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COVID-19 VA BUYRAK YETISHMOVCHILIGI

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Tayanch so’zlar: COVID-19, koronavirus infektsiyasi, buyrak zararlanishi, buyrak yetishmovchiligi.
Ключевые слова: COVID-19, коронавирусная инфекция, поражение почек, почечная недостаточность.
Key words: COVID-19, coronavirus infection, kidney damage, kidney failure.

COVID-19 o'tkir respirator xastalik bilan xarakterlanadi, 70% ga yaqin bemorlar yengil grippga o'xshash belgilarni o’tqazishsa, 30% bemorlar og'ir yoki jiddiy klinik kechish kuzatilib poliorgan zararlanishgacha olib kelishi mumkin (masalan, nefro-, kardio-, gemo-, va neyropatiyalar kabi) va intensiv davo olayotgan 50% bemorlar dializga muhtoj bo’lishi mumkin. Bular orasida o'tkir buyrak zararlanishi (O’BZ) yuqori o'lim xavfiga olib keluvchi jiddiy asoratdir. Ushbu maqolada O’BZ va Covid-19 tushunchalarini ko’rib chiqamiz. COVID-19 pandemiya bo'lib, undan vafot etganlar soni yuqori ko’rsatkichlarni tashkil etdi. O'tkir buyrak zararlanishi (O’BZ) va surunkali buyrak kasalligi (SBK) bilan og'rigan bemorlarda COVID-19 asoratlari rivojlanish xavfi yuqori bo’lib o’z navbatida COVID-19 infektsiyasi ham buyrak funksiyasining buzilishiga olib kelishi mumkin. COVID-19 li bemorlarda buyrak faoliyati muhimligini hisobga olgan holda, ushbu maqolaning maqsadi buyrak va COVID-19 haqida mavjud ma'lumotlarni o'rganishdir. Biz COVID-19 bemorlarida buyrak shikastlanishining asosiy mexanizmlarini va dializ va buyrak transplantatsiyasi bilan og'rigan bemorlarni davolash prinsiplarini umumlashtiramiz. SARSCoV-2 o'tkir respirator sindromi davrida O’BZ bilan og'rigan bemorlarni erta nazorotga olish va buyraklar faoliyatini sinchkovlik bilan tahlil qilishga alohida e'tibor berish juda muhim degan xulosaga keldik.

COVID-19 И ПОЧЕЧНАЯ НЕДОСТАТОЧНОСТЬ

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COVID-19 является острым респираторным заболеванием, около 70% больных имеют легкие гриппоподобные симптомы, а 30% больных имеют тяжелое или крайне тяжелое клиническое течение, которое может привести к полиорганному поражению (например, как нефро-, кардио-, гемо- и нейропатии) и 50% пациентов интенсивной терапии могут нуждаться в диализе. Среди них острое почечное повреждение (ОПП) является серьезным осложнением с высоким риском летального исхода. В этой статье мы рассмотрим понятия ОПП и Covid-19. COVID-19 — это пандемия, и число погибших очень велико. Пациенты с острым повреждением почек (ОПП) и хронической болезнью почек (ХБП) имеют высокий риск развития осложнений от COVID-19, в свою очередь, заражение COVID-19 также может вызвать почечную недостаточность. Учитывая важность функции почек у пациентов с COVID-19, целью этой статьи является обзор доступной информации о почках и COVID-19. Мы обобщаем основные данные о механизмах повреждения почек у пациентов с COVID-19 и принципы лечения пациентов с диализом и трансплантацией почки. Делаем вывод, что очень важно уделять особое внимание ранней госпитализации больных с ОПП и тщательному анализу функции почек при остром респираторном синдроме SARS-CoV-2.

