



ISSN: 2181-3426
Journal DOI: 10.26739/2181-3426



MARKAZIY OSIYO ENDOKRINOLOGIK JURNALI

ЦЕНТРАЛЬНО АЗИАТСКИЙ ЭНДОКРИНОЛОГИЧЕСКИЙ ЖУРНАЛ

CENTRAL ASIAN ENDOCRINOLOGICAL JOURNAL

VOLUME 4

ISSUE 3

2024

MARKAZIY OSIYO ENDOKRINOLOGIK JURNALI

4 ЖИЛД, 3 СОН

ЦЕНТРАЛЬНО АЗИАТСКИЙ ЭНДОКРИНОЛОГИЧЕСКИЙ ЖУРНАЛ
ТОМ 4, НОМЕР 3

CENTRAL ASIAN ENDOCRINOLOGICAL JOURNAL
VOLUME 4, ISSUE 3

«ТУРАКУЛОВ УКИШЛАРИ»
илмий-амалий анжуман
«ТУРАКУЛОВСКИЕ ЧТЕНИЯ»
научно-практическая конференция
«TURAKULOVS READINGS»
Scientific and practical conference

МАТЕРИАЛЫ КОНФЕРЕНЦИИ

Учредитель:

Национальная
Ассоциация
эндокринологов
Узбекистана.

Tadqiqot.uz



ТОШКЕНТ-2024



MARKAZIY OSIYO ENDOKRINOLOGIK JURNALI

ЦЕНТРАЛЬНО АЗИАТСКИЙ ЭНДОКРИНОЛОГИЧЕСКИЙ ЖУРНАЛ | CENTRAL ASIAN ENDOCRINOLOGICAL JOURNAL

№3 (2024) DOI <http://dx.doi.org/10.26739/2181-3426-2024-3>

Бош мухаррир:
Главный редактор:
Chief Editor:

Хайдарова Ф. А.
Заместитель директора РСНПМЦ
Эндокринологии по лечебной работе, главный
эндокринолог РУз, д.м.н., профессор

Бош мухаррир ўринбосари:
Заместитель главного редактора:
Deputy Chief Editor:

Халимова З. Ю.
Заместитель директора РСНПМЦ
Эндокринологии по науке, д.м.н.,
профессор

Маъсул котиб:
Ответственный секретарь:
Executive Secretary:

Каланходжаева Ш. Б.
Заведующая Учебного центра при
РСНПМЦ Эндокринологии, к.м.н.

Техник котиб:
Технический секретарь:
Technical Secretary:

Сиддиқов А.А.
РСНПМЦ Эндокринологии

ТАХРИРИЙ МАСЛАХАТ КЕНГАШИ | РЕДАКЦИОННЫЙ СОВЕТ | EDITORIAL BOARD

Т. Камалов

Заведующий Отделением гнойные осложнения
сахарного диабета, Республиканского
Специализированного Научно-Практического
Медицинского Центра Эндокринологии имени
академика Ё. Х. Туракулова
д.м.н.

М. Каримов

ГУ “РСНПМЦТ и МР”, руководитель
отдела гастроэнтерологии, д.м.н.,
Профессор

Д. Набиева

Ташкентская медицинская академия,
заведующая кафедрой факультетской и
госпитальной терапии №1 с курсом
профессиональных заболеваний, д.м.н.,
доцент

Н. Алиханова

Заведующая научного отдела Диабетологии
РСНПМЦ Эндокринологии, д.м.н.

Г. Наримова

Заведующая отделением Тиреоидной патологии
РСНПМЦ Эндокринологии, д.м.н.

Н. Юлдашева

Руководитель отдела патологии сетчатки и
зрительного нерва РСНПМЦ
Эндокринологии, д.м.н.

Л. Аббосхужаева - старший научный
сотрудник, к.м.н. РСНПМЦЭ Председатель
Эндокринологической и Диабетической
Ассоциации Узбекистана

Ю. Урманова

Доцент кафедры эндокринологии с детской
эндокринологией ТашПМИ, д.м.н.

Н. Алимова

С.н.с. Отдела детской эндокринологии
РСНПМЦ Эндокринологии. Главный педиатр
эндокринолог МЗ РУз к.м.н

А. Садыкова

Учёный секретарь, к.м.н.

А. Холикова

Заведующая отделением нейроэндокринологии
РСНПМЦ Эндокринологии, д.м.н.

А. Алиева

Заместитель главного врача по стационару
Республиканского специализированного научно-
практического медицинского центра
эндокринологии МЗ РУз имени академика
Я.Х.Туракулова, к.м.н.

Н. Садикова

Ташкентская медицинская академия,
доцент кафедры Внутренние болезни
№2, к.м.н.

А. Каримов

Руководитель отделения нейрохирургии
РСНПМЦ Эндокринологии, директор РСНПМЦ
Неврологии и Инсульта, к.м.н.

РЕДАКЦИОННАЯ КОЛЛЕГИЯ:

А. Алимов - Заместитель министра здравоохранения начальник Главного управления здравоохранения, д.м.н., профессор

Д. Нажмутдинова - Ташкентская медицинская академия, профессор кафедры Внутренние болезни №2, д.м.н., профессор

Ж. Аканов - ОФ “Казахстанское общество по изучению диабета”, Президент, к.м.н., главный внештатный эндокринолог г. Алматы, главный врач Центра Диабета МК “ААА”, член AASD, ISE

Ф. Бахритдинова - Ташкентская медицинская академия, профессор кафедры Офтальмологии, д.м.н., профессор

М. Каттаходжаева - Ташкентский Государственный Стоматологический Институт, профессор кафедры акушерства-гинекологии, д.м.н., профессор

В. Мирзаде - Председатель Азербайджанской Ассоциации Эндокринологии, Диабетологии и Терапевтического Обучения, Заведующий кафедрой терапии Азербайджанского государственного Института совершенствования врачей им. А. Алиева, Председатель Научного Общества Эндокринологов Азербайджана, Пожизненный член Международной Диабетической Федерации, д.м.н., профессор

З. Камалов - Институт иммунологии и геномики человека АН РУз, заместитель директора по научной работе, заведующий лабораторией иммунорегуляции, д.м.н., профессор;

Э. Гроссман - Член академии медицинских наук Великобритании, Заслуженный профессор эндокринологии Оксфордского университета, Старший научный сотрудник Колледжа Грин Темплтон, профессор нейроэндокринологии Барт и Лондонской школы медицины, Консультант эндокринолог Лондонского клинического центра эндокринологии

А. Шек - Руководитель лаборатории ИБС и атеросклероза РСНПМЦ Кардиологии МЗ РУз, д.м.н., профессор

Ф. Тураев - директор Республиканского специализированного научно-практического медицинского центра эндокринологии имени академика Ё.Х. Туракулова, д.м.н.

Б. Шагазатова - Ташкентская медицинская академия, профессор кафедры внутренних болезней №2, д.м.н.

