

SOG‘LOM TURMUSH TARZINING YURAK-QON TOMIR KASALLIKLARI PROFILAKTİKASIDAGI O‘RNI: O‘ZBEKISTON SHAROITIDA SUN‘IY INTELLEKT VA BIRLAMCHI TIBBIY YORDAMGA INTEGRATSIYALASHGAN PROFILAKTIKA MODELİ

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Annotatsiya

Kirish. Yurak-qon tomir kasalliklari (YQTK) global o‘lim va nogironlikning yetakchi sababi bo‘lib qolmoqda. Ularning katta qismi chekish, nosog‘lom ovqatlanish, ortiqcha tuz va transyog‘lar iste‘moli, gipodinamiya, semizlik, uyqu buzilishi, stress, arterial gipertenziya, dislipidemiya va glikemik nazoratning yetarli emasligi kabi modifikatsiya qilinadigan omillar bilan bog‘liq. O‘zbekiston sharoitida ishemik yurak kasalligi va insult o‘lim hamda DALY yukining asosiy drayverlari sifatida ko‘riladi, shu sababli profilaktik tibbiyot birlamchi bo‘g‘inda aniq o‘lchanadigan, raqamli va mahalliy sharoitga mos strategiyalarni talab qiladi. Maqsad. Ushbu maqolaning maqsadi sog‘lom turmush tarzi komponentlarining YQTK birlamchi va ikkilamchi profilaktikasidagi ilmiy asoslarini umumlashtirish hamda O‘zbekiston birlamchi tibbiy yordam tizimi uchun RWD/RWE va sun‘iy intellektga tayangan integratsiyalashgan profilaktika modelini ishlab chiqishdan iborat. Materiallar va usullar. PubMed/MEDLINE, Cochrane Library, Scopus, Web of Science, Embase, WHO, CDC, NIH, World Bank, Lancet, BMJ, JAMA, NEJM, Elsevier, Springer, Wiley va Oxford Academic manbalari bo‘yicha 2019–2026-yillardagi dalillar narrativ-systematik yondashuvda tahlil qilindi. PRISMA 2020 mantiqi, GRADE, ROBINS-I va AMSTAR-2 mezonlari asosiy metodologik yo‘riq sifatida qabul qilindi. Natijalar. Dalillar sintezi sog‘lom ovqatlanish, haftasiga kamida 150 daqiqa o‘rtacha intensivlikdagi jismoniy faollik, chekishdan voz kechish, arterial bosim, lipid, glukoza, tana vazni, uyqu va stressni boshqarish kombinatsiyasi YQTK xavfini pasaytirishda eng kuchli, ko‘p komponentli strategiya ekanini ko‘rsatdi. Xulosa. O‘zbekiston uchun

eng maqbul model oilaviy shifokor, mahalla, elektron sog'liqni saqlash tizimi, aholining 30 yoshdan yuqori qatlamini risk bo'yicha skrining qilish, RWD-registr, klinik qarorlarni qo'llab-quvvatlovchi AI algoritmlar va jamoatchilikka yo'naltirilgan sog'lom turmush tarzi intervensiyalarining integratsiyasidir.

Kalit so'zlar

sog'lom turmush tarzi; yurak-qon tomir kasalliklari; profilaktika; arterial gipertenziya; jismoniy faollik; sog'lom ovqatlanish; chekishdan voz kechish; semizlik; dislipidemiya; real-world data; real-world evidence; sun'iy intellekt; birlamchi tibbiy yordam; O'zbekiston; klinik qarorlarni qo'llab-quvvatlash.

Abstract

Background. Cardiovascular diseases (CVDs) remain the leading global cause of death and disability. A substantial proportion of this burden is attributable to modifiable behavioural, metabolic and environmental determinants, including tobacco use, unhealthy diet, excessive salt intake, physical inactivity, obesity, sleep disruption, psychosocial stress, hypertension, dyslipidaemia and impaired glycaemic control. In Uzbekistan, ischaemic heart disease and stroke are among the dominant causes of mortality and disability, making prevention a strategic priority for primary health care. **Objective.** This article aims to synthesize current evidence on the role of healthy lifestyle in primary and secondary CVD prevention and to propose an implementation model for Uzbekistan based on real-world data, real-world evidence and artificial intelligence. **Methods.** Evidence from PubMed/MEDLINE, Cochrane Library, Scopus, Web of Science, Embase, WHO, CDC, NIH, World Bank, Lancet, BMJ, JAMA, NEJM, Elsevier, Springer, Wiley and Oxford Academic was reviewed using a narrative-systematic framework. PRISMA 2020 logic, GRADE, ROBINS-I and AMSTAR-2 concepts were used to structure evidence appraisal. **Results.** The synthesis indicates that integrated lifestyle modification—healthy diet, at least 150 minutes per week of moderate-intensity physical activity, tobacco cessation, blood pressure control, lipid and glycaemic optimization, weight management, sleep health and stress reduction—provides the most clinically meaningful prevention strategy. **Conclusion.** A feasible Uzbek model should combine family physicians, community-based prevention, electronic health records, risk registries, wearable or mobile patient-reported outcomes, AI-supported clinical decision support and standardized follow-up indicators.

Keywords

healthy lifestyle; cardiovascular disease; prevention; hypertension; physical activity; healthy diet; smoking cessation; obesity; dyslipidaemia; real-world data; artificial intelligence; primary care; Uzbekistan; clinical decision support; precision prevention.