COVID-19 AND KIDNEY FAILURE

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COVID-19 is an acute respiratory disease, about 70% of patients have mild flu-like symptoms, and 30% of patients have a severe or extremely severe clinical course that can lead to multiple organ damage (for example, nephro, cardio, hemo, and neuropathies) and 50 % of intensive care patients may need dialysis. Among them, acute kidney injury (AKI) is a serious complication with a high risk of death. In this article, we will look at the concepts of AKI and Covid-19. COVID-19 is a pandemic and the death toll is very high. Patients with acute kidney injury (AKI) and chronic kidney disease (CKD) are at high risk of developing complications from COVID-19, in turn, infection with COVID-19 can also cause kidney failure. Given the importance of kidney function in patients with COVID-19, the purpose of this article is to review the available information about the kidney and COVID-19. We summarize the main data on the mechanisms of kidney injury in patients with COVID-19 and the principles of management of dialysis and kidney transplant patients. We conclude that it is very important to pay special attention to early hospitalization of patients with AKI and a thorough analysis of kidney function in acute respiratory syndrome SARS-CoV-2.

Kirish. Coronaviridae oilasiga mansub viruslar sutemizuvchilar va qushlarda kasallik keltirib chiqarishi va ijobiy ma'noli bir zanjirli RNKni o'z ichiga olgan konvertli zarrachalarga ega bo'lishi mumkin. Koronavirus infektsiyasi tumov kabi yengil holatdan tortib og'ir kasalliklargacha, jumladan, og'ir o'tkir respirator sindromli koronavirus (SARS-CoV), Yaqin Sharq respirator sindromi koronavirusi (MERS-CoV) va og'ir o'tkir respirator sindromga olib kelishi mumkin. COVID -19 – boshqa viruslar tarqalish mexanizmi kabi insonlar orasida aksirish va yo'tal yoki bemor ajralmalari bilan kontakt orqali yuqadi. COVID-19 kasalligi yoshi keksa va surunkali respirator kasalliklari, yondosh kasalliklari, xafaqon va nefropatiya kabi boshqa surunkali kasalliklari bo’l-

gan bemorlarda kasallik nisbatan og’irroq kechadi. COVID-19 kasalligining asosiy simptomlariga umumiy holsizlik, tana haroratining ko’tarilishi va quruq yo'tal, shuningdek, balg'am ajralishi, bosh og'rig'i, ich ketishi, nafas yetishmovchiligi va limfopeniya kiradi. Ayni kunlarda COVID-19 uchun effektiv davolash rejalarini topish bo‘yicha ko‘plab tajribalar amalga oshirilmoqda. Profilaktik emlashni yo’lga qo’yish yoki yangi dori namunalarini topish uning eng yetakchi bosqichidir. Ammo, ba'zi keng ta’sir doirali dorilar COVID-19 bilan kasallangan bemorlarda infektsiyani yengil o’tishi uchun qo'llaniladi. Kam hollarda poliorgan yetishmovchilik rivojlanadi, bu esa COVID-19 dan letallikni statistik jihatdan oshiradi. COVID-19 bilan kasallangan bemorlarda a’zolar disfunksiyasi 35% ga yaqin sodir bo'lishi ehtimol qilinadi, ularning 7-10% o'tkir buyrak zararlanishi (O’BZ) bilan bog'liq. SARS va MERS-CoV infektsiyalari bo'yicha eski ma'lumotlarga ko'ra, 5-15% hollarda O’BZ rivojlanishi qayd etilgan [19]. COVID-19 ning rivojlanishi buyrak funksiyasining buzilishi yoki shikastlanishiga, shuningdek respirator tizimining zararlanishiga olib keladi. COVID-19 bilan og'rigan bemorlarda buyrak funksiyasi ahamiyatliligini hisobga olgan holda, ushbu maqola buyrak yetishmovchiligi va COVID-19 haqidagi mavjud ma'lumotlarga asoslangan.