М. Пауэлл - Старший консультант нейрохирург Национальной больницы неврологии и нейрохирургии, Директор по образованию нейрохирургии в Великобритании, член комитета и экзаменатор Межвузовского совета по нейрохирургии Королевского хирургического колледжа

В. Панькив - Заведующий отделом профилактики, лечения сахарного диабета и его осложнений Украинского научно-практического центра эндокринной хирургии, трансплантации эндокринных органов и тканей МЗ Украины, эксперт МЗ Украины по эндокринологии, Заслуженный врач Украины д.м.н., профессор

Б. Даминов - Ректор Ташкентского Педиатрического Медицинского Института, д.м.н., Профессор

Т. Хегай - Заведующая лабораторией геномно-клеточных технологий Института иммунологии и геномики человека АН РУз, д.м.н.

Е. Георгадзе - Профессор Национального института эндокринологии Тбилиси MD, PhD

Т. Саатов - Институт Биофизики и биохимии при НУ Уз, заведующий лабораторией Метаболизма, доктор биологических наук, профессор, академик АН РУз.

Р. Базарбекова - Председатель РОО «Ассоциация врачей-эндокринологов Казахстана», заведующий кафедрой эндокринологии КазМУНО, д.м.н., профессор

Л. Туйчиев - Ташкентская медицинская академия, заведующий кафедрой инфекционных и детских инфекционных болезней, д.м.н., профессор

А. Гадаев - Профессор кафедры внутренних болезней 3 Ташкентской медицинской академии, д.м.н.

Г. Рахимова - Заведующая кафедрой эндокринологии Центра развития профессиональной квалификации медицинских работников, д.м.н., профессор

Ш. Зуфарова - директор Республиканского центра репродуктивного здоровья населения, д.м.н., профессор кафедры акушерства и гинекологии

1. Наримова Гулчехра Джуманиязовна, Анварова Севарахон Шухрат кизи. РАЗЛИЧИЯ В ПОКАЗАТЕЛЯХ СОСТАВА ТЕЛА МЕЖДУ ВОЗРАСТНЫМИ ГРУППАМИ У ЛЮДЕЙ С ИЗБЫТОЧНЫМ ВЕСОМ И ОЖИРЕНИЕМ.....	7
2. Далимова Гузаль Абдурашидовна, Максудова Диёра Дониеровна, Кодирова Фарангиз Кудратовна, Кодиров Шохрух Йулдошевич, Назарова Бахора Уктамовна, Салихова Зебо Абдулзохидовна, Салохутдинов Хасан Садриддинович, Салохутдинов Хусан Садриддинович ГОРМОНАЛЬНО-НЕАКТИВНЫЕ АДЕНОМЫ ГИПОФИЗА: КЛИНИЧЕСКИЕ ОСОБЕННОСТИ (ОБЗОРНАЯ СТАТЬЯ).....	15
3. Ахмедова Шахноза Улугбековна, Бегматов Бобирмирзо Бахромович ДИСБАКТЕРИОЗ МИКРОФЛОРЫ КИШЕЧНИКА И ЕГО КОРРЕКЦИЯ У ДЕТЕЙ С САХАРНЫМ ДИАБЕТОМ 1 ТИПА.....	19
4. Ахмади Табасом, Муслимова Хадижат Муратовна, Титова Виктория Викторовна ИЗУЧЕНИЕ КОМОРБИДНОЙ ПАТОЛОГИИ У ПАЦИЕНТОВ С САХАРНЫМ ДИАБЕТОМ 2 ТИПА.....	24
5. Юлдашева Нодира Махмуджановна, Ильясов Шоодил Шосайдмагруппович ОСНОВНЫЕ ПРОЦЕССЫ, ВЕДУЩИЕ К РАЗВИТИЮ КАТАРАКТЫ ПРИ САХАРНОМ ДИАБЕТЕ.....	31
6. Хайдарова Феруза Алимовна, Нурмухамедов Дониёрбек Бахтиёрвич, Омилжонов Муроджон Нусратжонович ҚАЛҚОНСИМОН БЕЗ ТУГУНЛИ ХОСИЛАЛАРИДА ТИРАДС ВА ЕВРО-ТИРАДС ТИЗИМЛАРИНИ ҚИЁСИЙ ТАХЛИЛИ (АКАДЕМИК Ё.Х. ТУРАҚУЛОВ НОМИДАГИ РИЭИАТМ КЛИНИКАСИДА).....	41
7. Алимов Анвар Валиевич, Муратова Шахло Тахиржановна, Махмудова Сахобат Мухсим кизи СЕМИЗЛИГИ БОР МЕТАБОЛИК ЖАРРОХЛИК ЎТКАЗГАН БЕМОРЛАР ПСИХОЛОГИК САЛОМАТИДАГИ ЎЗИГА ХОСЛИКЛАР.....	46
8. Нажмутдинова Дилором Камариддиновна, Садикова Азизахон Собит кизи СОВРЕМЕННЫЕ МЕТОДЫ ЛЕЧЕНИЯ ОЖИРЕНИЯ.....	54
9. Халимова Замира Юсуфовна, Дадаханова Марям Бахтияровна "ЭФФЕКТИВНОСТЬ ПРИМЕНЕНИЯ КЛАССИФИКАЦИИ ACR TI-RADS У ПАЦИЕНТОВ С УЗЛОВЫМИ ОБРАЗОВАНИЯМИ ЩИТОВИДНОЙ ЖЕЛЕЗЫ ДЛЯ ПУНКЦИОННОЙ БИОПСИИ».....	59
10. Alimuxamedova Gulrux Aybekovna, Sultonova Xurshida Tavakkalovna AYOLLARDA SEMIZLIK VA REPRODUKTIV DISFUNKSIYADA ASPROSINNING ROLI VA ANAMIYATI.....	66
11. Муратова Шахло Тахиржановна, Алимов Анвар Валиевич ОСОБЕННОСТИ ТИРЕОИДНОГО СТАТУСА ДЕТЕЙ И ПОДРОСТКОВ С БОЛЕЗНЬЮ ГРЕЙВСА, ПРОЖИВАЮЩИЕ В УСЛОВИЯХ ЙОДДЕФИЦИТА.....	75
12. Урунбаева Дилором Анваровна, Омонова Зилола Тохтамурод кизи ИССЛЕДОВАНИЕ ГИПОГЛИКЕМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ПРЕПАРАТА ИГЛАРЛИКСИ (СОЛИКВА) У БОЛЬНЫХ С САХАРНЫМ ДИАБЕТОМ 2 ТИПА.....	84