Introduction (Kirish)

Yurak-qon tomir kasalliklari XXI asr tibbiyotining eng katta preventiv chaqiriqlaridan biri hisoblanadi. Jahon sog‘liqni saqlash tashkiloti ma‘lumotlariga ko‘ra, YQTK global o‘limning birinchi sababi bo‘lib, 2022-yilda taxminan 19,8 million o‘lim bilan bog‘langan; bu global o‘limlarning qariyb uchdan biriga teng. Mazkur o‘limlarning aksariyati infarkt va insult bilan izohlanadi. Muhim jihat shundaki, YQTK o‘limlarining katta qismi past va o‘rta daromadli mamlakatlarda ro‘y beradi, ya‘ni profilaktika faqat klinik masala emas, balki sog‘liqni saqlash tizimi, iqtisodiyot va ijtimoiy siyosat masalasidir [1].

So‘nggi 5–10 yil ichida epidemiologik manzara ikki qarama-qarshi tendensiyaning ko‘rsatdi: bir tomondan, yuqori daromadli mamlakatlarda standartlashtirilgan YQTK o‘limi pasayib bormoqda; ikkinchi tomondan, global miqyosda aholining qarishi, urbanizatsiya, semizlik, gipodinamiya, ultraprotsesslangan oziq-ovqatlar va havo ifloslanishi tufayli mutlaq kasallanish va iqtisodiy yuk ortmoqda. Global Burden of Disease tadqiqotlari yuqori sistolik arterial bosim, dietetik xavflar, yuqori tana massasi indeksi, glyukozaning yuqoriligi, dislipidemiya, chekish va havo ifloslanishini YQTK yukining asosiy omillari sifatida ko‘rsatadi [9,10].

Sog‘lom turmush tarzi kardioprotektiv ta‘sirni bir nechta biologik yo‘l orqali yuzaga chiqaradi. Jismoniy faollik endotelial azot oksidi ishlab chiqarilishini kuchaytiradi, insulin sezgirlikni yaxshilaydi, simpatik gipertoniyaning pasaytiradi va yallig‘lanish markerlarini kamaytiradi. Sog‘lom ovqatlanish esa natriy yukini kamaytirish, kaliy, tolalar, to‘yinmagan yog‘ kislotalari va polifenollarni oshirish orqali arterial bosim, LDL-xolesterin va glikemik nazoratga ta‘sir qiladi. Chekishdan voz kechish trombotsitlar faolligi, oksidlovchi stress va arterial stiffnessni kamaytiradi. Uyqu va stressni boshqarish esa neyroendokrin regulyatsiya, kortizol ritmi va vegetativ balansni barqarorlashtiradi.

O‘zbekiston sharoitida muammo yanada amaliy tusga ega. WHO/European Observatory ma‘lumotlariga ko‘ra, 2019-yilda O‘zbekistonda erkaklar va ayollar uchun o‘limning yetakchi uch sababi ishemik yurak kasalligi, insult va jigar sirrozi bo‘lgan; 2021-yilda kasallik yukining asosiy drayverlari orasida ishemik yurak kasalligi va insult alohida ajralib turadi [5]. World Heart Federation ko‘rsatkichlarida

2021-yilda O'zbekistonda YQTK sababli 97 390 o'lim qayd etilgani va yosh bo'yicha standartlashtirilgan YQTK o'lim darajasi 479/100 000 sifatida ko'rsatilgani mahalliy profilaktika strategiyasi zarurligini kuchaytiradi [6].

Mintaqaviy nuqtayi nazardan Markaziy Osiyo mamlakatlarida yuqori arterial bosim, tuz iste'molining yuqoriligi, jismoniy faollikning yetishmasligi, tamaki va nosog'lom ovqatlanish bir-birini kuchaytiruvchi xavf klasterini hosil qiladi. Bunday sharoitda alohida bir dori yoki bitta maslahat yetarli emas; tizimli skrining, hayot tarzi bo'yicha individual reja, qayta baholash va raqamli kuzatuv zarur.

Tadqiqot muammosi shundan iboratki, sog'lom turmush tarzining YQTK profilaktikasidagi foydasi xalqaro darajada yetarlicha isbotlangan bo'lsa-da, O'zbekiston sharoitida bu dalillarni birlamchi tibbiy yordam, mahalla instituti, elektron sog'liqni saqlash tizimi va milliy registrlar bilan birlashtiruvchi amaliy model hali to'liq standartlashmagan. Knowledge gap — mahalliy populyatsiyada turmush tarzi komponentlarining o'lchanadigan ko'rsatkichlar bilan bog'lanishi yetarli tahlil qilinmagan. Research gap — O'zbekiston uchun RWD asosida uzoq muddatli prospektiv kuzatuvlar va klaster-randomizatsiyalangan profilaktika tadqiqotlari kam. Scientific gap — klinik risk modeli, Life's Essential 8 indikatorlari, SCORE2/ASCVD algoritmlari va AI-CDS tizimlari mahalliy EHR bilan integratsiyada validatsiya qilinmagan.