COVID-19 va buyrak yetishmovchiligi. Nefropatiyasi bo'lgan bemorlarda COVID-19 o’g’ir o’tish xavfi yuqori va O’BZ koronavirus bilan kasallangan bemorlar uchun yuqori xavf omilidir [19]. Shunungdek, buyrak disfunksiyasi SARS-CoV-2 infektsiyasining asoratlaridandir. Tadqiqotlar natijasi shuni ko'rsatdiki, buyrak yetishmovchiligi COVID-19 bilan kasalxonaga yotqizilgan bemorlarda ko'proq uchraydi va kasalxonada o'limning oshishiga olib keladi. Aksariyat hollarda, koronavirus bilan kasallangan bemorlarda proteinuriya (47%), gematuriya (24%), qonda mochevina oshishi (13%) va plazma kreatininining ko'payishi (16%) kuztilishi mumkin [4]. Izlanishlarda bemorlarning 3% da dastlabki kunlarda O’BZ rivojlandi. Ushbu tadqiqot buyrak shikastlanishining oldini olish uchun COVID-19 bilan kasallangan bemorlarda gemodinamik stabillik va nefrotoksik dorilardan foydalanmaslik, shuningdek siydik tahlilidek nazorat va qo’llab quvvatlash darkorligini ko’rsatadi [4]. Ushbu tadqiqotga qarshi boshqa tadqiqot shuni ko'rsatdiki, COVID-19da O’BZ kam kuzatiladi va SARSCoV-2 infektsiyasi COVID-19 bilan kasallangan bemorlarda buyrak funksiyasining buzilishiga yoki surunkali buyrak kasalligi (SBK) kuchayishiga olib kelmaydi [23]. Qon va boshqalar qon plazmasida mochevina va kreatinin sezilarli o'zgarishlarisiz glomerulyar filtratsiya tezligi (66,7%), kreatinin klirensi (41,7%) va mikroalbuminuriyaning ortishi (41,7%) darajasini ko'rsatdi. Ular siydikda mikroalbuminni, alfa1-mikroglobulinni, immunoglobulin-G va transferrin miqdorini o'lchash COVID-19 bilan kasallangan bemorlarda buyrak shikastlanishini erta tashhislashda samaraliroq deb ta’kidlashadi [12]. Izlanishlar natijasida shunday xulosa qilish mumkinki, COVID-19 infektsiyasi buyrak tubulointerstitsial tizimni to’g’ridan to’g’ri zaralashi va o'tkir buyrak yetishmovchiligini yuzaga keltirishi mumkin. COVID-19 bilan kasallangan 42 bemorning retrospektiv tahlili shuni ko'rsatdiki, bemorlarning 30 foizi o'tkir buyrak yetishmovchiligi, ayniqsa keksa bemorlarda yuzaga keldi. Bundan tashqari, o'limdan keyingi buyrak to'qimalarining tekshiruvi limfotsitar infiltratsiyani, og'ir o'tkir kanalchalar nekrozini va buyrak kanalchalarida virusli nukleokapsid oqsil antigenining to'planishini tasdiqladi [6].

COVID-19 bilan og'rigan bemorlarning siydigida SARS-CoV-2 virus zarralari mavjudligi virus zarralarining glomerulyar to'siq orqali kirib borishi bilan bog'liq bo'lishi mumkin[26]. Shuningdek, yangi koronavirusli pnevmoniya bilan og'rigan bemorlarning 51,67 foizida proteinuriya qayd etilgan, chunki pnevmoniyaning og'irligi siydikdagi oqsil darajasiga bevosita bog'liq edi [24]. COVID-19 va buyrak transplantatsiyasini qabul qiluvchilar. Infisirlanish - transplantatsiyadan keyingi butun davr davomida buyrak retsipiyentlari uchun kasallanish va o'limning asosiy sababidir. Viruslar invaziyasi - transplantatsiyadan keyingi opportunistik infektsiyaning eng keng tarqalgan sabablaridandir. Organ transplantatsiyasidan keyin faol invaziv virusli infektsiyaga hissa qo'shadigan turli omillar bo’lib yallig'lanish, transplantatni rad etish, to'qimalarning shikastlanishi va immunitetni susayishni o'z ichiga oladi [20]. Davom etayotgan pandemiya davrida SARS-CoV-2 infektsiyasi Xitoy va Ispaniyadan kelgan buyrak transplantatsiyasi bilan kasallangan bemorlarda qayd etilgan [9,14]. Metilprednizolonning past dozali rejimlari bilan birga immunosupressantlar miqdorini kamaytirish uzoq muddatli immunosupressiv terapiyada buyrak retsipiyentlarida COVID-19 pnevmoniyasini yengillashi mumkin [27]. Transplantatsiya qilingan bemorlarda COVID-19 bilan kasallanish bo'yicha ma'lumotlar kam bo'lsa-da, kasallikning tarqalishini oldini olish uchun profilaktik amaliyot va tavsiyalarga amal qilish tavsiya

