'lumotlariga ko'ra, dunyo bo'yicha 1,4 milliarddan ortiq inson AG bilan yashaydi [1]. AG natijasida rivojlanadigan yurak va buyrak shikastlanishlari nogironlik va o'lim ko'rsatkichlarining oshishiga olib keladi.

So'nggi yillarda yurak va buyrak faoliyatining o'zaro patofiziologik bog'liqligi asosida shakllanadigan kardioresnal sindrom klinik tibbiyotning dolzarb yo'nalishiga aylandi. ADQI (Acute Dialysis Quality Initiative) klassifikatsiyasiga ko'ra KRSning beshta asosiy turi mavjud bo'lib, AG fonida asosan 2-tip (surunkali yurak disfunktsiyasi → buyrak shikastlanishi) va 4-tip (surunkali buyrak kasalligi → yurak shikastlanishi) ko'proq uchraydi [2,3].

AG sharoitida uzoq davom etuvchi gemodinamik yuklama glomerulyar gipertenziya, nefroskleroz va miokard remodelingiga olib keladi. Renin-angiotenzin-aldosteron tizimi (RAAS) faollashuvi angiotenzin II sekretsiasining ortishiga sabab bo'lib, vazokonstriksiya, natriy retensiyasi, oksidlovchi stress va fibroz jarayonlarini kuchaytiradi [4]. Shu bilan birga simpatik nerv tizimi giperaktivligi va endotelial disfunktsiya mikrosirkulyatsiya buzilishlarini chuqurlashtiradi.

Zamonaviy tadqiqotlarda oksidlovchi stress, interleukin-6 (IL-6), o'simta nekrozi omili alfa (TNF- α) va CRP kabi yallig'lanish mediatorlari kardioresnal shikastlanish progressiasining muhim biomarkerlari sifatida ko'rilmogda [5]. Bundan tashqari, NT-proBNP darajasining oshishi yurak gemodinamik yuklamasi va SYning erta belgisi hisoblanadi. Albuminuriya va GFR pasayishi esa buyrak glomerulyar apparati shikastlanishining ishonchli markerlari hisoblanadi [6].

Hozirgi kunga qadar KRSning molekulyar va klinik mexanizmlari bo'yicha ko'plab tadqiqotlar olib borilgan bo'lsa-da, Markaziy Osiyo populyatsiyasida AG bilan kasallangan bemorlarda yurak va buyrak shikastlanishining parallel rivojlanishi yetarli darajada o'rganilmagan. Ayniqsa, NT-proBNP, albuminuriya va GFR ko'rsatkichlarining o'zaro bog'liqligi hamda ularning KRSni erta prognozlashdagi ahamiyati to'liq aniqlanmagan.

Tadqiqot maqsadi: AG bilan kasallangan bemorlarda KRS rivojlanishining asosiy klinik-patogenetik mexanizmlarini laborator va instrumental ko'rsatkichlar asosida baholash.

Ilmiy yangilik: AG bilan kasallangan bemorlarda NT-proBNP, albuminuriya va GFR o'rtasidagi o'zaro bog'liqlikni aniqlash hamda KRSning erta diagnostik markerlarini kompleks baholash (birinchi marta Markaziy Osiyo populyatsiyasida multivariat va ROC-tahlil bilan).

MATERIALLAR VA METODLAR:

Prospektiv kuzatuv xarakteridagi klinik tadqiqot 2024–2025-yillarda Termiz shahridagi statsionar va ambulator tibbiyot muassasalarida olib borildi. Kuzatuv davomiyligi 12 oyni tashkil etdi.

Tadqiqotga AG tashxisi bilan davolanayotgan **142 nafar** bemor jalb qilindi. Nazorat guruhi sifatida **30 nafar** sogʻlom shaxs tekshirildi, unda 35–75 yosh, AG tashxisining mavjudligi (ESC/ESH 2018 mezonlari boʻyicha), AG davomiyligi kamida 5 yil, Tadqiqotda ishtirok etishga yozma rozilik.