13. Рахимова Гульнара Нишановна, Иброхимов Худойберди Хусанжон угли ЧТО ИЗВЕСТНО О НАТРИЙ-ГЛЮКОЗНОМ КО-ТРАНСПОРТЕРЕ 1 ТИПА?	92
14. Убайдуллаева Дилфуза Бекмаматовна, Юлдашева Нодира Махмуджановна ДИСТИРЕОИДНАЯ ОПТИЧЕСКАЯ НЕЙРОПАТИЯ	100
15. Парпиева Наргиза Нусратовна, Рахимова Гулнара Нишановна, Тилляшайхова Ирода Мирзагалебовна ОЖИРЕНИЕ И COVID-19	108
16. Камилджанова Барно Рахимовна, Халимова Замира Юсуфовна, Сиддиқов Абдулбосит Адхамжон ўғли ЎЗБЕКИСТОН РЕСПУБЛИКАСИДА ҚАЛҚОНСИМОН БЕЗ САРАТОНИНИНГ ЭПИДЕМИОЛОГИК АСПЕКТЛАРИ, ТАШХИСЛАШ ВА ДАВОЛАШДАГИ МУАММОЛАРИ	114
17. Ботирхужа Лазизхужа Бобир угли, Юлдашева Нодира Махмуджановна ДИАБЕТИЧЕСКАЯ НЕЙРОДЕГЕНЕРАЦИЯ СЕТЧАТКИ	124
18. Alieva Anna Valeryevna, Khaydarova Feruza Alimovna, Khalilova Dilovar Zakhriddinovna, Saidova Saodat Khojiakbarovna, Salimova Alinur Samadovna, Aripova Malika Dilshadovna POST-COVID-19 DIABETES MELLITUS IN A CROSS-SECTIONAL STUDY: AUTOIMMUNE DISEASE WITH ENDOTHELIAL DYSFUNCTION?	131
19. Курганов Сардарходжа Каримович, Ибраимхўжаева Дилноза Бахадировна 2-ТИП ҚАНДЛИ ДИАБЕТ РИВОЖЛАНИШИДА ГЕНЕТИК ОМИЛЛАРНИНГ РОЛИ: ПОЛИМОРФИЗМЛАР ВА ПОПУЛЯЦИОН ТАҲЛИЛ	141
20. Дадаханова Марям Бахтияровна, Халимова Замира Юсуфовна "ГИСТО-ПАТОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА ПАЦИЕНТОВ С УЗЛОВЫМИ ОБРАЗОВАНИЯМИ ЩИТОВИДНОЙ ЖЕЛЕЗЫ ПО КЛАССИФИКАЦИИ BETHESDA»	150
21. Bazarova Sayora Abduvositovna, Najmutdinova Dilorom Kamariddinovna, Kuzieva Ma'mura Maxmudovna QANDLI DIABETNING SURUNKALI ASORATLARINI RIVOJLANISHIDA VITAMIN D3 YETISHMOVCHILIGINI AXAMIYATI	156
22. Зарединов Дамир Арифович, Нурмухамедов Дониёрбек Бахтиёрвич, Омилжонов Муроджон Нусратжонович ҚАЛҚОНСИМОН БЕЗ САРАТОНИ БИЛАН КАСАЛЛАНИШНИНГ РЕТРОСПЕКТИВ ТАҲЛИЛИ (АКАДЕМИК Ё.Х. ТУРАҚУЛОВ НОМИДАГИ РИЭИАТМ КЛИНИКА РЕГИСТРИ БЎЙИЧА)	164
23. Ibatov Javokhir Abdullayevich, Shamansurova Zulaykho Miralimjanovna IMPACT OF GLAUCOMA ON THE DEVELOPMENT OF BLINDNESS IN PATIENTS WITH DIABETIC RETINOPATHY	172
24. Дадаханова Марям Бахтияровна, Халимова Замира Юсуфовна "ОЦЕНКА ФУНКЦИОНАЛЬНОГО СОСТОЯНИЯ ПАЦИЕНТОВ С УЗЛОВЫМИ ОБРАЗОВАНИЯМИ ЩИТОВИДНОЙ ЖЕЛЕЗЫ»	180



Alieva Anna Valeryevna

doctor of medical sciences,

Khaydarova Feruza Alimovna

doctor of medical sciences, professor,

Khalilova Dilovar Zakhriddinovna

candidate of medical sciences,

Saidova Saodat Khojiakbarovna,

Salimova Alinur Samadovna,

Aripova Malika Dilshadovna

Republican Specialize Scientific-and-Practical Medical Centre of Endocrinology,
was named after academician Ya.Kh. Turakulov, Tashkent, Uzbekistan.

POST-COVID-19 DIABETES MELLITUS IN A CROSS-SECTIONAL STUDY: AUTOIMMUNE DISEASE WITH ENDOTHELIAL DYSFUNCTION?

 <http://dx.doi.org/10.5281/zenodo.14568674>

ANNOTATION

Purpose: To study the characteristics of diabetes occurring after contracting COVID-19. **Methods:** Hemostasis parameters, vitamin D levels, and beta cell-specific autoantibodies were tested in 70 patients with post-COVID-19-diagnosed diabetes. **Results:** In our cross-sectional study, we found a relatively high incidence of type 1 DM (16.7%) and LADA (4.76%) among adults who were diagnosed with DM after COVID-19. Adult patients with type 1 DM were younger, predominantly female, and had a high rate of family history of DM. The majority of patients with type 1 DM had mild COVID-19 and did not use corticosteroids during acute COVID-19. Patients with severe or mild COVID-19 also had a risk of diabetes onset. All patients with newly diagnosed DM had low vitamin D levels, although Uzbekistan has good insolation. New cases of DM were registered within 0 to 24 months after COVID-19. The majority of type 1 patients were diagnosed during the first 2 months and at 15-20 months after acute COVID-19. The incidence of new type 2 DM cases was consistent during the 2-year period after COVID-19. As expected, patients with type 2 HELLP syndrome had high D-dimer and von Willebrand factor levels. Type 1 DM patients, both adults and children, also had increased D-dimer and von Willebrand factor levels. VCAM-1 levels were high in all patients, including children, with the highest levels occurring in patients with LADA, indicating endothelial dysfunction. **Conclusion.** The increased incidence of type 1 DM with positive diabetes-specific antibodies after COVID-19 indicates damage to islet cells and their components by SARS-CoV-2 with further activation of autoimmune mechanisms. Young females with a family history of DM who were diagnosed with diabetes after COVID-19 should be tested for diabetes-specific antibodies for proper differentiation of the type of disease and timely insulin treatment. Type 1 DM that develops after COVID-19 should be treated as a disease associated with CVD and endothelial dysfunction. **Key words:** post-COVID-19, endothelial dysfunction, ICAM-1, VCAM-1, diabetes-specific antibodies.

Алиева Анна Валерьевна

доктор медицинских наук,

Хайдарова Феруза Алимовна

доктор медицинских наук, профессор,

Халилова Диловар Захриддиновна

кандидат медицинских наук,

Саидова Саодат Хожиякбаровна,

Салимова Алинур Самадовна,

Арипова Малика Дильшадовна

Республиканский специализированный научно-практический медицинский центр
эндокринологии имени академика Е.Х. Туракулова, Ташкент, Узбекистан

САХАРНЫЙ ДИАБЕТ 1 ТИПА ПОСЛЕ ПЕРЕНЕСЕННОЙ COVID-19 ИНФЕКЦИИ, ПЕРЕКРЕСТНОЕ ИССЛЕДОВАНИЕ: АУТОИММУННОЕ ЗАБОЛЕВАНИЕ С ЭНДОТЕЛИАЛЬНОЙ ДИСФУНКЦИЕЙ?