etiladi [18,1].

COVID-19 va dializ qabul qiluvchi bemorlar. COVID-19 gemodializ (GD) markazlaridagi dializ oluvchi bemorlarga jiddiy xavf soladi. Dializ oluvchi bemorlar SARS-CoV-2 infektsiyasiga qolgan insonlarga nisbatan ko'proq zaifdirlar [21]. COVID-19 bilan kasallangan GD bemorlarining 16% o'limi yurak-qon tomir kasalliklari, serebrovaskulyar kasalliklar va giperkalemiya tufayli sodir bo'lgan, ammo faqat COVID-19 pnevmoniyasi tufayli emas [16]. GD oluvchi bemorlarda yallig'lanish sitokinlarining nazorat guruhiga nisbatan yuqoriroq bo'lishiga qaramay, boshqa COVID-19 turlari bilan taqqoslaganda, COVID-19 bilan kasallangan GD oluvchi bemorlarda yallig'lanish sitokinlarining darajasi pastroq bo'lgan. Bundan tashqari, COVID-19 bilan kasallangan GD oluvchilarda periferik qonning mononuklear hujayralarida limfositlar soni COVID-19 bilan kasallangan boshqa bemorlarga nisbatan pastroq ko'rsatkichlarda bo'lgan [16]. Hozirgi vaqtda HD markazlarida SARS-CoV-2 infektsiyasini GD oluvchi bemorlar va ularning oilalari, tibbiyot xodimlari, ishchilar va boshqalarga yuqish xavfi ancha yuqori [19]. Shu sababli, bir qancha GD markazlari uchun ko'rsatmalar chiqarildi. Profilaktika, himoya, diagnostika, izolyatsiya qilish va tarqatish GD markazlarida COVID-19 tarqalishini kamaytirish va toldini olishning asosiy tamoyillari bo'lganligi uchun, COVID-19 bilan og'rigan dializ qabul qiluvchi bemorlarini olib borishda standart protokollarga amal qilishlari kerak [2].

COVID-19 da buyrak disfunktsiyasi mexanizmlari. Qator izlanishlar shuni ko‘rsatdiki, SARS-CoV-2 infektsiyasi davrida buyrak zararlanishi COVID-19 bemorlarining og‘ir holatlarida o‘lim bilan kuchli bog‘liq. Aniq mexanizm to'la-to’kis aniqlanmagan bo'lsada, angiotenzinni aylantiruvchi ferment 2 (AAF2) ekspressiyalovchi hujayralarning SARS-CoV infektsiyasiga o’ta sezgirligi bilan bog'liq bo'lishi mumkin [3]. SARS-CoV-2 hujayralarga AAF2 retseptorlari va hujayra transmembran serin proteazlari (TMSPR) yordamida koreseptor sifatida kiradi. ACE2 membrana bilan bog'langan aminopeptidaza sifatida o'pkada, yurakda, ichaklarda, buyraklarda yuqori darajada yig’iladi va immun tizim, yurak-qon tomir tizimlari va buyraklar faoliyatida asosiy rol o'ynaydi [10,22]. SARS-CoV-2 virusining AAF2 ga ulanishi orqali buyrak naychalariga kirishi hujayraga toksik ta’sir ko’rsatib buyrak disfunksiyasiga olib keladi [7].