Oʻtkir miokard infarkti (oxirgi 6 oy ichida), Terminal buyrak yetishmovchiligi ($GFR < 15 \text{ ml/min/1.73m}^2$), Onkologik kasalliklar, Autoimmun patologiyalar, Ogʻir infeksiyon kasalliklar, Homiladorlik va laktatsiya

Bemorlar AG darajasi (ESC/ESH 2018 boʻyicha Grade 1–3) va ADQI mezonlari asosida KRS mavjudligiga qarab quyidagicha guruhlariga ajratildi:

Guruh	Tavsif	n
1-guruh	AG Grade 1–2 (SAB 130–159 / DAB 85–99)	54
2-guruh	AG Grade 3 (SAB ≥ 180 / DAB ≥ 110)	48
3-guruh	AG + KRS (ADQI 2 va 4-turlari)	40
Nazorat	Sogʻlom shaxslar	30

Tekshiruv usullari

Klinik tekshiruv: SAB va DAB oʻlchashi (kunduzgi 3 marta, simobli sfigmomanometr), Tana vazni indeksi (BMI, kg/m^2), Yurak urish soni (YUS), Shikoyatlar va anamnez yigʻish

Instrumental tekshiruv: Sutkalik arterial bosim monitoringi (SABM, “Spacelabs 90217”), Elektrokardiografiya (EKG, “Schiller AT-102” 12 tarmoqli), Exokardiografiya (EchoKG, “Philips HD7” 2,5-3,5 MHz, Simpson usuli), Buyrak ultratovush tekshiruvi (“Toshiba Xario”, 3,5-5 MHz)

Laborator tekshiruv: Umumiy qon va siydik tahlili, Kreatinin (Jaffe usuli), mochevina (ureaza usuli), Albuminuriya: immunoturbidimetriya (mg/kun), Lipid profili, elektrolitlar, CRP: immunoturbidimetriya (mg/l), NT-proBNP: elektrokhemiluminessensiya (pg/ml)

Statistik tahlil: Dastur: SPSS 26.0 (IBM Corp., Armonk, NY), Natijalar: $M \pm SD$ (oʻrtacha $\pm$ standart ogʻish), Guruhlararo taqqoslash: ANOVA (post-hoc Tukey) va Student t-test, Korrelyatsiya: Pearson (normal taqsimotda) va Spearman

(normal bo'lmaganda), Multivariat logistik regressiya (KRS xavf omillari), ROC-tahlil (AUC, sezuvchanlik, o'ziga xoslik; DeLong usuli), $p < 0,05$ statistik ahamiyatli deb qabul qilindi

NATIJALAR:

1. Bemorlarning umumiy tavsifi

Bemorlarning o'rtacha yoshi $58,4 \pm 7,2$ yosh (35–75 yosh) bo'lib, erkaklar 54,2%, ayollar 45,8% ni tashkil qildi.

Yosh guruhlari bo'yicha taqsimot

Yosh guruhi	1-guruh (n=54)	2-guruh (n=48)	3-guruh (n=40)	p (1 vs 3)
35–44 yosh	22,2%	10,4%	5,0%	$<0,05$
45–59 yosh	48,1%	43,7%	32,5%	$>0,05$
≥ 60 yosh	29,7%	45,9%	62,5%	$<0,001$

Kasallik davomiyligi: 1-guruhda $6,2 \pm 1,4$ yil; 2-guruhda $9,8 \pm 2,1$ yil; 3-guruhda $13,6 \pm 2,8$ yil ($p < 0,001$).

2. Klinik simptomlar

Klinik belgi	1-guruh	2-guruh	3-guruh	p (trend)
Hansirash	24,1%	48,7%*	82,5%**	$<0,001$
Periferik shishlar	9,2%	28,4%*	67,5%**	$<0,001$
Taxikardiya	18,5%	36,2%*	58,0%**	$<0,001$
Tungi poliuriya	12,9%	24,6%	45,0%**	$<0,01$
Yurak sohasida og'riq	20,3%	41,5%*	52,5%**	$<0,01$
*Izoh: * $p < 0,05$ (1-guruhga nisbatan); ** $p < 0,05$ (1 va 2-guruhlarga nisbatan)*				

3. Gemodinamik ko'rsatkichlar

Ko'rsatkich	1-guruh	2-guruh	3-guruh	p
SAB (mm sim. ust.)	148,2±4,6	164,5±5,2*	178,4±6,1**	<0,001
DAB (mm sim. ust.)	92,6±3,2	101,4±3,8*	108,2±4,4**	<0,001
YUS (t/min)	78,4±3,6	86,2±4,1*	94,8±4,6**	<0,001