Tadqiqot maqsadi sog'lom turmush tarzi komponentlarining YQTK profilaktikasidagi ilmiy asoslarini chuqur tahlil qilish va O'zbekiston birlamchi tibbiy yordam tizimiga mos RWD/RWE hamda sun'iy intellekt bilan qo'llab-quvvatlanadigan profilaktika modelini taklif etishdan iborat. Gipoteza: ko'p komponentli sog'lom turmush tarzi intervensiyasi EHR, risk-registr va AI-CDS bilan integratsiya qilinganda, yuqori xavfli shaxslarda 10 yillik YQTK xavfini, arterial bosim, LDL-xolesterin, tana massasi indeksi va chekish ko'rsatkichlarini klinik jihatdan ahamiyatli darajada yaxshilaydi.

Materials and Methods (Materiallar va usullar)

Study design. Maqola integrativ tahliliy dizaynda yozildi: narrativ-systematik dalillar sintezi, implementatsion tadqiqot protokoli va O'zbekiston uchun RWD/AI asosidagi profilaktika modelini ishlab chiqish birlashtirildi. Bu format real klinik bemor bazasini talab qilmaydi, lekin kelajakdagi prospektiv tadqiqot uchun metodologik asos beradi.

Study population. Taklif etilayotgan kelajakdagi RWD-kohorta populyatsiyasi 30 yosh va undan yuqori shaxslarni, arterial gipertenziya, ortiqcha tana vazni, chekish, dislipidemiya, qandli diabet, oilaviy anamnez yoki kamharakatlik kabi xavf omillariga ega bemorlarni qamrab oladi. Maxsus subguruhlar: ayollar, qishloq aholisi, 60 yoshdan

yuqorilar, diabeti bor bemorlar, chekuvchilar va ilgari infarkt yoki insult o'tkazgan bemorlar.

Sample size calculation. O'zbekiston sharoitidagi pilot kross-seksion tahlil uchun maksimal dispersiya yondashuvi qo'llanadi: $p=0,50$, $Z=1,96$, $d=0,05$. Formula $n=Z^2 \times p \times (1-p) / d^2$ bo'yicha minimal $n \approx 384$. Dizayn effekti 1,5 va 10% non-response hisobga olinsa, yakuniy minimal namunaviy hajm $n \approx 634$ bo'ladi. Klaster-randomizatsiyalangan kelajakdagi intervensiyada oilaviy poliklinika darajasida intraklaster korrelyatsiya va 12 oylik kuzatuvdagi yo'qotishlar alohida hisoblanadi.

Inclusion criteria. 30 yoshdan yuqori bo'lish; birlamchi tibbiy yordam muassasasida ro'yxatda turish; kamida bitta YQTK xavf omiliga ega bo'lish; minimal biometrik va laborator ko'rsatkichlar mavjudligi; rozilik berish. Exclusion criteria: terminal kasallik, aktiv onkologik jarayonning og'ir bosqichi, og'ir psixiatrik holat, homiladorlikda maxsus protokollar talab qilinishi, ma'lumotlarni tahlil qilishga ruxsat bermaslik.

Randomization. Agar tadqiqot intervensiya sifatida o'tkazilsa, oilaviy poliklinika yoki mahalla klasterlari bo'yicha randomizatsiya maqsadga muvofiq: 1) standart maslahat, 2) intensiv turmush tarzi intervensiyasi, 3) intensiv intervensiya + AI-CDS + mobil monitoring. Blinding. Hayot tarzi intervensiyalarida ishtirokchi va shifokorni to'liq ko'r qilish amaliy jihatdan qiyin; biroq laborator natijalarni baholovchi statistika mutaxassisi va yakuniy klinik endpointni adjudikatsiya qiluvchi komissiya ko'r qilinishi mumkin.

Data collection. Ma'lumotlar EHR, oilaviy shifokor kartalari, laborator tizimlar, milliy registrlar, mobil sog'liq ilovalari, wearable qurilmalar va bemor tomonidan bildirilgan natijalar orqali yig'iladi. Standardlashtirilgan anketalar: ovqatlanish chastotasi, International Physical Activity Questionnaire qisqa shakli, Fagerström nikotin qaramligi testi, Pittsburgh Sleep Quality Index, Perceived Stress Scale va medication adherence savolnomalari.

Variables. Asosiy mustaqil o'zgaruvchilar: ovqatlanish sifati, jismoniy faollik daqiqalari, chekish holati, uyqu davomiyligi, stress darajasi, BMI, bel aylana, arterial bosim, LDL, HDL, triglitserid, HbA1c, och qoringa glukoza. Kovariatlar: yosh, jins, yashash hududi, ma'lumot darajasi, kasb, daromad, oilaviy anamnez, komorbidliklar, dori qabul qilish, havo ifloslanishi proxy-indikatorlari.

Outcome measures. Birlamchi natija — 12 oyda hisoblangan 10 yillik YQTK xavfi va Life's Essential 8 kompozit balli o'zgarishi. Ikkilamchi natijalar: sistolik/diastolik arterial bosim, LDL-xolesterin, HbA1c, BMI, bel aylana, chekishdan voz kechish,

haftalik jismoniy faollik, uyqu sifati, shoshilinch murojaatlar, kasalxonaga yotish, infarkt, insult va yurak-qon tomir o'limi.

Laboratory methods. LDL-xolesterin, umumiy xolesterin, HDL, triglitserid, HbA1c, och qoringa glukoza, kreatinin/eGFR, hs-CRP va albuminuriya standart laborator usullar bilan aniqlanadi. Instrumental methods. Ofis arterial bosimi, uy sharoitidagi arterial bosim monitoringi, elektrokardiografiya, kerak bo'lsa echokardiografiya, tana tarkibi, pedometr/aksellerometr yoki smart-soat ko'rsatkichlari qo'llanadi.