Buyrak hujayralarida bir hujayrali RNK ketma-ketligi tahlili shuni ko'rsatdiki, AAF2 proksimal kanalcha hujayralari va podotsitlarda TMSPR bilan birgalikda ifodalanadi, bu buyrak hujayralari SARS-CoV-2 infektsiyasi bilan zararlanganligini ko'rsatadi. TMSPR –virus yuzasidagi bitishuvchi oqsillarini aktivlashtirib, xo’jayin hujayralar bilan membranani birlashtiradi [25]. SARS-CoV infektsiyasida o'tkir respirator distress sindromi (O’RDS) va turli organlar yetishmovchiligi patogenezida ishtirok etadigan sitokin bo'roni sindromi kuchli yallig'lanish reaksiyasi bilan bog'liq namoyon bo’ladi. Virusning organlarda, ayniqsa buyraklarda ko'payishi tizimli virusli sepsis va tizimli yallig'lanish reaksiyalarini yuzaga keltiradi, keyinchalik ko'plab a’zolarda hujayra zararlanadi [13].

Bundan tashqari, SARS-CoV-2 infektsiyasi yallig'lanishga qarshi sitokinlarni (IL-4, IL-10, IL-1b, IFN-c, IP-10 va MCP-1) va xemokinlarni (CCL2, CCL3, CCL5, CXCL1, CXCL8 va CXCL9) ajralib chiqishi orqali sitokinlar kaskadini faollashtiradi va SARS-CoV va MERS-CoV infektsiyalarida kuzatilganidek, bemorning o'limiga olib keladi [15,8]. Bundan tashqari, COVID-19 bilan og'rigan bemorlarda buyrak yetishmovchiligi rabdomioliz, gipoksiya, suvsizlanish, yondosh kasalliklarning mavjudligi va steroid bo'lmagan yallig'lanishga qarshi dorilarni noto'g'ri qo'llash natijasida yuzaga kelishi mumkin [17,11].

AAF2 ga asoslangan terapevtik strategiyalar. Dastlab yengil o’zgarishlar sifatida namoyon bo'lgan buyrakdagi o’zgarishlar, keyinchalik bemorlarning sezilarli qismida og'ir O’BZ deb tashhis qo'yilishi mumkin. COVID-19 bilan og'rigan bemorlarda O’BZ muhim prognostik omil bo'lib, bemorlarni ko'proq maqsadli aralashuvlar bilan davolash maqsadga muvofiq. Olingan ma'lumotlar shuni ko'rsatadiki, buyrak hujayralari AAF2 va TMSPR2 ifodasi tufayli COVID-19 virusining maqsadli organlaridan biri hisoblanadi. Virusning biriktiruvchi oqsili, TMSPR proteazi va AAF2 retseptoriga qaratilgan agentlar profilaktika va terapiya uchun potentsial klinik strategiyalar bo'lishi mumkin [5].

Xulosa: COVID-19 virusi AAF2 ni ekspressiyalovchi hujayralarga hujum qiladi va ko‘plab a’zolarga zarar yetkazadi. COVID-19 sababli yuzaga kelgan nefropatiya letallik va kasallanishni sezilarli darajada oshiradi. Bemorlarning buyrak faoliyatini diqqat bilan nazorat qilish, nefrotoksik tekshiruvlar va preparatlarni qabulini oldini olish, aylanib yuruvchi qon hajmini va a’zolarning

kislorodga to’yinishini nazorat qilish zarurdir. Tasdiqlangan davolash sxemalari mavjud bo'lmaganda, ko'p a'zolar yetishmovchiligi bo'lgan COVID-19 bilan og'rigan bemorlarni parvarish qilishda kuchli qo'llab-quvvatlovchi choralar zarur. COVID-19 haqidagi o'rganilmagan tushunchalar haqida tobora ko'proq yangi ma'lumotlarni aniqlash uchun qo'shimcha tadqiqotlar talab etiladi.