4. Laborator ko'rsatkichlar

Ko'rsatkich	Nazorat (n=30)	1-guruh	2-guruh	3-guruh	p (trend)
Kreatinin (mkmol/l)	78,4±3,1	96,2±4,2	118,6±5,1*	156,3±6,8**	<0,001
Mochevina (mmol/l)	5,1±0,3	6,4±0,4	8,2±0,5*	11,6±0,7**	<0,001
GFR (ml/min/1,73m ²)	98,6±4,5	82,4±3,8	64,8±3,1*	46,2±2,9**	<0,001
CRP (mg/l)	2,8±0,2	5,6±0,4	9,8±0,6*	16,4±0,9**	<0,001
NT-proBNP (pg/ml)	96±8	214±16	486±28*	964±42**	<0,001
Albuminuriya (mg/kun)	12,5±1,6	38,4±3,2	94,6±5,8*	248,2±10,4* *	<0,001

5. Elektrokardiografiya natijalari

EKG o'zgarishi	1-guruh	2-guruh	3-guruh	p
Chap qorincha gipertrofiyasi	31,4%	62,5%*	77,5%**	<0,001
Sinus taxikardiyasi	22,2%	43,7%*	60,0%**	<0,001

EKG o'zgarishi	1-guruh	2-guruh	3-guruh	p
ST-T o'zgarishlari	14,8%	29,1%	52,5%**	<0,01

6. Exokardiografiya natijalari

Ko'rsatkich	1-guruh	2-guruh	3-guruh	p
Chap qorincha devori qalinligi (mm)	11,2±0,4	13,6±0,6*	15,1±0,7**	<0,001
Ejeksion fraksiya (%)	61,4±2,2	56,8±2,1*	48,2±1,8**	<0,001
Diastolik disfunksiya (%)	18,5%	44,3%*	68,0%**	<0,001

7. Buyrak ultratovush tekshiruvi

3-guruhdagi 32 nafar bemorda (80,0%) kortikomeduliyar differensiasiya pasayishi, 28 nafarida (70,0%) parenxima zichlashuvi va 18 nafarida (45,0%) buyrak o'lchamlarining kichrayishi (<9 sm) aniqlandi ($p < 0,01$ 1-guruhga nisbatan).

8. Korrelyatsion tahlil (Pearson)

Ko'rsatkichlar juftligi	r	p
NT-proBNP ↔ Albuminuriya	0,71	<0,001
Kreatinin ↔ GFR	-0,76	<0,001
CRP ↔ Chap qorincha gipertrofiyasi	0,64	<0,01
SAB ↔ Albuminuriya	0,58	<0,05
Yosh ↔ GFR	-0,62	<0,01
Yosh ↔ NT-proBNP	0,59	<0,01

9. Multivariat logistik regressiya (KRS xavf omillari)

Omil	OR	95% CI	p
Yosh (≥ 60)	3,42	1,78–6,58	<0,001
AG davomiyligi (≥ 10 yil)	2,98	1,54–5,76	<0,01
NT-proBNP (≥ 500 pg/ml)	4,12	2,01–8,44	<0,001
Albuminuriya (≥ 100 mg/kun)	3,67	1,89–7,12	<0,001
GFR (< 60 ml/min)	3,91	1,95–7,85	<0,001

10. ROC-tahlil natijalari

Biomarker	AUC	95% CI	Sezuvchanlik	O'ziga xoslik	Optimal kesish nuqtasi
NT-proBNP	0,89	0,84–0,94	85,0%	81,2%	512 pg/ml
Albuminuriya	0,84	0,78–0,90	80,0%	77,5%	105 mg/kun
GFR	0,81	0,75–0,87	77,5%	75,0%	58 ml/min

MUHOKAMA

Ushbu tadqiqot AG uzoq davom etishi yurak va buyrakning parallel struktur-funksional shikastlanishiga olib kelishini va KRS bosqichma-bosqich rivojlanishini tasdiqladi. Yangi jihatlardan biri shundaki, KRS shakllanishi faqat terminal bosqichda emas, balki AGning dastlabki bosqichlaridayoq boshlanishi aniqlandi. 1-guruhda GFR ning yengil pasayishi ($82,4 \pm 3,8$ ml/min), albuminuriya paydo bo'lishi ($38,4 \pm 3,2$ mg/kun) hamda chap qorincha gipertrofiyasining boshlang'ich belgilari (31,4%) subklinik o'zgarishlar erta rivojlanishini ko'rsatadi.