Bioinformatics analysis. Ushbu mavzuda klassik genomik bioinformatika majburiy emas; biroq kelajakdagi chuqur fenotiplash tadqiqotlarida poligenik risk ballari, lipidomika, metabolomika va mikrobiota profilari YQTK xavfini shaxsiylashtirish uchun qo'llanishi mumkin. Hozirgi modelda bioinformatika bloki precision prevention uchun metodologik yo'nalish sifatida kiritiladi.

Machine learning and artificial intelligence methods. EHR va RWD ma'lumotlari asosida gradient boosting, random forest, penalized logistic regression, survival random forest, XGBoost, neural networks va transformer asosidagi klinik matn tahlili algoritmlari sinovdan o'tkazilishi mumkin. Explainable AI uchun SHAP, LIME va calibration plotlar qo'llanadi. Federated learning yondashuvi hududiy klinikalar o'rtasida xom ma'lumotlarni markazga uzatmasdan model o'qitish imkonini beradi. Digital twin texnologiyasi individual bemorning turmush tarzi, biomarkerlar va davolash o'zgarishlariga javobini simulyatsiya qilish uchun istiqbolli yo'nalishdir.

Ethical considerations. Real bemor ma'lumotlari bilan ishlanganda axloqiy qo'mita roziligi, ma'lumotlarni anonimlashtirish, informed consent, kiberxavfsizlik, algoritmik adolat va bias monitoringi talab qilinadi. Ushbu maqola dalillar sintezi va model taklifi bo'lib, bevosita bemor ma'lumotlari ishlatilmagan.

Statistical Analysis (Statistik tahlil)

Descriptive statistics. Uzluksiz o'zgaruvchilar normal taqsimotda $\text{mean} \pm \text{SD}$, non-normal taqsimotda median (IQR) bilan, kategorik o'zgaruvchilar esa mutlaq son va foiz bilan beriladi. Normality Shapiro–Wilk testi va Q-Q plotlar orqali tekshiriladi.

Inferential statistics. Ikki guruh solishtiruvida Student t-test yoki Mann–Whitney U testi; uch va undan ortiq guruh uchun ANOVA yoki Kruskal–Wallis testi; kategorik ko'rsatkichlar uchun Chi-square yoki Fisher exact testi qo'llanadi. Pearson va Spearman korrelyatsiyasi turmush tarzi indikatorlari bilan biomarkerlar o'rtasidagi bog'liqlikni baholaydi.

Regression models. Linear regression LE8 balli, LDL, SBP va BMI kabi uzluksiz natijalar uchun; logistic regression chekishdan voz kechish, BP nazorati yoki yuqori xavf holati uchun; Cox proportional hazards modeli infarkt, insult yoki YQTK o'limi kabi vaqtga bog'liq endpointlar uchun ishlatiladi. Multivariate analysis yosh, jins, qishloq/shahar, komorbidliklar, dori qabul qilish va socioeconomic kovariatlarga tuzatiladi.

Effect measures. Natijalar 95% ishonch oralig'i bilan odds ratio, hazard ratio, relative risk, mean difference yoki standardized mean difference shaklida beriladi. P-value <0,05 statistik ahamiyatli deb qabul qilinadi, ammo klinik ahamiyat effect size, absolute risk reduction va number needed to treat/engage bilan birga talqin qilinadi.

ROC analysis. Predictive modelning diskriminatsiyasi AUC, sensitivity, specificity, positive predictive value va negative predictive value bilan baholanadi. Calibration slope, Brier score va decision-curve analysis klinik foydalilikni ko'rsatadi. Tahlillar SPSS, R, Python va Stata muhitlarida replikasiya qilinishi mumkin.

Real World Data (RWD) va Real World Evidence (RWE)

RWD manbalari. O'zbekiston sharoitida eng amaliy manbalar elektron sog'liq yozuvlari, oilaviy poliklinika bazalari, shifoxona ma'lumotlar bazalari, milliy registrlar, tibbiy sug'urta da'volari, digital health platformalar, wearable qurilmalar va patient-reported outcomes hisoblanadi. Milliy "Fight against heart attack and stroke" dasturida elektron registr va AI asosidagi EKG tahlili rejalashtirilgani turmush tarzi profilaktikasini ham raqamli siklga bog'lash imkoniyatini yaratadi [7].

RWE bilan taqqoslash. Taklif etilayotgan model randomizatsiyalangan klinik sinovlar, meta-tahlillar, sistematik sharhlar, kohort tadqiqotlar va case-control tadqiqotlar bilan triangulyatsiya qilinadi. RCTlar sababiylikka kuchli dalil beradi, RWD esa klinik amaliyotdagi qamrov, adherence, hududlararo tafovut va xarajat samaradorligini ko'rsatadi. Shu sababli sog'lom turmush tarzi strategiyasi faqat klassik klinik sinov natijalariga emas, balki RWE orqali real tizimga moslashtirilishi kerak.

