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REPRODUKTIV YOSHDAGI AYOLLARDA ASPROSINNING METABOLIK KO'RSATKICHLAR VA GONADOTROP GORMONLAR BILAN O'ZARO BOG' LIQLILIGI

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РЕЗЮМЕ

Цель исследования: определить уровень аспросина у женщин репродуктивного возраста и изучить его взаимосвязь с метаболическими показателями и гонадотропными гормонами.

Материал и методы: в одноцентровое поперечное исследование были включены 108 женщин репродуктивного возраста, обратившихся в РСНПМЦЭ имени академика Ё.Х. Туракулова. У участниц были определены антропометрические показатели, параметры углеводного обмена, уровни аспросина и гонадотропных гормонов, а их взаимосвязь оценивалась с помощью корреляционного анализа Спирмена.

Результаты. Уровень аспросина продемонстрировал статистически значимую положительную корреляцию с индексом массы тела (ИМТ) ($p = 0,645$; $p < 0,001$), окружностью талии ($p = 0,668$; $p < 0,001$), уровнем глюкозы натощак ($p = 0,349$; $p = 0,003$), инсулина ($p = 0,548$; $p < 0,001$), а также индексом НОМА-IR ($p = 0,567$; $p < 0,001$). Между уровнем аспросина и определёнными в фолликулярной фазе уровнями лютеинизирующего гормона (ЛГ) ($p = 0,192$; $p = 0,160$), фолликулостимулирующего гормона (ФСГ) ($p = 0,108$; $p = 0,438$), а также соотношением ЛГ/ФСГ ($p = 0,149$; $p = 0,287$) статистически значимой взаимосвязи не выявлено.

Заключение. Полученные результаты свидетельствуют о том, что аспросин прежде всего может быть перспективным метаболическим маркером, тогда как для изучения его взаимодействия с репродуктивной системой необходимы более крупные исследования с включением большего числа участниц.

Ключевые слова: ожирение, адипокины, аспросин, гонадотропины.

SUMMARY

Objective. To determine asprosin levels in women of reproductive age and to investigate its relationship with metabolic indicators and gonadotropic hormones.

Materials and methods: a total of 108 women of reproductive age who attended the Republican Specialized Scientific and Practical Medical Center of Endocrinology named after Academician Yo.Kh. Turakulov were included in this single-center cross-sectional study. Anthropometric parameters, carbohydrate metabolism parameters, asprosin levels, and gonadotropic hormone levels were determined in the participants, and their relationships were assessed using Spearman's correlation analysis.

Results. Asprosin level showed statistically significant positive correlations with body mass index (BMI) ($p = 0.645$; $p < 0.001$), waist circumference ($p = 0.668$; $p < 0.001$), fasting glucose ($p = 0.349$; $p = 0.003$), insulin ($p = 0.548$; $p < 0.001$), and the HOMA-IR index ($p = 0.567$; $p < 0.001$). No statistically significant relationships were found between asprosin level and luteinizing hormone (LH) measured during the follicular phase ($p = 0.192$; $p = 0.160$), follicle-stimulating hormone (FSH) ($p = 0.108$; $p = 0.438$), or the LH/FSH ratio ($p = 0.149$; $p = 0.287$).

Conclusion. The obtained results indicate that asprosin may primarily serve as a promising metabolic marker, while larger studies with greater sample sizes are required to investigate its interaction with the reproductive system.

Keywords: obesity, adipokines, asprosin, gonadotropins.