NT-proBNP ning guruhlar bo'yicha progressiv oshishi ($96 \rightarrow 214 \rightarrow 486 \rightarrow 964$ pg/ml) miokard devoriga tushayotgan gemodinamik yuklama va SYV og'irligini aks ettiradi.

NT-proBNP va albuminuriya o'rtasidagi kuchli musbat korrelyatsiya ($r=0,71$; $p<0,001$) yurak va buyrak shikastlanishining parallel rivojlanishini tasdiqlaydi. ROC-tahlil NT-proBNP ning KRS diagnostikasida yuqori samaradorlikka ega ekanligini ko'rsatdi ($AUC=0,89$).

CRP darajasining bosqichma-bosqich ortib borishi ($2,8 \rightarrow 5,6 \rightarrow 9,8 \rightarrow 16,4$ mg/l) surunkali yallig'lanish KRS patogenezidagi muhim rolini tasdiqlaydi. Yallig'lanish mediatorlari endotelial disfunktsiya, oksidlovchi stress va fibroz jarayonlarini kuchaytirib, yurak va buyrak to'qimalarining progressiv shikastlanishiga olib keladi [5,7].

Albuminuriya va GFR buyrak funksional holatining eng muhim markerlari sifatida namoyon bo'ldi. GFR ning progressiv pasayishi ($98,6 \rightarrow 82,4 \rightarrow 64,8 \rightarrow 46,2$ ml/min) nefronlar filtratsion faoliyatining izchil buzilib borayotganini ko'rsatdi. Multivariat tahlil GFR <60 ml/min KRS xavfini 3,91 barobar oshirishini aniqladi.

Exokardiografik tekshiruvlar chap qorincha devori qalinlashuvi, EF pasayishi va diastolik disfunktsiya AG davomiyligi bilan parallel rivojlanishini ko'rsatdi. 2-guruhda yurak remodelingining boshlang'ich bosqichlari, 3-guruhda esa sistolik-diastolik disfunktsiya va SYB belgilari ustunlik qildi.

Tadqiqot natijalari ADQI klassifikatsiyasiga mos ravishda bemorlarda asosan **2-tip KRS** (surunkali yurak disfunktsiyasi $\rightarrow$ buyrak shikastlanishi) shakllanganligini ko'rsatdi. Shu bilan birga, ayrim bemorlarda GFR ning keskin pasayishi va yuqori albuminuriya 4-tip elementlari mavjudligini ham ko'rsatdi. Seleksion bias (faqat statsionar bemorlar) – ambulator bemorlarni ham qamrab olish kerak.

XULOSA:

1. AG uzoq davom etishi yurak va buyrakning parallel struktur-funksional shikastlanishiga olib keladi. AG davomiyligi ≥ 10 yil bo'lgan bemorlarda KRS rivojlanish xavfi 2,98 barobar ($OR=2,98$; 95% CI 1,54–5,76) yuqori.
2. Klinik simptomlar (hansirash, periferik shishlar, tungi poliuriya) va gemodinamik ko'rsatkichlar (SAB, DAB, YUS) guruhlararo bosqichma-bosqich kuchayib boradi. 3-guruhda hansirash (82,5%) va periferik shishlar (67,5%) ustunlik qiladi.
3. Laborator ko'rsatkichlardan **NT-proBNP** ($AUC=0,89$; kesish nuqtasi 512 pg/ml), **albuminuriya** ($AUC=0,84$; 105 mg/kun) va **GFR** ($AUC=0,81$; 58 ml/min) KRSni erta aniqlashda yuqori diagnostik ahamiyatga ega.
4. NT-proBNP va albuminuriya o'rtasidagi kuchli musbat korrelyatsiya ($r=0,71$; $p<0,001$) yurak va buyrak shikastlanishining parallel rivojlanishini tasdiqlaydi. Bu ikki biomarker KRS patogenezida “organ-organ” dialogining o'ziga xos belgisi sifatida xizmat qiladi.