АННОТАЦИЯ

Актуальность: Нарушение функции эндотелия занимает одно из главенствующих мест в развитии макрососудистых осложнений у пациентов с Сахарным Диабетом (инсульт, инфаркт), а также в прогрессировании микрососудистых диабетических осложнений

Цель: изучить особенности течения диабета 1 типа, возникающего после перенесенной COVID-19 инфекции. **Материалы и методы:** Параметры гемостаза, уровень витамина D и у 70 пациентов были проверены специфические аутоантитела к бета клеткам поджелудочной железы. **Результаты:** В нашем перекрестном исследовании мы обнаружили относительно высокую заболеваемость СД 1 типа (16,7%) и LADA (4,76%) среди взрослых, у которых СД был диагностирован после COVID-19. Взрослые пациенты с СД 1 типа были моложе, преимущественно женского пола, и имели высокий уровень семейного анамнеза СД. Большинство пациентов с СД 1 типа имели легкую форму COVID-19 и не использовали кортикостероиды во время острого течения COVID-19. Пациенты с тяжелой или легкой формой COVID-19 также имели риск развития диабета. У всех пациентов с впервые выявленным СД наблюдался низкий уровень витамина D, хотя в Узбекистане хорошая инсоляция. Новые случаи СД зарегистрированы в сроки от 0 до 24 месяцев после заражения COVID-19. У большинства пациентов 1-го типа диагноз был диагностирован в течение первых 2 месяцев и через 15-20 месяцев после острого заболевания COVID-19. Заболеваемость новыми случаями СД 2 типа оставалась постоянной в течение двухлетнего периода после COVID-19. **Заключение.** Увеличение заболеваемости СД 1 типа с положительными диабет-специфическими антителами после COVID-19 свидетельствует о повреждении островковых клеток и их компонентов, SARS-CoV-2 с дальнейшей активацией аутоиммунных механизмов. Молодым женщинам с семейным анамнезом СД, у которых после COVID-19 был диагностирован сахарный диабет, необходимо пройти тестирование на диабет-специфические антитела для правильной дифференциации типа заболевания и своевременного лечения инсулином. СД 1 типа, развившийся после COVID-19, следует рассматривать как заболевание, связанное с сердечно-сосудистыми заболеваниями и эндотелиальной дисфункцией.

Ключевые слова: пост-COVID-19, эндотелиальная дисфункция, ICAM-1, VCAM-1, диабетспецифические антитела.

Aliyeva Anna Valerievna

tibbiyot fanlari doktori,

Xaydarova Feruza Alimovna

tibbiyot fanlari doktori, professor,

Khalilova Dilovar Zaynudinovna

tibbiyot fanlari nomzodi,

Saidova Saodat Xojiakbarovna,

Salimova Alinur Samadovna,

Aripova Malika Dilshodovna

Akademik Yo.X.Turakulov nomidagi Respublika ixtisoslashtirilgan endokrinologiya ilmiy- amaliy tibbiyot markazi, Toshkent, O'zbekiston

COVID-19 INFEKTSIYASIDAN KEYIN RIVOJLANGAN QANDLI DIABET 1TURI TADQIQOTI: ENDOTELIAL DISFUNKTSIYASI VA OTOIMMÜN KASALLIKMI?**ANNOTATSIYA**

Dolzarblik. Endoteliya funksiyasining buzilishi qandli diabet (insult, infarkt) bilan og'riqan bemorlarda makrososudli asoratlarning rivojlanishida, shuningdek, mikrososudli diabetik asoratlarning rivojlanishida yetakchi o'rinlardan birini egallaydi. **Maqsad:** COVID-19 infeksiyasini o'tkazib yuborganidan keyin yuzaga kelgan qandli diabet 1 turining xususiyatlarini o'rganish. **Materiallar va usullar:** 70 bemorda gemostaz parametrlar, D vitamini darajasi va oshqozon osti bezi beta hujayralariga xos autotanachalar tekshirildi. **Natijalar:** Bizning kesishgan tadqiqotimizda COVID-19 dan keyin qandli diabet 1 tur (16,7%) va LADA (4,76%) bilan kasallanishning nisbatan yuqori ekanligini aniqladik. Qandli diabet 1 turiga chalingan kattalar asosan ayollar bo'lib, oilada qandli diabetga moyillik darajasi yuqori edi. Qandli diabet 1 turiga chalingan bemorlarning ko'pchiligi COVID-19 ni engil o'tkazgan va COVID-19 ning o'tkir davrida kortikosteroidlar ishlatmagan. Og'ir yoki engil COVID-19 bilan og'riqan bemorlar ham diabet rivojlanishi xavfi ostida edi. Yangi aniqlangan qandli diabet bilan og'riqan barcha bemorlarda D vitamini darajasi past bo'lgan, ammo O'zbekistonda yaxshi insolyatsiya mavjudligi ma'lum. Yangi aniqlangan diabet COVID-19 infeksiyasidan keyin 0 oydan 24 oygacha bo'lgan vaqt ichida qayd etildi. **Xulosa:** COVID-19 dan keyin qandli diabetga xos ijobiy antitanachalar bilan qandli diabet 1 turining ko'payishi SARS-CoV-2 tomonidan oshqozon osti bezi orolchalari hujayralari va ularning tarkibiy qismlariga zarar yetkazilishiga va shu bilan birga autoimmun mexanizmlarining faollashishiga dalolat qiladi. COVID-19 dan keyin qandli diabet tashxisi qo'yilgan oilaviy qandli diabete bo'lgan yosh ayollar kasallik turini to'g'ri ajratish va insulin bilan o'z vaqtida davolash uchun qandli diabetga xos antitanachalar tekshiruvini o'tqazishlari kerak. COVID-19 dan keyin rivojlanadigan 1-tur diabetni yurak-qon tomir kasalliklari va endoteliya disfunktsiyasi bilan bog'liq kasallik deb hisoblash kerak. **Kalit so'zlar:** post-COVID-19, endoteliya disfunktsiyasi, ICAM-1, VCAM-1, diabetga xos antitanachalar.

Introduction. Patients with diabetes mellitus (DM) were the most vulnerable group to COVID-19 during the pandemic, and they had the highest risk of severe COVID-19 and death due to the disease [1,2]. Moreover, the consequences of SARS-CoV-2 infection are still present even after the end of the pandemic as the incidence of diabetes mellitus (DM) has increased. The type of new DM that appears after COVID-19 infection is a matter of investigation, taking into consideration the tropism of the SARS-CoV-2 virus for accessing pancreatic beta-cells, the wide use of corticosteroids during COVID-19 treatment, and cytokine effects in severe cases of infection [1]. However, the role of endothelial dysfunction in the onset of DM after COVID-19 is unclear [2]. Additionally, how long one can expect the appearance of new DM cases after contracting COVID-19 has yet to be studied. For example, Zhang et al. reported that 15.5 cases of DM after COVID-19 occurred per 1000 person-years, with a mean follow-up of 63 to 352 days. The risk of diabetes increases by 1.62 (95% CI, 1.45-1.80) after individuals have COVID-19, with the highest relative risk occurring during the first 3 months but continuing to risk for more than 6 months [3].

Materials and methods. In this cross-sectional study, we examined patients with post-COVID-19-diagnosed diabetes. Patients who met the following criteria were included: 1) had a diagnosis of diabetes based on the International Classification of Disease-10 (ICD-10) classification, 2) had a hemoglobin A1c level $\geq$ or equal to 6.5% (48 mmol/mol), 3) had a fasting glucose level $\geq$ 7.0 mmol/L, and 4) had a random plasma glucose level $\geq$ 11.0 mmol/L. The type of diabetes diagnosed was determined from the medical records of the patients.