Yog' to'qimasi inson tanasida 5% dan 60% gacha tana massasini tashkil etishi mumkin bo'lib, nafaqat

energetik depo, balki faol endokrin a'zo hisoblanadi. Ayniqsa so'nggi yillarda adipokinlar-yog' to'qimasi

ishlab chiqaruvchi biologik aktiv molekularlar o'rganilishga bo'lgan qiziqish sezilarli darajada ortib bormoqda. Asprosin nisbatan yaqinda kashf qilingan adipokinlardan bo'lib, 2016-yilda Ch.Romere va hammualliflar tomonidan aniqlanib, uglevod va energiya almashinuvida ishtirok etuvchi gormon sifatida e'lon qilindi [13,14]. Birlamchi asosan oq yog' to'qimasi mahsuloti sifatida e'tirof etilgan asprosin, hozirgi kunda ko'plab to'qimalar, xususan tog' ay va biriktiruvchi to'qima turli xil komponentlari tomonidan ishlab chiqarilishi aniqlandi [11].

Asprosin oreksigen gormon bo'lib, ham markaziy, ham periferik ta'sirga ega [7]. U gematoensefalik baryerdan o'tib, AgRP+ neyronlar ishini proteintirozinfosfataza δ (Ptpd) retseptorlari bilan bog'lanish orqali kuchaytiradi, shuningdek, POMC neyronlar faolligini susaytiradi [8].

Periferik a'zoldan asosan jigar, me'da osti bezi, mushak to'qimasi va yurakka ta'siri aniqlangan [17]. Asprosin jigarda o'z retseptorlari bilan bog'lanib, qonga glyukoza ajralishini kuchaytiradi [13]. Asprosin glyukoza almashinuvida ishtirok etib va ishtahaga ta'sir qilib, semizlik, qandli diabet rivojlanishida ehtimoliy ahamiyatga ega [10]. Ko'plab tadqiqotlarda asprosinning TVI, bel aylanasi, qondagi glyukoza miqdori bilan musbat korrelyatsiyasi borligi aniqlandi [15,16], shu bilan bir qatorda ba'zi tadqiqotlar bunday bog'liqlik yo'qligini ko'rsatmoqda [2,6,12].

Korika va hammualliflar o'tkazgan adabiyotlar sharhida asprosin miqdori bilan tana vazni indeksi o'rtasidagi bog'liqlik bo'yicha tadqiqot natijalari bir-biriga zid ekanligi ko'rsatilgan. Shu sababli asprosinni semizlikning ishonchli markeri sifatida baholash uchun yirik ko'lamli va standartlashtirilgan qo'shimcha tadqiqotlar o'tkazish zarur.

To'plangan ma'lumotlarga qaramay, tadqiqotlarning yuqori darajadagi geterogenligi va natijalarning qarama-qarshiligi hozirgi vaqtda asprosinni ishonchli mustaqil biomarker sifatida baholash imkonini bermaydi. Shu sababli reproduktiv yoshdagi ayollarda metabolik va reproduktiv jarayonlarning o'zaro bog'liqligida

asprosinning o'rnini aniqlashtirishga qaratilgan qo'shimcha prospektiv tadqiqotlar o'tkazish zarur.

MATERIALLAR VA METODLAR

Bir markazli kesimiy tadqiqotga akad.Yo.To'raqulov nomidagi RIEIATM ga murojaat qilgan 108 nafar reproduktiv yoshdagi ayollar tanlanib, ulardan 26 nafar normal tana vaznli ishtirokchilar nazorat guruhi deb olindi. Tadqiqotga kiritish mezonlari: reproduktiv yoshdagi ayollar, tadqiqotda ishtirok etishga ixtiyoriy rozilik berilishi, asosiy guruh uchun tana vazni indeksining $25,0 \text{ kg/m}^2$ va undan yuqori bo'lishi, nazorat guruhi uchun tana vazni indeksining $18,5\text{--}24,9 \text{ kg/m}^2$ oralig'ida bo'lishi, antropometrik tekshiruv va zarur laboratoriya tahlillarini o'tkazish imkoniyati. Tadqiqotdan chiqarish mezonlari: homiladorlik va emizish davri, ikkilamchi semizlik bilan kechuvchi endokrin kasalliklar, og'ir yoki dekompensatsiyalangan somatik kasalliklar, tekshirilayotgan metabolik va gormonal ko'rsatkichlarga sezilarli ta'sir qiluvchi dori vositalarini qabul qilish, tadqiqot uchun zarur klinik yoki laboratoriya ma'lumotlarining to'liq bo'lmasligi, ishtirokchining tadqiqotda qatnashishni davom ettirishdan bosh tortishi. Barcha ishtirokchilarda antropometriya ko'rsatkichlari, uglevod almashinuvi ko'rsatkichlari, gonadotrop gormonlar, asprosin miqdori tekshirildi. Asprosin immunoferment tahlili asosida tekshirildi. Natijalar o'rtasidagi bog'liqlik Spirmen korrelyatsiyasi bilan solishtirildi, $p < 0,05$ qiymat statistik ahamiyat mezonini sifatida qabul qilindi. Natijalar statistik tahlili Jamovi 2.7.31. dasturi orqali amalga oshirildi.