5. EchoKGda chap qorincha gipertrofiyasi (77,5%) va diastolik disfunktsiya (68,0%) AG bilan og'irlashgan sari ortadi va KRS ning muhim mexanizmlaridan biridir.
6. **Yosh ≥ 60** (OR=3,42; 95% CI 1,78–6,58) va **AG davomiyligi ≥ 10 yil** (OR=2,98) KRS rivojlanishining mustaqil xavf omillari hisoblanadi.
7. **Amaliy tavsiyalar:**
 - o AG bilan kasallangan barcha bemorlarda kamida yiliga 1 marta **albuminuriya, GFR va NT-proBNP** ni aniqlash.
 - o NT-proBNP ≥ 500 pg/ml yoki albuminuriya ≥ 100 mg/kun bo'lgan bemorlarda kardiorenal nazoratni kuchaytirish (3 oyda 1 marta qayta tekshiruv).
 - o GFR < 60 ml/min bo'lgan bemorlarda nefroprotektiv davolash (RAAS blokatorlari) va yurak yetishmovchiligi profilaktikasini boshlash.
8. Keyingi tadqiqotlar uchun: molekulyar biomarkerlar (NGAL, KIM-1, galektin-3) va RAAS faolligini (renin, aldosteron) o'z ichiga olgan ko'p markazli, uzoq muddatli kuzatuv tadqiqotlari o'tkazish zarur.

QISQARTMALAR RO'YXATI

Qisqartma	To'liq nomi (o'zbek/ruscha)	English
AG	Arterial gipertoniya	Arterial hypertension
KRS	Kardiorenal sindrom	Cardiorenal syndrome
RAAS	Renin-angiotenzin-aldosteron tizimi	Renin-angiotensin-aldosterone system
SYU	Surunkali yurak yetishmovchiligi	Chronic heart failure
SBK	Surunkali buyrak kasalligi	Chronic kidney disease
GFR	Glomerulyar filtratsiya tezligi	Glomerular filtration rate
CKD-EPI	Chronic Kidney Disease Epidemiology Collaboration	—

Qisqartma	To'liq nomi (o'zbek/ruscha)	English
NT-proBNP	N-terminal pro-brain natriuretic peptide	—
CRP	C-reaktiv oqsil	C-reactive protein
SAB	Sistolik arterial bosim	Systolic blood pressure
DAB	Diastolik arterial bosim	Diastolic blood pressure
SABM	Sutkalik arterial bosim monitoringi	Ambulatory blood pressure monitoring
EKG	Elektrokardiografiya	Electrocardiography
EchoKG	Exokardiografiya	Echocardiography
BMI	Tana massasi indeksi	Body mass index
ADQI	Acute Dialysis Quality Initiative	—
AUC	Area under the curve	—
ROC	Receiver operating characteristic	—
OR	Odds ratio	—
CI	Confidence interval	—

FOYDALANILGAN ADABIYOTLAR

1. Williams B, Mancia G, Spiering W, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension. European Heart Journal. 2018;39(33):3021-3104. doi:10.1093/eurheartj/ehy339