Patients with a known history of diabetes before January 2020 and patients with gestational diabetes were excluded. Patients were enrolled in the study from June 2021 to January 2022.

Data on COVID-19 infection were extracted from the country database of COVID-19 patients, and the diagnosis was confirmed by PCR. COVID-19 severity was defined as follows based on the medical records of patients: mild COVID-19 was defined as the absence of fever, respiratory symptoms or signs of pneumonia on CT; moderate COVID-19 infection was defined as fever, respiratory symptoms, or CT signs of pneumonia; and severe disease was defined as shortness of breath with a respiratory rate ≥ 30 breaths/min, blood oxygen saturation $\leq 93\%$ at rest, or arterial partial pressure of oxygen (PaO₂)/fraction of inspired oxygen (FiO₂) ≤ 300 mm Hg Art. as hypoxemia and chest imaging with lesion progression greater than 50% within 24–48 hours.

All participants signed informed consent prior to enrollment. The research protocol was approved by the Ethics Committee of the RSSPMCE (#1-2021), and the study was conducted in accordance with the Declaration of Helsinki.

Clinical examination

Anthropometry and medical examination All parameters were taken from patients who had fasted overnight. Each subject underwent a basic medical examination with anthropometric measurements (height, weight, body mass index (BMI)). Data on the inpatient course (i.e., days of admission, use of corticosteroids) were obtained from available medical records.

Blood sampling and laboratory analysis

A peripheral venous blood sample was drawn from an indwelling cannula in each subject after 12 h of fasting. All blood samples collected were centrifuged at 5000 rpm and transported to a certified institutional laboratory.

Hemostasis parameters were tested using a Huma-Clot coagulometer. D-dimer and von Willebrand factor levels were tested using immune turbidimetry at Sismex CA-600.

Vitamin D levels were quantified in plasma by an electrochemiluminescent immunoassay (ECLIA) on a Cobas immunochemical analyzer.

The beta cell-specific autoantibodies (anti-insulin, anti-GAD, and anti-islet Abs), as well as the levels of ICAM and VCAM, were analyzed using an electrochemiluminescent ECLIA test (Cobas, UK).

Statistics. Normally distributed data are presented as the mean and standard deviation (SD). Categorical variables are presented as numbers and percentages. The mean differences between groups were calculated using two-sample t tests for normally distributed variables.

All analyses were performed in SPSS (version 23). Figures were created using OriginPro 8.6.

Results. In our study, we examined 70 patients who were diagnosed with diabetes after contracting COVID-19. As shown in Table 1, all children with newly diagnosed diabetes after coronavirus infection had type 1 DM (100% of 28 patients), while adults predominantly had type 2 DM (78.57% of 42 patients).

Table 1. Types of diabetes diagnosed in children and adults after COVID-19.

№	Type of DM	Number, (%)	
		Children (n=28)	Adults (N=42)
1	Type 1 DM:	28 (100%)	7 (16.7%)
	Anti-insulin Ab +	5 (17.86%)	-
	Anti-GAD-Ab +	14 (50.0%)	1
	Anti-islet Ab +	6 (21.43%)	(14.29%)
	No Ab -	3 (10.71%)	3
			(42.86%)
			3
			(42.86%)
2	Type 2 DM	-	33 (78.57%)
3	LADA (anti-islet Ab +)	-	2 (4.76%)

In our study, the most common antibody found in the observed children was GAD, indicating autoimmune type 1 DM. No antibodies were detected in a total of 10.71% of the children with DM. Adults were predominantly diagnosed with type 2 DM (79%). In 2 adult patients predominantly diagnosed with type 2 DM, antibodies against islet cells were detected; therefore, the type of diabetes was reclassified as LADA. These patients received metformin monotherapy and had target HbA1c levels (6.5% and 5.1%) at the time of the study.

A significant portion of adult patients have type 1 DM, possibly caused by direct damage to beta cells and their components caused by SARS-CoV-2.

As shown in Figure 1, adult patients with type 1 DM were younger than patients with type 2 diabetes and LADA were at the time of diabetes onset (32.43 ± 14.73 for type 1 DM vs 50.44 ± 9.73 for type 2 DM vs 61.0 ± 5.66 for LADA). The mean age of the children with newly diagnosed DM was 10.64 ± 4.47 years, ranging from 2 to 18 years.

The presence of overweight or obesity is associated with an increased risk of type 2 DM (3). In our study, patients with type 2 DM had a greater BMI (30.75 ± 6.11 kg/m²) than patients with type 1 DM (23.02 ± 6.54 kg/m²) or LADA (28.91 ± 2.22 kg/m²).

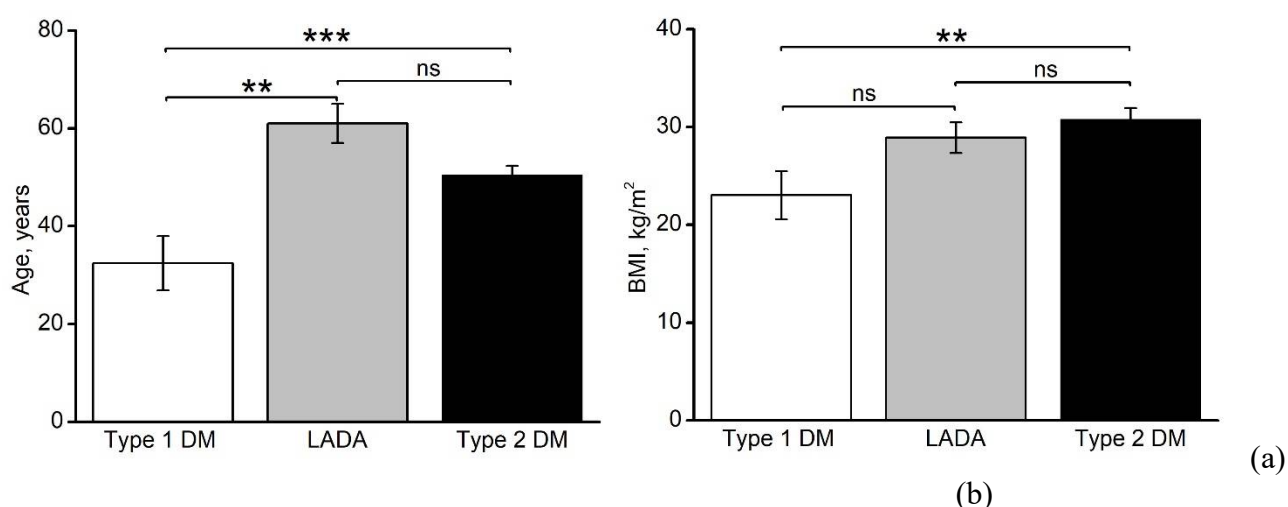


Fig. 1 Age (a) and BMI (b) of adult patients with newly diagnosed diabetes a) $p=0.002$ for age between type 1 DM and LADA, $p=0.0004$ between type 1 DM and type 2 DM; b) $p=0.005$ for BMI between type 1 DM and type 2 DM

Table 2 shows that adult patients with type 1 DM were predominantly female. However, the incidence of type 1 DM in the total population is greater in men [5]. There were no differences in sex between type 2 DM patients and children.