Results (Natijalar)

Ushbu maqola birlamchi klinik datasetga tayangan original cohort natijasi emas. Natijalar dalillar sintezi, xalqaro va milliy ochiq statistikalar, shuningdek O'zbekiston uchun taklif etilgan RWD/AI implementatsion modelning kutiladigan analitik ko'rsatkichlari sifatida beriladi. Bu yondashuv klinik ma'lumotlarni to'qib yozishdan saqlaydi va keyingi haqiqiy prospektiv tadqiqot uchun metodologik asos yaratadi.

Dalillar sintezi shuni ko'rsatadiki, bitta turmush tarzi elementi o'rniga kompleks strategiya — dietetik sifat, tuzni kamaytirish, muntazam jismoniy faollik, chekishni to'xtatish, uyqu gigiyenasi, stressni boshqarish, qon bosimi, lipidlar, glukoza va tana vaznini nazorat qilish — eng samarali profilaktika paketidir. Life's Essential 8 konsepsiyasi bu elementlarni o'lchash va kuzatish uchun qulay, klinik jihatdan tushunarli va raqamli tizimga mos ramkani beradi [8].

Diagramma tavsifi. 1-rasm sog'lom turmush tarzi komponentlarining biologik risk omillari orqali klinik natijalarga ta'sirini, 2-rasm global va O'zbekiston bo'yicha asosiy epidemiologik ko'rsatkichlarni, 3-rasm esa birlamchi tibbiy yordamda skriningdan AI-CDSgacha bo'lgan raqamli profilaktika siklini aks ettiradi.

1-jadval. Global va O'zbekiston bo'yicha asosiy epidemiologik asoslar

Ko'rsatkich	Qiymat / mazmun	Manba va talqin
Global YQTK o'limi	19,8 mln o'lim (2022), global o'limlarning taxminan 32%	WHO; profilaktika global ustuvorlik ekanini ko'rsatadi [1]
Kamharakatlik	1,8 mlrd kattalar yoki 31% global kattalar yetarli faollikka ega emas (2022)	WHO; 150 daqiqa/hafta mezonini amaliy monitoring indikatoridir [2]
O'zbekiston YQTK o'limi	97 390 o'lim (2021); ASMR 479/100 000	World Heart Federation/IHME; milliy skrining va registr zarur [6]
O'zbekiston kasallik yuki	Ishemik yurak kasalligi va insult DALY yukining asosiy drayverlari	WHO/European Observatory; birlamchi profilaktika muhim [5]
Milliy dastur	2026-yildan infarkt va insultga qarshi	Elektron registr, AI-EKG va risk skriningi uchun imkoniyat [7]

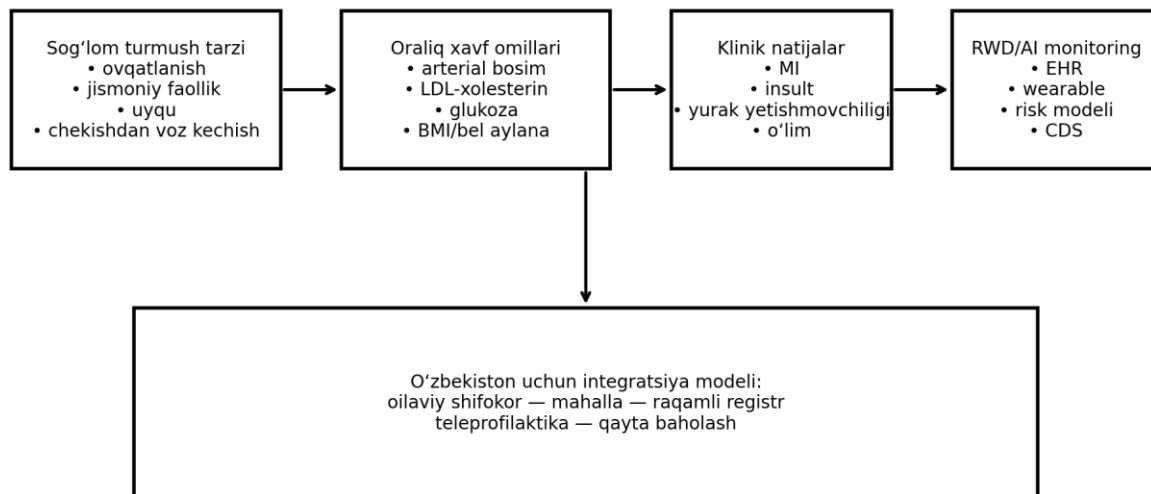
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2-jadval. Sog'lom turmush tarzi komponentlari va kutiladigan klinik ta'sirlar