2. Ronco C, Haapio M, House AA, Anavekar N, Bellomo R. Cardiorenal syndrome. *Journal of the American College of Cardiology*. 2008;52(19):1527-1539. doi:10.1016/j.jacc.2008.07.051
3. Rangaswami J, Bhalla V, Blair JEA, et al. Cardiorenal syndrome: Classification, pathophysiology, diagnosis, and treatment strategies. *Circulation*. 2019;139(16):e840-e878. doi:10.1161/CIR.0000000000000664
4. Ma K, Gao W, Xu H, Liang W, Ma G. Role and mechanism of the renin-angiotensin-aldosterone system in the onset and development of cardiorenal syndrome. *International Journal of Hypertension*. 2022;2022:3239057. doi:10.1155/2022/3239057
5. Zannad F, Rossignol P, Iraqi W. Extracellular matrix fibrotic markers in heart failure and cardiorenal syndrome. *Heart Failure Reviews*. 2018;23(3):319-329. doi:10.1007/s10741-018-9682-1
6. Hadjiphilippou S, Kon SP. Cardiorenal syndrome: Review of our current understanding. *Journal of the Royal Society of Medicine*. 2016;109(1):12-17. doi:10.1177/0141076815618617
7. Kumar U, Garimella PS, Wettersten N. Cardiorenal syndrome: Pathophysiology. *Cardiology Clinics*. 2019;37(3):251-265. doi:10.1016/j.ccl.2019.04.001
8. House AA, Anand I, Bellomo R, et al. Definition and classification of cardiorenal syndromes. *Contributions to Nephrology*. 2010;165:33-38. doi:10.1159/000313721
9. Johns EJ. Functional insights into the cardiorenal syndrome. *Hypertension Research*. 2024;47(8):1747-1749. doi:10.1038/s41440-024-01809-7
10. Baxromovna, Amirova Sabrina, and Kenjayev Yodgor Mamatqulovich. "Insult kassaligining profilaktikasi va uning reabilitatsiyadagi ahamiyati. *Synapses: Insights across the Disciplines*, 2 (1), 81–85." 30 Apr. 2025.
11. Halilova Gulniso Ilhom qizi, & Kenjayev Yodgor Mamatqulovich. (2025). Bolalarda miopiyaning erta tashxisi va profilaktikasi. *SYNAPSES: Insights across the Disciplines*, 2(3), 92–97. Retrieved from <https://inlibrary.uz/index.php/siad/article/view/76876>.
<https://doi.org/10.5281/zenodo.15097781>
12. Kenjayev Y., & Muhammadiyev B. (2025). Miakard infarkti: reabilitatsiyasi va profilaktikasi. *Medicine, Pedagogy and Technology: Theory and Practice*, 3(3), 246–250. Retrieved from <https://inlibrary.uz/index.php/mpttp/article/view/76866>.
<https://doi.org/10.5281/zenodo.15092194>

13. Kenjayev Y., & Berdiyeva S. (2025). Ayollar jinsiy a'zolarining o'sma kasalliklari. Journal of Science-Innovative Research in Uzbekistan, 3(3), 18–22. Retrieved from <https://inlibrary.uz/index.php/journal-science-innovative/article/view/72303>. <https://zenodo.org/records/15001302>
14. Murodova F., & Kenjayev Y. (2025). Qandli diabetning kelib chiqish va davolash usullari. Journal of Science-Innovative Research in Uzbekistan, 3(3), 23–27. Retrieved from <https://inlibrary.uz/index.php/journal-science-innovative/article/view/72302>. <https://zenodo.org/records/15001330>
15. Kenjayev Y., & Erkayeva G. (2025). Yo'ldosh tushish davri va ilk chilla davrida qon ketishi terminal holati. Journal of Science-Innovative Research in Uzbekistan, 3(3), 13–17. Retrieved from <https://inlibrary.uz/index.php/journal-science-innovative/article/view/72304>. <https://zenodo.org/records/15001267>
16. Пайғамова Шахнозобону Ўктамжон қизи, & Кенжаев Ёдгор Маматқулович. (2025). Фертиликни тиклаш учун лапароскопик усулларнинг самарадорлиги. ACUMEN: International Journal of Multidisciplinary Research, 2(2), 414–421. Retrieved from <https://inlibrary.uz/index.php/aijmr/article/view/72283>. <https://doi.org/10.5281/zenodo.14956699>
17. Xudoyberdiyeva Adiba, & Kenjayev Yodgor. (2025). Jigarning tuzilishi va funksional birliklarini gistomorfologik o'rganishni baholash. SYNAPSES: Insights across the Disciplines, 2(2), 194–207. Retrieved from <https://inlibrary.uz/index.php/siad/article/view/69197>. <https://doi.org/10.5281/zenodo.14938642>
18. Kenjayev Y., & Xudoyorova U. (2025). Преэклампсия ва гипертензив ҳолатлар: ҳомиладорликдаги хавфлар, диагностика ва даволаш усуллари. ACUMEN: International Journal of Multidisciplinary Research, 2(2), 306–314. Retrieved from <https://inlibrary.uz/index.php/aijmr/article/view/68857>. <https://doi.org/10.5281/zenodo.14920022>
19. Tog'aymurotova Shaxnoza Samid qizi, & Kenjayev Yodgor Mamatqulovich. (2025). Bosh miya o'smalari: sabablari, belgilari va davolash usullari. ACUMEN: International Journal of Multidisciplinary Research, 2(2), 279–286. Retrieved from <https://inlibrary.uz/index.php/aijmr/article/view/68839>. <https://doi.org/10.5281/zenodo.14919587>
20. Kenjayev Yodgor Mamatqulovich, & Farxodova Afruza Farxodovna. (2025). Ishlab chiqarishda zararli omillar ta'sirini kamaytirish uchun maxsus biologik