NATIJALAR

108 nafar ishtirokchi TVI ko'rsatkichlariga ko'ra 5 ta guruhga bo'lindi (1-jadval). Bunda 26 nafari (24,1%) normal tana vaznli nazorat guruhini tashkil qildi. Nazorat guruhida bel aylanasi (BA) o'rtacha 62 sm ni, bo'ksa (BSA) aylanasi 90 sm ni tashkil qildi. Qolgan guruhlarda bu ko'rsatkichlar TVI oshishi bilan ko'tarilishi aniqlandi. Ortiqcha vazn $n=21$ (24,1%), semizlik I $n=39$ (36,1%), semizlik II $n=13$ (12%), semizlik III $n=9$ (8,3%) ni tashkil qildi.

1-jadval

Ishtirokchilarning TVI ko'ra guruhlanishi va antropometrik ko'rsatkichlari

Ko'rsatkich	Normal tana vazni (n=26)	Ortiqcha vazn (n=21)	Semizlik I (n=39)	Semizlik II (n=13)	Semizlik III (n=9)	p
Yoshi, yil	21,5 (21,0–32,0)	30,0 (25,0–34,0)	33,0 (29,0–39,0)	34,0 (31,0–42,0)	35,0 (34,0–38,0)	<0,001
Bo'yi, m	1,62 (1,57–1,65)	1,62 (1,58–1,68)	1,63 (1,60–1,67)	1,62 (1,60–1,66)	1,61 (1,58–1,65)	0,902
Bel aylanasi, sm	62,0 (60,0–68,8)	83,0 (82,0–86,0)	94,0 (92,0–97,0)	109,0 (102,0–110,0)	114,0 (112,0–124,0)	<0,001
Bo'ksa aylanasi, sm	90,0 (82,5–90,0)	103,0 (99,0–108,0)	113,0 (112,0–119,0)	121,0 (120,0–125,0)	128,0 (128,0–137,0)	<0,001
Bel aylanasi/bo'ksa aylanasi nisbati	0,721 (0,696–0,784)	0,811 (0,784–0,843)	0,822 (0,812–0,851)	0,864 (0,843–0,901)	0,883 (0,867–0,917)	<0,001

Ishtirokchilar uglevod almashinuvi tekshirilganda TVI toifalari bo'yicha och qoringa glikemiya, insulin va HOMA-IR ko'rsatkichlarida statistik ahamiyatli guruhlararo farqlar aniqlandi (barchasida $p < 0,001$).

Glikemiya bir tekis o'zgarmagan bo'lsa-da, semizlik darajasi ortishi bilan insulin va HOMA-IR ko'rsatkichlarining izchil oshishi kuzatildi (2-jadval).