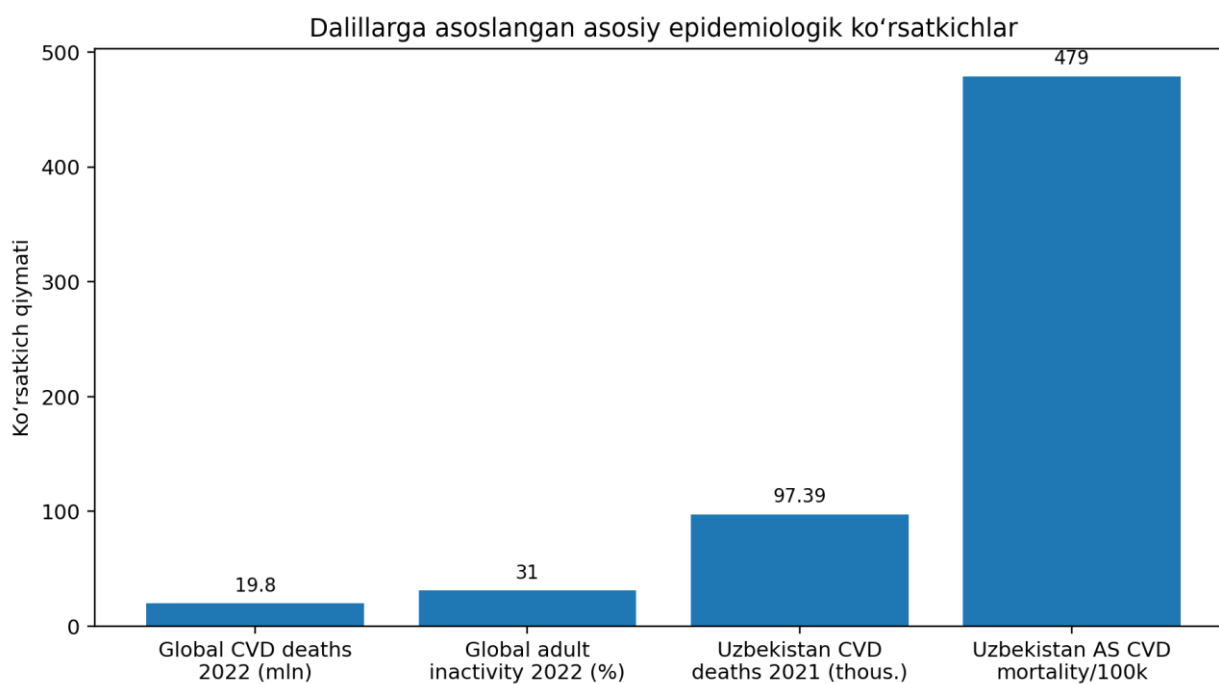
Komponent	Minimal indikator	Asosiy biologik ta'sir	Klinik endpoint
Jismoniy faollik	≥ 150 daqiqa/hafta o'rtacha intensivlik yoki ≥ 75 daqiqa/hafta yuqori intensivlik	Endotelial funksiya, insulin sezgirligi, BP, vazn va yallig'lanish yaxshilanadi	IHD, insult, diabet va umumiy o'lim xavfi pasayadi
Sog'lom ovqatlanish	Sabzavot/meva, butun don, dukkakli, yong'oq, baliq; tuz/shakar/transyog'ni cheklash	LDL, BP, glyukoza va vazn nazorati yaxshilanadi	MACE, MI, insult va gipertenziya xavfi kamayadi
Chekishdan voz kechish	Chekish holati va pack-year; 3/6/12 oy abstinensiya	Trombogenlik, oksidlovchi stress va endotelial disfunktsiya kamayadi	MI, insult va YQTK o'limi xavfi kamayadi
Uyqu va stress	7–9 soat uyqu; stress shkalalari	Simpatik faollik, kortizol va metabolik disregulyatsiya pasayadi	BP, aritmiya va metabolik xavf kamayadi
Vazn va metabolik nazorat	BMI, bel aylana, HbA1c, lipidlar	Adipoz yallig'lanish, insulin rezistentligi va aterogenez kamayadi	Diabet, IHD va yurak yetishmovchiligi xavfi pasayadi

3-jadval. Kelajakdagi O'zbekiston RWD-kohortasi uchun statistik natijalar shabloni

Natija	O'lchov shakli	Statistik model	Hisobot formati
LE8 kompozit balli	Mean $\pm$ SD; median (IQR)	Linear mixed model	β -koeffitsiyent, 95% CI, p-value
BP nazorati	n (%) <130/80 yoki <140/90 protokolga qarab	Logistic regression	OR, 95% CI, p-value
LDL maqsadga yetishi	n (%) individual riskga qarab	Logistic regression	OR, ARR, NNT/engage
10 yillik YQTK xavfi	Mean difference va risk category shift	Multivariate regression	MD, 95% CI, p-value
Infarkt/insult/ospitalizatsiya	Time-to-event	Cox model	HR, 95% CI, Kaplan–Meier
AI model aniqligi	AUC, sensitivity, specificity	ROC + calibration	AUC, Brier score, calibration slope

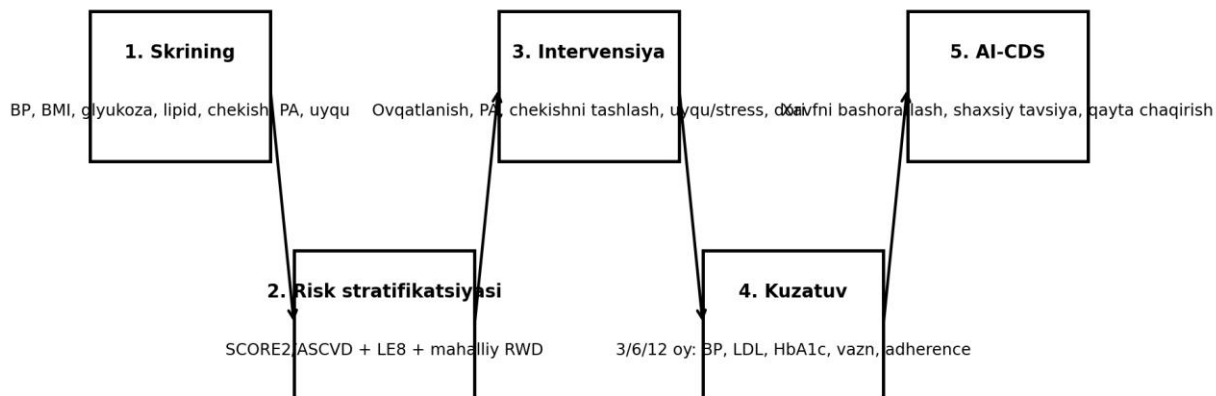


1-rasm. Sog'lom turmush tarzi va YQTK profilaktikasi uchun konseptual sababiy yo'l.