Table 2. The characteristics of patients with newly diagnosed diabetes according to diabetes type

Characteristic	Adults			Children (type 1 DM, n=28)
	Type 1 (n=7)	LADA (n=2)	Type 2 (n=33)	
Gender (male, %)	2 (28.57%)	0	19 (57.58%) $p=0.285$ comparing to type 1 adults	14 (50%) $p=0.322$ comparing to type 1 adults
Family history of DM	3 (42.86%)	-	21 (63.63%)	2 (7.14%)

COVID severity	5 (71.43%)	1 (50%) 1 (50%)	12 (36.36%)	17 (71.43%)
Mild	2 (28.57%)	0	18 (54.54%)	9 (32.14%)
Moderate	0		3 (9.09%)	2 (7.14%)
Severe				
Use of dexamethasone during COVID-19	1 (14.29%)	1 (50%)	18 (54.54%)	0
Vit D, ng/mL)	16.43±7.5	19.35±7.7	21.13±10.6	22.23±9.5
	4	1	9	6

A family history of diabetes is known to be high among patients with type 2 DM and relatively low among patients with type 1 DM [4]. In our study, 2/3 of the patients with T2DM and slightly less than half of those with T1DM had a family history of diabetes, while only 7% of the children had a family history of diabetes, which corresponds to the data before the COVID-19 era.

Only 3 patients with type 2 diabetes in our study had severe COVID-19. The vast majority of people with type 1 diabetes (71.43%) had mild COVID-19.

Half of the patients with type 2 diabetes and one of two patients with LADA received dexamethasone during the acute period of COVID-19. All patients had low vitamin D levels (Table 2).

Furthermore, we evaluated the time elapsed from acute COVID-19 to the onset (in patients with type 1 DM) or diagnosis (in patients with LADA and type 2 DM) of DM. New cases of DM were registered within 0 to 24 months after COVID-19, with a mean duration of 9.0 months for type 1 DM patients and 4.65 months for type 2 DM patients in adults ($p=0.224$) and 1.92 months for children. New type 1 DM cases prevailed in the first 2 months and at 15-²⁰ months after acute COVID-19, while new type 2 DM cases were diagnosed starting from the 1st month after acute viral infection and up to the 24th month.

Type 2 DM is known to be an equivalent of cardiovascular disease [12]. In our study, 15.2% of patients with newly diagnosed type 2 DM had arterial hypertension by the time of diabetes onset. None of the patients with type 1 DM or LADA had been diagnosed with arterial hypertension.

COVID-19 is associated with endothelial dysfunction and a prothrombotic state [13]; therefore, we studied the parameters of endothelial function and coagulograms in patients with newly diagnosed diabetes.

Table 3 shows that, as expected, type 2 DM patients had high D-dimer (12.12% of patients) and von Willebrand factor (21.21% of patients) levels. Notably, type 1 DM patients, both adults and children, also had increased D-dimer and von Willebrand factor levels.

Table 3. Parameters of endothelial function and coagulogram results in patients with newly diagnosed diabetes according to the type of diabetes

Characteristic	Adults			Children (type 1 DM, n=28)
	Type 1 (n=7)	LADA (n=2)	Type 2 (n=33)	
D-dimer high (>0.5 mg/L)	3 (42.86%)	0	4 (12.12%)	6 (21.43%)
Von Willebrand factor high	3 (42.86%)	-	7 (21.21%)	3 (10.71%)
PTI	99.43±16.1	113.5±6.3	108.84±11.2	95.64±14.3
	7	6	9	6
INR	1.04±0.11	0.95±0.03	0.97±0.05	1.07±0.11
APTT	23.4±4.34	23.25±0.6	23.74±2.15	23.58±4.76
		4		

Cell adhesion molecules increase during the first 6 hours after SARS-CoV-2 infection [14,15] and persist for a long time thereafter, as we showed earlier [16]. In the present study, ICAM-1 levels were high, and there was no significant difference between the groups of adults. Children had significantly lower levels of ICAM-1 than adults with type 1 DM. VCAM-1 levels were high in all patients, with the highest levels occurring in patients with LADA. Notably, children also had high levels of VCAM-1 (Figure 2).

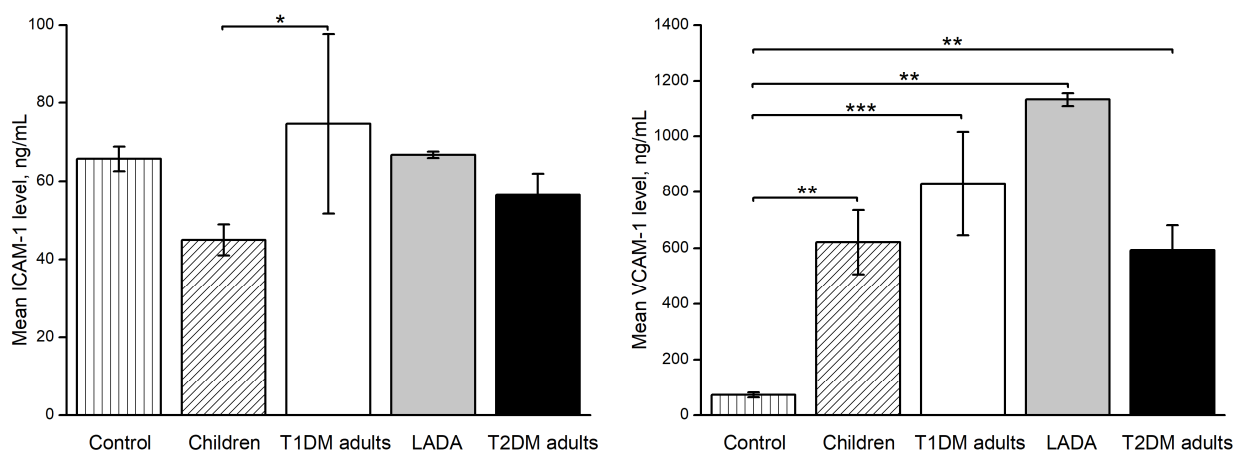


Fig. 2 The cell adhesion molecules ICAM-1 and VCAM-1 are increased in all patients with newly diagnosed DM. Ten patients without COVID-19 who had COVID-19 in 2020 were enrolled as a control group for cell adhesion molecules to exclude the influence of hyperglycemia. For the ICAM-1 level, $p=0.022$ for children vs adults with type 1 DM. For VCAM-1 levels: $p=0.002$ for children vs controls, $p=0.0006$ for adults with type 1 DM vs controls, $p=0.002$ for LADA vs controls, and $p=0.002$ for adults with type 2 DM vs controls

For routine coagulogram parameters, there were no significant shifts either to hyper or to hypocoagulation in any of the studied groups.

Discussion.

