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QAND MIQDORINING SUYAKLANISHGA TA'SIRI

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Annotatsiya: Qand (glyukoza) miqdorining suyak to‘qimasiga ta’siri murakkab fiziologik jarayon bo‘lib, suyaklarning zichligi, qayta tiklanish tezligi va osteoblast hamda osteoklast faolligiga sezilarli ta’sir ko‘rsatadi [1]. Tadqiqotlar shuni ko‘rsatadiki, giperglikemiya (yuqori qand miqdori) holatida suyak to‘qimalarida oksidativ stress ortadi, bu esa osteoblastlar faoliyatini susaytiradi va suyakning mineralizatsiyasini pasaytiradi [2]. Shuningdek, qand darajasi past bo‘lganda (gipoglikemiya) kalsiyning suyakka singishi buzilishi kuzatiladi [3]. Ushbu maqolada 2015–2025-yillar oralig‘idagi ilmiy tadqiqotlar asosida qand miqdorining suyaklanishga ta’siri yoritiladi.

Kalit so‘zlar: glyukoza, suyaklanish, osteoblast, osteoklast, giperglikemiya, insulin, suyak zichligi.

Tadqiqot maqsadi: Ushbu maqolaning maqsadi — glyukoza darajasining suyak to‘qimasining fiziologik va biokimyoviy xususiyatlariga ta’sirini tahlil qilish, suyak shakllanishi va buzilishida metabolik o‘zgarishlarning roli hamda diabetga aloqador osteopatiya mexanizmlarini ilmiy asosda yoritishdir [4].

Tadqiqot uslublari: Tadqiqotda 2015–2025-yillarda nashr etilgan ilmiy maqolalar tahlil qilindi. Ma’lumotlar PubMed, ScienceDirect, Nature, Frontiers in Endocrinology va Elsevier bazalaridan olindi. Tanlangan tadqiqotlarda hayvonlar va insonlarda glyukoza darajasi bilan suyak to‘qimasi o‘rtasidagi bog‘liqlik o‘rganilgan. Metaanaliz, klinik kuzatuv va eksperimental natijalar solishtirma tahlil orqali umumlashtirildi [5].

Kirish: Suyak to‘qimasi — organizmning mexanik tayanchi bo‘lib, uning shakllanishi murakkab endokrin va metabolik mexanizmlar orqali boshqariladi. Glyukoza bu jarayonda muhim energiya manbai sifatida xizmat qiladi. Biroq qand miqdorining keskin o‘zgarishlari (ayniqsa diabet holatida) suyak to‘qimasining qayta tiklanish jarayonlarini izdan chiqaradi [6].

So‘nggi yillarda olib borilgan tadqiqotlar shuni ko‘rsatadiki, diabet bilan bog‘liq giperglikemiya suyak zichligini kamaytiradi va sinish xavfini oshiradi [7].

Natijalar: 1. Giperglikemiya va oksidativ stress: Yuqori glyukoza darajasi suyak hujayralarida ROS (reactive oxygen species) miqdorini oshiradi, bu esa osteoblast differensiasiyasini to‘xtatadi [8].

2. Osteoblastlar faoliyatining pasayishi: Glyukoza konsentratsiyasi ortishi Runx2, COL1A1 kabi genlarning ekspressiyasini kamaytiradi, bu esa suyak to‘qimasining hosil bo‘lishini sekinlashtiradi [9].

3. Osteoklastlarning faollashuvi: Yuqori qand miqdori RANKL/OPG nisbati orqali osteoklastlar sonini ko‘paytiradi, bu esa suyak rezorbsiyasini kuchaytiradi [10].

4. Insulin va suyak metabolizmi: Insulin osteoblastlar uchun anabolik signal sifatida muhimdir. Diabetda insulin yetishmovchiligi suyaklarning tiklanish jarayonini sekinlashtiradi [11].

5. Gipoglikemiya ta’siri: Past qand darajasi ATP ishlab chiqarishni kamaytiradi, bu esa kalsiyning suyak matriksiga singish jarayonini buzadi [12].

Muhokama

Glyukoza darajasining suyaklanishga ta’siri ko‘p omilli jarayon bo‘lib, insulin signalizatsiyasi, oksidativ stress, gormonal muvozanat va mikrotsirkulyatsiya bilan chambarchas bog‘liq [13]. Tadqiqotlar shuni ko‘rsatadiki, diabetga chalingan bemorlarda suyaklar sinuvchanroq bo‘ladi, garchi ularning suyak mineral zichligi ba’zan normal ko‘rsatkichda saqlansa ham [14].

So‘nggi yillarda glyukoza metabolizmini tartibga soluvchi dori vositalarining suyakga ta’siri (masalan, metformin, GLP-1 agonistlari) ham o‘rganilmoqda. Ba’zilari suyak hosil bo‘lishini rag‘batlantiruvchi ta’sirga ega ekanligi aniqlangan [15].

Xulosa: Glyukoza miqdorining suyaklanish jarayoniga ta’siri ilmiy jihatdan isbotlangan. Yuqori qand darajasi osteoblastlarning faolligini pasaytiradi, suyakning qayta tiklanish jarayonini sekinlashtiradi va sinish xavfini oshiradi. Shu sababli diabet profilaktikasi, ovqatlanish muvozanatini saqlash va insulin signalizatsiyasini normallashtirish suyak salomatligini ta’minlashda muhim rol o‘ynaydi [16].

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