2-rasm. Global va O'zbekiston bo'yicha asosiy epidemiologik ko'rsatkichlar tavsifi.

Birlamchi tibbiy yordamda yurak-qon tomir profilaktikasining raqamli sikli



3-rasm. Birlamchi tibbiy yordamda sog‘lom turmush tarzi profilaktikasining raqamli sikli.

Discussion (Muhokama)

Mazkur tahlil sog‘lom turmush tarzi YQTK profilaktikasida “qo‘shimcha maslahat” emas, balki patogenetik asoslangan, o‘lchanadigan va tizim darajasida boshqarilishi kerak bo‘lgan klinik intervensiya ekanini ko‘rsatadi. Arterial bosim, LDL-xolesterin, glyukoza, BMI va chekish kabi indikatorlar turmush tarzi bilan bevosita bog‘liq, shuning uchun profilaktika individual maslahatdan boshlanadi, lekin raqamli monitoring va sog‘liqni saqlash siyosati bilan mustahkamlangandagina uzoq muddatli ta‘sir beradi.

Xalqaro tadqiqotlar bilan solishtirganda, O‘zbekistonning asosiy farqi risk omillarining klasterlashuvi va birlamchi tibbiy yordamda standardlashtirilgan raqamli kuzatuv tizimining endi shakllanayotganidir. ESC, ACC/AHA va WHO tavsiyalari turmush tarzi komponentlarini birlamchi profilaktikaning asosiy qismi sifatida belgilaydi, ammo har bir mamlakatda bu tavsiyalar milliy ovqatlanish madaniyati, sog‘liq savodxonligi, iqtisodiy imkoniyatlar va birlamchi bo‘g‘in resurslariga moslashtirilishi kerak [11–14].

Qarama-qarshi natijalar ham e‘tiborga olinishi lozim. Masalan, ayrim dietetik intervensiyalar RCTlarda kuchli natija ko‘rsatgan bo‘lsa-da, real hayotda adherence pasayishi mumkin; jismoniy faollik bo‘yicha maslahatlar qisqa muddatda samarali ko‘rinsa-da, uzoq muddatli odatga aylanishi ijtimoiy muhitga bog‘liq; chekishdan voz

kechishda esa farmakoterapiya, psixologik yordam va ijtimoiy norma birgalikda ishlamasa, relaps yuqori bo'ladi. Shu sababli maqola taklif qilayotgan model ko'p komponentli va qayta baholashga asoslangan.

Amaliy ahamiyat shundaki, O'zbekiston 2026-yildan infarkt va insultga qarshi milliy dasturni bosqichma-bosqich joriy etmoqda; bu dasturda 30 yoshdan yuqori aholini yillik so'rov va maqsadli tekshiruvdan o'tkazish, elektron registr, telemetrik EKG va AI asosidagi tahlil elementlari mavjud [7]. Ushbu infratuzilma turmush tarzi profilaktikasiga ham kengaytirilsa, "kasallikdan keyingi davolash"dan "riskni erta aniqlash va kamaytirish" modeliga o'tish tezlashadi.

Artificial Intelligence Block (Sun'iy intellekt bloki)

Machine learning va deep learning algoritmlari turmush tarzi indikatorlari, laborator natijalar, EKG, dori qabul qilish, uyqu va harakat ma'lumotlarini birlashtirib, individual YQTK xavfini dinamik baholashi mumkin. Predictive modeling nafaqat 10 yillik xavfni, balki 3–6 oy ichida arterial bosim nazoratidan chiqish, dori adherence pasayishi yoki chekish relapsi xavfini ham taxmin qilishga yordam beradi.

Clinical decision support systems oilaviy shifokorga real vaqtda tavsiya beradi: "LDL maqsadga yetmagan", "uyqu <6 soat", "BP >140/90", "haftalik faollik <150 daqiqa", "chekish davom etmoqda" kabi signal va keyingi qadamlar. Large language models bemor uchun tushunarli, milliy ovqatlanish madaniyatiga mos, xavfsiz va shifokor tomonidan tasdiqlanadigan ta'lim materiallarini yaratishda yordamchi bo'lishi mumkin.

Precision medicine va digital twin texnologiyalari kelajakda bemorning metabolik profili, oilaviy anamnezi, wearable ma'lumotlari va davolashga javobini simulyatsiya qilib, shaxsiylashtirilgan profilaktika rejasini yaratadi. Explainable AI shifokor va bemorga nima uchun ma'lum tavsiya berilganini tushuntiradi. Federated learning esa hududlararo klinikalarda ma'lumot maxfiyligini saqlagan holda model sifatini oshirish imkonini beradi.