Ishtirokchilar uglevod almashinuvi ko'rsatkichlari

Ko'rsatkich	Normal tana vazni	Ortiqcha vazn	Semizlik I	Semizlik II	Semizlik III	p
Och qoringa glyukoza, mmol/l	n=22 4,25 (4,03–4,79)	n=19 5,00 (4,65–5,10)	n=32 5,30 (4,95–5,69)	n=13 5,20 (4,50–5,90)	n=9 5,00 (4,30–5,40)	<0,001
Insulin, mkEd/ml	n=11 5,27 (4,25–7,30)	n=10 13,45 (9,60–17,50)	n=30 17,85 (12,53–24,52)	n=12 22,45 (20,35–30,70)	n=6 40,70 (39,05–45,13)	<0,001
HOMA-IR indeksi	n=11 1,05 (0,76–1,63)	n=10 2,85 (2,09–3,15)	n=26 4,31 (2,67–6,42)	n=12 5,87 (4,73–7,56)	n=6 8,32 (7,68–8,72)	<0,001

Tekshirilgan ayollarda follikulyar fazadagi gonadotrop gormonlar ko'rsatkichlari TVI toifalari bo'yicha tahlil qilindi (3-jadval). Follikulyar fazada LG miqdori normal tana vaznidan I darajali semizlikkacha pasayib, II–III darajali semizlikda qayta ko'tarilish tendensiyasini

ko'rsatdi. FSG semizlik darajasi ortishi bilan ko'tarilish tendensiyasiga ega bo'ldi, LG/FSG nisbati esa deyarli barqaror qoldi. Biroq ushbu farqlar statistik ahamiyatli emas edi: LG -p = 0,457, FSG-p = 0,281 va LG/FSG-p = 0,916.

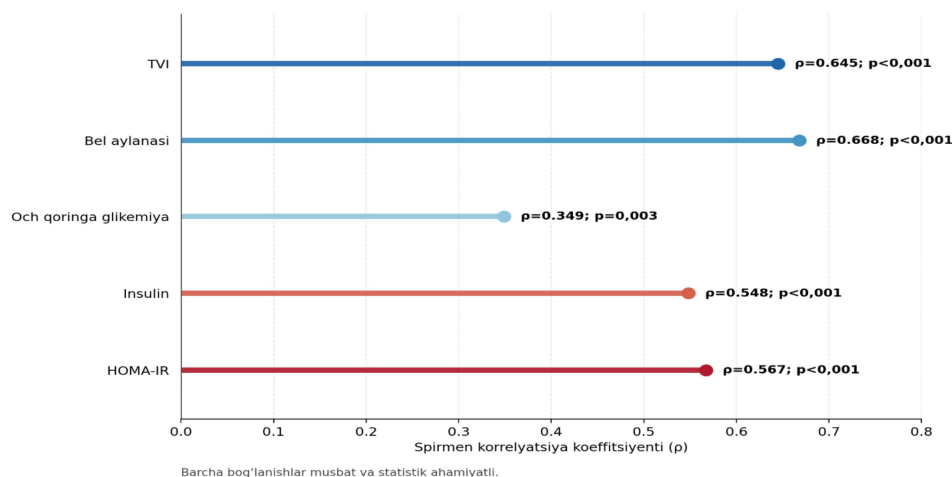
Tadqiqot guruhlarida gonadotrop gormonlar ko'rsatkichlari

Ko'rsatkich	Norma (n=21)	Ortiqcha vazn (n=14)	Semizlik I (n=23)	Semizlik II (n=7)	Semizlik III (n=8)	p
LG, mME/ml	8,20 (4,74–10,20)	7,01 (5,62–8,86)	5,99 (3,85–10,60)	8,42 (6,83–14,00)	9,50 (5,23–18,90)	0,457
FSG, mME/ml	5,55 (4,25–7,36)	5,64 (4,92–6,07)	5,72 (3,46–7,29)	6,20 (5,54–6,75)	7,44 (6,40–8,97)	0,281
LG/FSG	1,30 (0,91–2,02)	1,10 (0,75–1,80)	1,33 (0,76–1,84)	1,36 (0,87–2,41)	1,22 (0,86–1,64)	0,916

Asprosin miqdori 80 ta ayolda tekshirilib, nazorat guruhida uning konsentratsiyasining medianasi 0,925 ng/ml ni tashkil qildi. TVI oshishi bilan uning miqdori ham ko'tarilib, guruhlar o'rtasida mos ravishda quyidagi natijalarni ko'rsatdi: ortiqcha vazn guruhida 1,164;

semizlik I-1,375; semizlik II- 1,7; semizlik III- 2,3 ng/ml.