It is well documented that post-COVID-19 patients often suffer from DM of both type 1 and type 2, and the unusually high occurrence of new diabetes cases after COVID-19 is well described [1,2]. Type 1 DM is an autoimmune disease characterized by the presence of antibodies against insulin, GAD, and islet or beta-cell components [4]. In our study, the most common antibody found in the observed children was GAD, indicating autoimmune type 1 DM. No antibodies were detected in a total of 10.71% of the children with DM. As expected, adults were predominantly diagnosed with type 2 DM (79%). In 2 adult patients predominantly diagnosed with type 2 DM, antibodies against islet cells were detected; therefore, the type of diabetes was reclassified as LADA. Surprisingly, a significant portion of adult patients had type 1 DM, possibly because of direct damage to beta cells and their components caused by SARS-CoV-2.

Data obtained from the city health department on all patients who had COVID-19 in Tashkent in 2020 showed that 8% of new cases of diabetes were identified among children and adults who had COVID-19 in 2020. Among children who recovered from COVID-19, diabetes was detected in 4%, and among adults, it was detected in 8% [8]. This is a significantly greater incidence of DM than 0.02% of DM diagnosed in children without COVID-19 [17] and is in line with data for adults [18].

According to the data of the National Registry of Diabetes, type 1 DM accounts for 7.4% of all DM cases [19]. However, in our study, 16.7% of the participants were type 1. LADA cases were not registered in the Republic. The main reason is the absence of registered reagents for antibody testing. Here, we found anti-islet antibodies in two patients who were diagnosed with type 2 DM; these patients received metformin monotherapy and had target HbA1c levels at the time of the study.

The increased incidence of type 1 DM with positive diabetes-specific antibodies suggests damage to islet cells and their components by SARS-CoV-2 with further activation of autoimmune mechanisms.

These results are consistent with those of Zhang T., Wrona M. et al., who reported a high incidence of DM in both type 1 and type 2 patients after COVID-19 [1,2].

There are data showing a high incidence of newly diagnosed DM after severe COVID-19 [6]. In our study, only 3 patients with type 2 diabetes had severe COVID-19. The vast majority of people with type 1 diabetes (71.43%) had mild COVID-19.

The use of glucocorticoids was associated with an increased risk of diabetes [7]. In our study of the population of Tashkent city, we showed that the use of dexamethasone for acute COVID-19 was associated with a 2.7-fold increased risk of new cases of DM [8]. Here, half of the patients with type 2 diabetes and one of two patients with LADA received dexamethasone during the acute period of COVID-19.

Vitamin D deficiency is associated with an increased risk of both type 1 and type 2 DM [9-11]. In our study, all patients had low vitamin D levels.

Adult patients with type 1 DM were younger, predominantly female, and had a high rate of family history of DM. The majority of patients with type 1 DM had mild COVID-19 and did not use corticosteroids during acute COVID-19. Other studies have shown a link between severe COVID-19 and an increased risk of DM [6]. Our study showed that patients with severe or mild COVID-19 also had a risk of diabetes onset. Our data confirmed the link between corticosteroid use and new DM cases, in agreement with the results of other authors [7].

Tiberti C. et al reported no effect of COVID-19 on the development of type 1 DM autoimmunity and no increase in the frequency of SARS-CoV-2 antibodies in newly diagnosed type 1 diabetes patients relative to healthy individuals [20]. In their study, 53,7% of newly diagnosed type 1 DM patients had no diabetes-specific autoantibodies. As in our study, 80% of the COVID-19 patients with newly diagnosed DM were female.

Therefore, young females with a family history of diabetes mellitus (DM) diagnosed after contracting COVID-19 should be tested for diabetes-specific antibodies for proper differentiation of the type of diabetes and timely insulin treatment.

Patients with LADA in our study had good diabetes control after receiving oral noninsulin therapy. However, taking into account the autoimmune cause of the disease, these patients will require strict control and follow-up and should be well educated regarding signs of acute diabetes complications to start insulin treatment in due time.

Type 1 and type 2 DM risk is associated with low vitamin D levels [9-11]. In our study, all patients with newly diagnosed DM had low vitamin D levels, although Uzbekistan has good insolation.

New cases of DM were registered within 0 to 24 months after COVID-19. The majority of type 1 patients with positive diabetes-specific antibodies were registered during the first 2 months and 15-20 months after acute COVID-19. The incidence of new type 2 DM cases was consistent during the 2-year period after COVID-19.

As expected, patients with type 2 HELLP syndrome had high D-dimer and von Willebrand factor levels. Notably, type 1 DM patients, both adults and children, also had increased D-dimer and von Willebrand factor levels. Furthermore, adults and children with newly diagnosed DM after COVID-19 had a high risk of endothelial dysfunction, as indicated by a high level of VCAM-1.

ICAM-1 levels were high, and there was no significant difference between groups in adults. Children had significantly lower levels of ICAM-1 than did the control group and the group of adult patients with type 1 DM. VCAM-1 levels were high in all patients, with the highest levels occurring in patients with LADA. Notably, children also had high levels of VCAM-1. There were no significant shifts in routine parameters of coagulograms either to hyper or to hypocoagulation in any of the studied groups.

Thus, the risk of new diabetes cases after COVID-19 is high both in adults and in children. Young nonobese women with a family history of DM are at risk for type 1 DM after COVID-19.

Type 1 DM that develops after COVID-19 should be treated as a disease associated with CVD and endothelial dysfunction.

Limitations of the study. The small number of patients in our study could influence the statistical ratios. However, additional studies are needed to determine the association between female sex and type 1 DM risk in adults after COVID-19.

No diabetes-specific antibodies were detected in three children (10.71%) or 3 adult patients (42.86%) with type 1 DM. Nevertheless, there might be tyrosine phosphatase (IA-2-AA) autoantibodies or zinc transporter 8 autoantibodies (ZnT8A), which were not detected in our study due to the lack of reagents. Testing for these antibodies could also reveal more LADA cases among type 2 DM adult patients.

We realize that discussing risks contradicts the cross-sectional study design, and we may only propose the risk based on the revealed association; therefore, further studies are needed.

Declarations

- Ethics approval and consent to participate: The research protocol was approved by the Ethics Committee of the RSSPMCE (#1-2021), and the study was conducted in accordance with the Declaration of Helsinki. All participants signed informed consent prior to enrollment. Informed consent was obtained from the respective parent(s)/guardian(s) of participants aged less than 16 years.

- Consent for publication: Not applicable.

- Availability of data and materials: Data are available via the following link: <https://www.scidb.cn/en/s/3yqqYr>

<https://www.scidb.cn/en/anonymous/M3lxcVly>

- Competing interests: The authors declare that they have no conflicts of interest.

- Funding: This study was funded by the Ministry of Innovation of the Republic of Uzbekistan No. A-CC-2021-139.

- Authors' contributions. All the authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by AA, MA and DK. Laboratory analyses were performed by SS and AS. The first draft of the manuscript was written by AA, and all the authors commented on previous versions of the manuscript. All the authors have read and approved the final manuscript.