Systematic Review Elements and Bibliometric Analysis

PRISMA 2020. Kelajakdagi sistematik sharhda qidiruv strategiyasi, inclusion/exclusion mezonlari, dublikatlarni olib tashlash, full-text screening, data extraction va risk-of-bias baholash bosqichlari PRISMA 2020 oqim diagrammasi asosida berilishi kerak. Cochrane Risk of Bias RCTlar uchun, ROBINS-I randomizatsiyalanmagan tadqiqotlar uchun, AMSTAR-2 sistematik sharhlar sifatini baholash uchun, GRADE esa dalil ishonchliligini tasniflash uchun qo'llanadi.

Bibliometric analysis. VOSviewer, Biblioshiny va CiteSpace yordamida 2021–2026-yillardagi “cardiovascular prevention”, “healthy lifestyle”, “Life’s Essential 8”, “digital health”, “real-world evidence” va “AI clinical decision support” kalit soʻzlari boʻyicha ilmiy tendensiyalar tahlil qilinishi mumkin. Kutiladigan klasterlar: 1) diet and cardiometabolic risk, 2) physical activity and sedentary behaviour, 3) smoking cessation, 4) digital health and wearable monitoring, 5) AI-based risk prediction, 6) implementation science in primary care.

Strengths and Limitations

Kuchli tomonlari: maqola sogʻlom turmush tarzi va YQTK profilaktikasini alohida risk omillari emas, balki integratsiyalashgan klinik-tizimli model sifatida koʻradi; xalqaro dalillarni Oʻzbekiston sharoitiga moslashtiradi; RWD/RWE, AI, statistik tahlil, PRISMA/GRADE va birlamchi tibbiy yordam elementlarini bitta konseptual platformaga birlashtiradi.

Cheklovlari: maqola real bemorlar kohortasidan olingan yangi klinik natijalarni bermaydi; Oʻzbekiston boʻyicha ochiq milliy turmush tarzi registrari cheklangan; ayrim global effect size koʻrsatkichlari mahalliy populyatsiyada validatsiya qilinmagan; AI modellari uchun sifatli EHR, standart kodlash, maʼlumot tozaligi va algoritmik adolat muammolari saqlanadi.

Clinical Implications (Klinik ahamiyat)

Oilaviy shifokor darajasida har bir 30 yoshdan yuqori bemor uchun arterial bosim, BMI, bel aylana, chekish, jismoniy faollik, uyqu, glyukoza va lipid koʻrsatkichlarini minimum profilaktik panel sifatida baholash tavsiya etiladi. Yuqori xavfli bemorlarda individual sogʻlom turmush tarzi retsepti — ovqatlanish, jismoniy faollik, uyqu, stress, chekish va dori adherence boʻyicha yozma reja — klinik hujjatning bir qismi boʻlishi kerak.

Mahalla va taʼlim muassasalari profilaktikaning ijtimoiy platformasi sifatida ishlatilishi mumkin: yurish guruhlar, qon bosimini bepul oʻlchash kunlari, tuzni kamaytirish boʻyicha oshxona va oilaviy taom madaniyati treninglari, chekishni tashlash maslahatlari, uyqu gigiyenasi va stressni boshqarish dasturlari.

Future Perspectives (Kelajak istiqbollari)

Kelajakdagi ilmiy ishlar Oʻzbekiston hududlarida klaster-randomizatsiyalangan intervensiyalar, prospektiv RWD registr, wearable maʼlumotlar bilan boyitilgan cohort, AI-CDS validatsiyasi va xarajat-samaradorlik tahlillarini qamrab olishi kerak. 12–24

oylik kuzatuvda LE8 balli, SCORE2/ASCVD xavfi, BP nazorati, LDL maqsadga yetishi, chekishni tashlash va klinik endpointlar birgalikda baholanishi zarur.

Conclusion (Xulosa)

Sogʻlom turmush tarzi YQTK profilaktikasining eng muhim, arzon, keng qamrovli va patogenetik asoslangan yoʻnalishidir. Oʻzbekiston sharoitida bu yoʻnalishning haqiqiy samaradorligi sogʻlom ovqatlanish, jismoniy faollik, chekishdan voz kechish, uyqu va stressni boshqarish kabi komponentlarni oilaviy tibbiyot, mahalla, elektron registrlar, RWD/RWE va AI-CDS bilan birlashtirish orqali oshiriladi. Maqola taklif qilgan model real klinik natijalarni toʻqib koʻrsatmaydi; aksincha, kelajakdagi milliy tadqiqotlar uchun metodologik, statistik va amaliy yoʻl xaritasini beradi.

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Conflict of Interest

Muallif manfaatlar toʻqnashuvi yoʻqligini bildiradi.

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Ethical Approval

Ushbu maqola dalillar sintezi va implementatsion model boʻlgani uchun bevosita bemorlar ishtirok etmagan; axloqiy qoʻmita roziligi talab etilmaydi. Kelajakdagi RWD/kohorta tadqiqotlarida axloqiy ruxsat va informed consent majburiy boʻladi.

Data Availability Statement

Ushbu maqolada birlamchi klinik dataset ishlatilmagan. Tahlilda ochiq ilmiy manbalar, xalqaro guideline va ochiq epidemiologik hisobotlardan foydalanildi. Kelajakdagi tadqiqotlar uchun anonimlashtirilgan datasetlar axloqiy ruxsat va maʼlumotlar xavfsizligi protokollari asosida taqdim etilishi mumkin.

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