Asprosin TVI, uglevod almashinuvi ko'rsatkichlari bilan musbat korrelyatsiya ko'rsatdi (rasm). Eng kuchli bog'liqlik bel aylanasi ($\rho = 0,668$) va TVI ($\rho = 0,645$) bilan aniqlandi ($p < 0,001$).



Asprosin va metabolik ko'rsatkichlar o'rtasidagi bog'liqlik.

Asprosin miqdori follikulyar fazada aniqlangan LG ($\rho = 0,192$; $p = 0,160$), FSG ($\rho = 0,108$; $p = 0,438$) va LG/FSG nisbati ($\rho = 0,149$; $p = 0,287$) o'rtasida statistik ahamiyatli bog'liqlik aniqlanmadi.

MUHOKAMA

Semizlik va insulinrezistentlik reproduktiv tizim faoliyatiga ham ta'sir ko'rsatishi sababli asprosinning ayollarreproduktiv salomatligidagi o'zni alohida e'tiborga loyiq. Ko'pchilik tadqiqotlarda tuxumdondan polikistozi sindromi bo'lgan ayollarda asprosin miqdori nazorat guruhlariga nisbatan yuqori ekanligi aniqlangan. Shu

bilan birga, asprosinning gipotalamus-gipofiz boshqaruvi, xususan, FSG va LG bilan o'zaro bog'liqligi haqidagi ma'lumotlar cheklangan va qarama-qarshidir, chunki aksariyat tadqiqotlarda statistik ahamiyatli bog'liqlik aniqlanmagan [1,3,4,5,9]. Olingan natijalar uning ta'siri to'g'ridan-to'g'ri neyroendokrin mexanizmlardan ko'ra, asosan metabolik mexanizmlar orqali amalga oshishi mumkinligini ko'rsatadi. Bu asprosin insulinrezistentlik va giperandrogenizm shakllanishi orqali reproduktiv funksiyaga bilvosita ta'sir ko'rsatishi mumkinligini taxmin qilishga imkon beradi.

XULOSA

Tadqiqot natijalariga ko'ra, reproduktiv yoshdagi ayollarda asprosin miqdori TVIga bog'liq bo'lib, uning ko'rsatkichi qolaversa bel aylanasi, uglevod almashinuvi ko'rsatkichlari bilan musbat bog'lanishga ega. Gonadotrop gormonlar bilan esa statistik ahamiyatli korrelyatsiya aniqlanmadi, bu asprosin avvo ehtimoliy metabolik marker ekanligini ko'rsatadi.

MINNATDORCHILIK

Tadqiqotni tashkil etish va o'tkazishda ko'rsatgan yordami uchun Akademik Yo.X. To'raqulov nomidagi Respublika ixtisoslashtirilgan endokrinologiya ilmiy-amaliy tibbiyot markazi jamoasiga hamda tadqiqotda ishtirok etgan barcha ayollarga minnatdorchilik bildiramiz.

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ПЕРВЫЙ ДОКУМЕНТИРОВАННЫЙ СЛУЧАЙ ПРОВЕДЕНИЯ 131I-МЙБГ-ТЕРАПИИ У РЕБЁНКА С МЕТАСТАТИЧЕСКОЙ ФЕОХРОМОЦИТОМОЙ В УЗБЕКИСТАНЕ: ОПИСАНИЕ КЛИНИЧЕСКОГО СЛУЧАЯ

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XULOSA

Dolzarbligi. Bolalardagi metastatik feoxromotsitoma kam uchraydi, murakkab klinik kechishi bilan tavsiflanadi va ko‘pincha multimodal davolashni talab qiladi. MYBG yig‘uvchi o‘choqlarda 131I-MYBG teranostik davolash usuli sifatida qo‘llanishi mumkin.