References

1. Alieva AV, Djalilov AA, Khaydarova FA, Alimov AV, Khalilova DZ, Talenova VA, Alimova NU, Aripova MD, Sadikova AS (2023) Factors influencing the severity of COVID-19 course for patients with diabetes mellitus in Tashkent: a retrospective cohort study. *Obes and metab* 20(2):92-103. <https://doi.org/10.14341/omet12801>
2. Alikhanova NM, Akbarov ZS, Ismailov SI (2016) Epidemiological Aspects of Diabetes Mellitus in Tashkent on the Basis of Register Data. *Int J Endoc* 2(74):111-114. <https://doi.org/10.22141/2224-0721.2.74.2016.70948>
3. Alieva A (2023) Indicators of Endothelial Dysfunction and the rate of Thrombotic Complications in Patients with Type 2 Diabetes Mellitus at Different Periods After COVID-19. *Juvenis Scientia* 4(9):35-41. https://doi.org/10.32415/jscientia_2023_9_4_35-41
4. Atkinson MA. (2016) Williams Textbook of Endocrinology (Thirteenth Edition). Chapter 32 - Type 1 Diabetes Mellitus. [ed.] Kenneth S. Polonsky, P. Reed Larsen, Henry M. Kronenberg, Shlomo Melmed. Pp 1451-1483
5. Bonaventura A, Vecchié A, Dagna L, Martinod K, Dixon DL, Van Tassell BW, Dentali F, Montecucco F, Massberg S, Levi M, Abbate A (2021) Endothelial dysfunction and immunothrombosis as key pathogenic mechanisms in COVID-19. *Nature Reviews. Immunology* 21:319-329. <https://doi.org/10.1038/s41577-021-00536-9>
6. Boucher BJ (2011) Vitamin D insufficiency and diabetes risks. *Curr Drug Targets* 12(1):61-69. <https://doi.org/10.2174/138945011793591653>

7. De Rosa S, Arcidiacono B, Chiefari E, Brunetti A, Indolfi C, Foti DP (2018) Type 2 Diabetes Mellitus and Cardiovascular Disease: Genetic and Epigenetic Links. *Front Endocrinol (Lausanne)* 17;9:2. [https://doi: 10.3389/fendo.2018.00002](https://doi.org/10.3389/fendo.2018.00002)
8. Grammatiki M, Karras S, Kotsa K (2019) The role of vitamin D in the pathogenesis and treatment of diabetes mellitus: a narrative review. *Hormones (Athens)* 18(1):37-48. [https://doi: 10.1007/s42000-018-0063-z](https://doi.org/10.1007/s42000-018-0063-z)
9. IDF Atlas, 10th edition. [Online] 2021. <https://diabetesatlas.org/data/en/country/214/uz.html>.
10. Khaydarova FA, Alieva AV, Berdikulova DM, Alimova NU, Khalilova DZ, Tojjeva IM (2022) Structure of mortality among patients with diabetes mellitus in the republic of Uzbekistan during COVID-19 pandemic. *Diabetes mellitus* 25(4):322-326. <https://doi.org/10.14341/DM12786>
11. Leung PS (2016) The Potential Protective Action of Vitamin D in Hepatic Insulin Resistance and Pancreatic Islet Dysfunction in Type 2 Diabetes Mellitus. *Nutrients* 5;8(3):147 [https://doi: 10.3390/nu8030147](https://doi.org/10.3390/nu8030147)
12. Meyer K, Patra T, Vijayamahantesh, Ray R (2021) SARS-CoV-2 Spike Protein Induces Paracrine Senescence and Leukocyte Adhesion in Endothelial Cells. *J Virol* 10;95(17):e0079421. [https://doi: 10.1128/JVI.00794-21](https://doi.org/10.1128/JVI.00794-21)
13. Nordström A, Hadrévi J, Olsson T, Franks PW, Nordström P (2016) Higher Prevalence of Type 2 Diabetes in Men Than in Women Is Associated With Differences in Visceral Fat Mass. *J Clin Endocrinol Metab* 101(10):3740-3746. [https://doi: 10.1210/jc.2016-1915](https://doi.org/10.1210/jc.2016-1915)
14. Tiberti C, Nenna R, Tromba V, Filardi T, Petrarca L, Silvestry F, Fassino V, Montuori M, Mancino E, Lenzi A, Midulla F, Constantino F, Morano S (2023) No effects of COVID-19 on the development of type 1 diabetes autoimmunity and no evidence of an increased frequency of SARS-CoV-2 antibodies in newly diagnosed type 1 diabetes patients relative to healthy subjects. *Acta Diabetol* 60:1301–1307. [https://doi: 10.1007/s00592-023-02152-6](https://doi.org/10.1007/s00592-023-02152-6)
15. Wu J, Mackie SL, Pujades-Rodriguez M (2020) Glucocorticoid dose-dependent risk of type 2 diabetes in six immune-mediated inflammatory diseases: a population based cohort analysis. *BMJ Open Diabetes Research and Care* 8:e001220. [https://doi:10.1136/bmjdr-2020-001220](https://doi.org/10.1136/bmjdr-2020-001220)
16. Wrona M, Skrypnik D (2022) New-Onset Diabetes Mellitus, Hypertension, Dyslipidemia as Sequelae of COVID-19 Infection—Systematic Review. *Int J Environ Res Public Health*. 19, 13280:1-10. [https://doi: 10.3390/ijerph192013280](https://doi.org/10.3390/ijerph192013280)
17. Xie Y, Al-Aly Z (2022) Risks and burdens of incident diabetes in long COVID: a cohort study. *The Lancet Diabetes and Endocrinology* 10(5):311-321. [https://doi.org/10.1016/S2213-8587\(22\)00044-4](https://doi.org/10.1016/S2213-8587(22)00044-4)
18. Zhang T, Mei Q, Zhang Z, et al. Risk for newly diagnosed diabetes after COVID-19: a systematic review and meta-analysis. *BMC Med*. 2022;20(1):444. [PMCID: PMC9666960] [PubMed: 36380329]
19. Zhang J, Tecson KM, McCullough PA (2020) Endothelial dysfunction contributes to COVID-19-associated vascular inflammation and coagulopathy. *Rev. Cardiovasc* 21(3):315–319. [https://doi: 10.31083/j.rcm.2020.03.126](https://doi.org/10.31083/j.rcm.2020.03.126)
20. Zhang T, Mei Q, Zhang Zh, Walline JH, Liu Y, Zhu H, Zhang Sh (2022) Risk for newly diagnosed diabetes after COVID-19: a systematic review and meta-analysis. *BMC Med* 20(444):1-10. [https://doi: 10.1186/s12916-022-02656-y](https://doi.org/10.1186/s12916-022-02656-y)

MARKAZIY OSIYO ENDOKRINOLOGIK JURNALI

4 ЖИЛД, 3 СОН

ЦЕНТРАЛЬНО АЗИАТСКИЙ ЭНДОКРИНОЛОГИЧЕСКИЙ ЖУРНАЛ
ТОМ 4, НОМЕР 3

CENTRAL ASIAN ENDOCRINOLOGICAL JOURNAL
VOLUME 4, ISSUE 3

Editorial staff of the journals of www.tadqiqot.uz
Tadqiqot LLC the city of Tashkent,
Amir Temur Street pr.1, House 2.
Web: <http://www.tadqiqot.uz/>; Email: info@tadqiqot.uz
Phone: (+998-94) 404-0000

Контакт редакций журналов. www.tadqiqot.uz
ООО Tadqiqot город Ташкент,
улица Амира Темура пр.1, дом-2.
Web: <http://www.tadqiqot.uz/>; Email: info@tadqiqot.uz
Тел: (+998-94) 404-0000