Foydalanilgan adabiyotlar:

1. Р. А. Ибадов, Г. Ш. Хамраева, С. Х. Ибрагимов Ключевые стратегии организации работы отделений реанимации и интенсивной терапии на этапах пандемии COVID-19 // Вестник врача, № 2 (99), 2021. С.134-140. DOI: 10.38095/2181-466X-2021992-134-140
2. Х. Т. Мирахмедова, Г. Х. Исканова, С. Ш. Эгамова Предикторы повреждения почек при COVID-19 // Вестник врача, № 3.1 (96), 2020. С.63-66.
3. Andrea G, Daniele D, Barbara A, Davide M, Laura A, Paolo R, et al. Coronavirus Disease 2019 and Transplantation: a view from the inside. Am J Transplant. 2020. doi: 10.1111/ ajt.15853.
4. Basile C, Combe C, Pizzarelli F, Covic A, Davenport A, Kanbay M, et al. Recommendations for the prevention, mitigation and containment of the emerging SARS-CoV-2 (COVID-19) pandemic in haemodialysis centres. Nephrol Dial Transplant. 2020. doi: 10.1093/ndt/gfaa069.
5. Burchfield J. Renin-Angiotensin-Aldosterone System: Double-Edged Sword in COVID-19 Infection. Preprints 2020.
6. Cheng Y, Luo R, Wang K, Zhang M, Wang Z, Dong L, et al. Kidney impairment is associated with in-hospital death of COVID-19 patients. MedRxiv. 2020. doi: 10.1101/2020.02.18.20023242.
7. Deng YY, Zheng Y, Cai GY, Chen XM, Hong Q. Singlecell RNA sequencing data suggest a role for angiotensin-converting enzyme 2 in kidney impairment in patients infected with 2019-nCoV. Chin Med J. 2020. doi: 10.1097/CM9.0000000000000783.
8. Diao B, Feng Z, Wang C, Wang H, Liu L, Wang C, et al. Human kidney is a target for novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. MedRxiv. 2020. doi:10.1101/2020.03.04.20031120
9. Fan C, Li K, Ding Y, Lu WL, Wang J. ACE2 expression in kidney and testis may cause kidney and testis damage after 2019-nCoV infection. MedRxiv. 2020. doi: 10.1101/2020.02.12.20022418.
10. Fu Y, Cheng Y, Wu Y. Understanding SARS-CoV-2Mediated Inflammatory Responses: From Mechanisms to Potential Therapeutic Tools. Virol Sin. 2020. doi: 10.1007/ s12250-020-00207-4.
11. Guillen E, Pineiro GJ, Revuelta I, Rodriguez D, Bodro M, Moreno A, et al. Case report of COVID□19 in a kidney transplant recipient: Does immunosuppression alter the clinical presentation? Am J Transplant. 2020. doi: 10.1111/ajt.15874.
12. Guo L, Yu K, Li D, Yang H, Liu L, Fan J, et al. Potential Pathogenesis of Multiple Organ Injury in COVID-19. Preprints 2020. doi: 10.20944/preprints202003.0308.v1.
13. Hamming I, Timens W, Bulthuis ML, Lely AT, Navis G, van Goor H. Tissue distribution of ACE2 protein, the functional receptor for SARS coronavirus. A first step in understanding SARS pathogenesis. J Pathol. 2004;203:6317.
14. Hong Xw, Chi Zp, Liu Gy, Huang H, Guo Sq, Fan Jr, et al.
15. Jin Y, Yang H, Ji W, Wu W, Chen S, Zhang W, et al. Virology, Epidemiology, Pathogenesis, and Control of COVID-19. Viruses. 2020;12:372.
16. Li Q, Cheng Q, Zhao Z, Zeng L, Zhu L, Guo W, et al. Novel Coronavirus Infection and Acute Kidney Injury in Two Renal Transplant Recipients: Case Report. Preprints 2020. Analysis of early renal injury in COVID-19 and diagnostic value of multi-index combined detection. MedRxiv. 2020. doi: 10.1101/2020.03.07.20032599.
17. Li X, Geng M, Peng Y, Meng L, Lu S. Molecular immune pathogenesis and diagnosis of COVID-19. J Pharm Anal. 2020. doi: 10.1016/j.jpha.2020.03.001.
18. Ma Y, Diao B, Lv X, Zhu J, Liang W, Liu L, et al. 2019 novel coronavirus disease in hemodialysis (HD) patients: Report from one HD center in Wuhan, China. MedRxiv. 2020. doi: 10.1101/2020.02.24.20027201.
19. Menachery VD, Yount BL Jr, Debbink K, Agnihothram S, Gralinski LE, Plante JA, et al. A SARS-like cluster of circulating bat coronaviruses shows potential for human emergence. Nat Med. 2016;22:446. doi: 10.1038/nm0416446d.
20. Michaels MG, La Hoz RM, Danziger Isakov L, Blumberg EA, Kumar D, Green M, et al. Coronavirus disease 2019: Implications of emerging infections for transplantation. Am J Transplant. 2020. doi: 10.1111/ajt.15832.
21. Naicker S, Yang CW, Hwang SJ, Liu BC, Chen JH, Jha V. The novel coronavirus 2019 epidemic and kidneys. Kidney Int. 2020. doi: 10.1016/j.kint.2020.03.001.
22. Safarova G.A. Features of the clinical course of covid-19 in comorbid conditions (A literature review) //New day in medicine 6 (38) 2021 ISSN 2181-712X. EISSN 2181-2187 pages 88-95
23. Safarova G.A. The significance of duplex scan in chronic kidney disaese during coronavirus infection// New day in medicine 5 (43) 2022 ISSN 2181-712X. EISSN 2181-2187
24. Tolouian R ZVS, Ghiyasvand S, Tolouian A, Ardalan MR. COVID-19 interactions with angiotensin-converting enzyme 2 (ACE2) and the kinin system; looking at a potential treatment. J Renal Inj Prev. 2020;9:e19. doi: 10.34172/jrip.2020.19