Materiallar va usullar. Kasalligi 2019-yilda boshlangan bolaning klinik holati bayon etildi. Jarrohlik amaliyotlari, kimyoterapiya va 2023-yilda Turkiyada o‘tkazilgan 131I-MIBG terapiyasidan so‘ng, 2025-yilda kasallik yana takrorlandi. Klinik, laborator, morfologik va tasvirlash ma‘lumotlari o‘zaro solishtirildi. 123I-MYBG mavjud bo‘lmagani uchun o‘choqlarning MYBG to‘plash xususiyati diagnostik 131I-MYBG (48 MBq) tekshiruv orqali baholandi.

Natijalar. 2025-yil aprelida O‘zbekistonda ilk bor bevosita 3700 MBq 131I-MYBG terapevtik faolligi yuborildi. Terapiyadan keyingi tasvirlarda L5 umurtqa va jigarning V segmentidagi o‘choqlarda preparat to‘planishi kuzatildi. 2026-yil aprelidagi nazorat tekshiruvda laborator ko‘rsatkichlar referens chegaralarda bo‘lib, faol o‘simta jarayoni belgilari aniqlanmadi. Ushbu ma‘lumotlar asosida bemor remissiya holatida deb baholandi. 12 oy davomida davolash bilan bog‘liq klinik jihatdan ahamiyatli asoratlari qayd etilmadi.

Xulosa. Ushbu klinik holat 123I-MYBG mavjud bo‘lmagan sharoitda 131I-MYBG teranostikasini qat‘iy klinik asoslash va radiatsion xavfsizlik talablariga rioya qilgan holda amaliy joriy etish mumkinligini ko‘rsatadi.

Kalit so‘zlar: feoxromotsitoma, metastatik feoxromotsitoma, 131I-MYBG, radionuklid terapiya, teranostika, pediatriya, O‘zbekiston.

Феохромоцитомы и параганглиомы (PPGL) относятся к редким нейроэндокринным опухолям. В педиатрической практике обращает на себя внимание высокая доля наследственных вариантов: на них приходится 70–80 % наблюдений [2]. Классификация

SUMMARY

Background. Metastatic pheochromocytoma is uncommon in children and usually requires multimodal treatment. When lesions retain MIBG avidity, 131I-MIBG offers a theranostic option.

Materials and methods. We report the case of a child whose disease was diagnosed in 2019. The patient underwent surgery, chemotherapy, and a course of 131I-MIBG therapy administered in Turkey, followed by disease relapse in 2025. Clinical, laboratory, pathological and radiological records were reviewed. Because 123I-MIBG was unavailable, lesion uptake was assessed by diagnostic 131I-MIBG scintigraphy (48 MBq).

Results. In April 2025 the patient received 3700 MBq of 131I-MIBG in Uzbekistan. Post-therapy scintigraphy showed uptake in the L5 vertebral body and in segment V of the liver. At follow-up in April 2026 all laboratory parameters lay within normal limits and no sign of active tumour was found, so the patient was regarded as being in remission. No clinically relevant side effects occurred over the 12 months.

Conclusion. The case shows that 131I-MIBG theranostics can be implemented where 123I-MIBG is not available, provided that the indication is carefully justified and radiation protection requirements are met.

Keywords: pheochromocytoma, metastatic pheochromocytoma, 131I-MIBG, radionuclide therapy, theranostics, pediatrics, Uzbekistan.

ВОЗ 2022 года признаёт метастатический потенциал за всеми PPGL, поэтому морфологическое заключение приобретает смысл лишь в сопоставлении с клинической картиной и данными о распространённости процесса [4].