- qo'shimchalarni qo'llash. International Conference On Interdisciplinary Science, 2(2), 162–164. <https://doi.org/10.5281/zenodo.14911314>
21. Xaydarov Saidrahim Ismoil o'g'li, & Kenjayev Yodgor Mamatqulovich. (2025). Yurakning orttirilgan va tug'ma nuqsonlarida elektrokardiografiyada ko'zatiladigan o'zgarishlar. SYNAPSES: Insights across the Disciplines, 2(2), 129–136. Retrieved from <https://inlibrary.uz/index.php/siad/article/view/69171>. <https://doi.org/10.5281/zenodo.14894036>
22. Kenjayev Yodgor Mamatkulovich, & Sultonova Dilfuza. (2025). Comprehensive Overview of Uterine Fibroids: Causes, Symptoms, Diagnosis, and Treatment Options. International scientific innovation research conference, 2(1), 26–29. <https://doi.org/10.5281/zenodo.14884425>
23. Kenjayev Yodgor Mamatkulovich, & Sultonova Dilfuza. (2025). Erectile dysfunction: causes, treatment, and prevention. international conference on medicine, science, and education, 2(2), 30–33. <https://doi.org/10.5281/zenodo.14884145>
24. Daminova Shahnoza Panji qizi, Kenjayev Yodgor Mamatkulovich. (2025). Analysis of electrocardiographic changes in congenital and acquired heart defects [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.14874480>
25. Халилова Гулнисо Илхом кизи, & Кенжаев Ёдгор Маматкулович. (2025). Глаукома: белгилари ва даволаш усуллари. ACUMEN: International Journal of Multidisciplinary Research, 2(2), 105–111. Retrieved from <https://inlibrary.uz/index.php/aijmr/article/view/65764>. <https://doi.org/10.5281/zenodo.14860323>
26. Daminova Shahnoza Panji qizi, & Kenjayev Yodgor Mamatqulovich. (2025). Sistemali kasalliklarning ko'z sog'lig'iga ta'siri: kardilogik va endokrin kasalliklar. Journal of new century innovations, 70(2), 17-20. <https://scientific-jl.com/new/article/view/1650>
27. Кенжаев Ёдгор Маматкулович, & Мамадалиева Гулзода Низомжон кизи. (2025). Нейроилм ва когнитив бузилишлар: хотира ва диққатни яхшилашга қаратилган замонавий нейротехнологиялар. ACUMEN: International Journal of Multidisciplinary Research, 2(1), 322–329. Retrieved from <https://inlibrary.uz/index.php/aijmr/article/view/65750>. <https://doi.org/10.5281/zenodo.14812358>
28. Kenjayev Y., & Farxodova A. (2025). Yurak etishmovchiligi bo'lgan bemorlarni rehabilitatsiya qilishning innovatsion usullari. Journal of Science-Innovative Research in Uzbekistan, 3(1), 705–718. Retrieved from

<https://inlibrary.uz/index.php/journal-science-innovative/article/view/65794>.

<https://zenodo.org/records/14796329>

29. Kenjayev Yodgor Mamatqulovich, & Xudoyorova Ummulaylo Shuxrat qizi. (2025). Jigar sinusoid kapilyarlaridagi o'zgarishlar gemangiomani tekshirishning samarali usullari. *Medicine, Pedagogy and Technology: Theory and Practice*, 3(1), 384–390. Retrieved from <https://inlibrary.uz/index.php/mpttp/article/view/64925>
<https://doi.org/10.5281/zenodo.14742643>
30. Amirova Sabrina Baxromovna, & Kenjayev Yodgor Mamatqulovich. (2025). Insult kassaligining profilaktikasi va uning reabilitatsiyadagi ahamiyati. *SYNAPSES: Insights across the Disciplines*, 2(1), 81–85. Retrieved from <https://inlibrary.uz/index.php/siad/article/view/64586>
<https://doi.org/10.5281/zenodo.14740048>