25. Wang L, Li X, Chen H, Yan S, Li D, Li Y, et al. Coronavirus disease 19 infection does not result in acute kidney injury: an analysis of 116 hospitalized patients from Wuhan, China. Am J Nephrol. 2020. doi: 10.1159/000507471.
26. Xie Z, Bao J, Cai Z, Liu S, Chen H, Qi J, et al. Clinical Characteristics of 60 COVID-19-Infected Patients with or Without Renal Injury In Hangzhou, China. Xie, Zhijun and Bao, Jianfeng and Cai, Zhaobin and Liu, Shourong and Chen, Haiping and Qi, Jianjiang and Yu, Jianhua and Guo, Jianchun and Miu, Liangbin and Li, Zhaoyi and Sun, Jing and Yang, Hui and Huang, Lin and Tang, Yujun and Li, Zhiyu and Zhang, Yi and Huang, Jinsong and Wen, Chengping, Clinical Characteristics of 60 COVID19-Infected Patients with or Without Renal Injury In Hangzhou, China (February 19, 2020). Available at SSRN: https://ssrn.com/abstract=3541126.
27. Xu D, Zhang H, Gong HY, Chen JX, Ye JQ, Meng T, et al. Identification of a Potential Mechanism of Acute Kidney Injury During the Covid-19 Outbreak: A Study Based on Single-Cell Transcriptome Analysis. Preprints 2020.
28. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature. 2020;579:270-3.
29. Zhu L, Xu X, Ma K, Yang J, Guan H, Chen S, et al. Successful recovery of COVID□19 pneumonia in a renal transplant recipient with long□term immunosuppression. Am J Transplant. 2020. doi: 10.1111/ajt.15869.