

# INDICATORS OF PHYSICAL DEVELOPMENT AND MATURITY LEVEL OF SPORTS SCHOOLGIRLS AND TEENAGE GIRLS

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## Abstract.

The purpose of the study is to assess the physical development and level of maturity of schoolgirls and teenage girls involved in sports. The main goal of the study is to study the impact of sports on the physical development of young people and their general level of maturity. Purpose of the study. The main goal of the study is to assess the level of physical development and maturity of schoolgirls and teenage girls involved in sports. Materials and methods: 2001 students involved in sports and teenage girls aged 11 to 15 years studying in 2 sports schools, 1 high school and 2 colleges in the Andijan region from 2019 to 2022 were examined. Anthropometric indicators reflecting the maturity of physical development were selected as the subject of the study, namely: the Brugsch index, Erisman index, Broca index, hemodynamic index, Livi index, body mass index, another indicator reflecting the level of maturity - the ratio of waist circumference/hip circumference. Research results. Index indicators of physical development/maturity of schoolgirls and teenage girls were studied and determined in research groups (the results of the analysis are presented in Table 1 and Figure 2 in the Appendix). The Brugsch index, which expresses the maturity of physical development, was determined in the studied girls as follows: in the main group -  $46.07 \pm 6.10$ , in the comparison group -  $45.08 \pm 5.10$  and in the control group -  $47.99 \pm 6.29$  [R1- 2<0.05; P1-3 <0.001; R2-3 <0.001]. Conclusion This information is important when assessing the maturity and age of schoolgirls and adolescent athletes. Their timely correction is of great importance in the prevention and treatment of reproductive and somatic acute and chronic diseases.

**Key words:** reproductive health, antenatal period, women of childbearing age, sexual development, sports, schoolgirls, physical development.

Muammoning dolzarbligi. Zamonaviy fanda o'quvchi-qizlar va o'smir qizlarning jinsiy rivojlanishi va reproduktiv funksiyasini shakillantirish masalasiga ekologik, tibbiy-ijtimoiy, somatik va boshqa omillarni shu jumladan, ularning sportchilik faoliyati bilan bog'liq kuchli jismoniy o'zgarishlarning ularga ta'sir qilishini o'rganishga katta e'tibor qaratilmoqda. Og'ir jismoniy faollik va sport mashg'ulotlarining o'quvchi - qizlar, o'smir qizlar va tug'ish yoshidagi ayollarning umumiy va balog'at yoshiga ta'siri haqida ko'plab ma'lumotlar bir - biriga ziddir. Yuqorida keltirilgan masalaga oydinlik kiritish maqsadida turli sport turlari bilan shug'ullanuvchi o'quvchi - qizlar va o'smir qizlarda reproduktiv kasalliklarning profilaktikasi bo'yicha innovatsion strategiyalarni ishlab chiqish muammosi to'liq yechilmagan fan yo'nalishi bo'lib qolmoqda.

Tadqiqot natijalari. Tadqiqot guruxlarida o'quvchi-qizlar va o'smir qizlar jismoniy rivojlanishi/yetukligining indeks ko'rsatkichlari o'rganildi va aniqlandi (1 - jadval va ilovadagi 2 - rasmda taxlilij natijalar keltirilgan). Jismoniy rivojlanish yetukligi ifodalanib ko'rsatuvchi Brugsh indeksi o'rganilgan qizlarda quyidagilarda aniqlandi: asosiy guruhda -  $46,07 \pm 6,10$ , qiyosiy guruhda -  $45,08 \pm 5,10$  va nazorat guruhida -  $47,99 \pm 6,29$  dan ifodalangan holda [R1-2 <0,05; R1-3 <0,001; R2-3 <0,001]. Tadqiqot guruxlarida Erisman indeksi 9,17  $\pm$  6,56 (I - guruhda), 9,63  $\pm$  5,94 (II - guruhda) va 7,89  $\pm$  6,26 (III - guruhda) ko'rsatkichlarda tavsiflanib ifodalanadi [R1 >0,05; R2 <0,001; R3 <0,001]. Asosiy guruhda, qiyosiy guruhda va nazorat guruhiga kiruvchi o'quvchi-qizlar va o'smir qizlarda Rorer indeksi xam aniqlandi va tasdiqlandiki bu indeks ularda muvofiq holda - 12,52  $\pm$  2,23, 9,63  $\pm$  5,94 va 7,89  $\pm$  6,26 ko'rsatkichlar bilan qayd qilinadi [R1-2 <0,001; R1-3 <0,05; R2-3 <0,001]. Jismoniy yetuklikni ifodalovchi yana ko'rsatkich - Brok indeksi tadqiqotning asosiy guruhidagilarda - 48,02  $\pm$  8,20, qiyosiy guruxidagilarda - 49,59  $\pm$  6,74 va nazorat guruhidagilarda - 46,43  $\pm$  9,37 ko'rsatkichlarini ifodalab jismoniy rivojlanish darajalarini ko'rsatadi [R1-2 <0,001; R1-3 <0,05; R2-3 <0,001]. Bizning o'rgangan populyatsiyamizda Livi indeksi - 46,07  $\pm$  6,09 (I guruhda), 45,08  $\pm$  5,09 (II guruhda) va 47,99  $\pm$  6,29 kabi ko'rsatkichlar bilan (III guruhda) aniqlanadi [R1-2 <0,05; R1-3 <0,001; R2-3 <0,001]. Tana vazni indeksi xam farqlanib tadqiqotning asosiy guruhidagilarda - 19,41  $\pm$  2,32, qiyosiy guruxidagilarda - 19,14  $\pm$  1,84 va nazorat guruhidagilarda - 19,78  $\pm$

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2,75 dan ko'rsatkichlar bilan tasdiqlanadi.

Yana bir yetuklik darajasini ifodalovchi ko'rsatkich – bel aylanasini/son aylanasiga nisbati ushbu sportchi qizlar populyatsiyasida – 0,77 ± 0,04 (I guruhdagilarda), 0,77 ± 0,01 (II guruhdagilarda) va 0,77 ± 0,02 (III guruhdagilarda) ifodalanish ko'rsatkichlari bilan tasdiqlanadi [R1-2 >0,05; R1-3 > 0,05; R2-3 < 0,05]. “YEIka kengligi/chanoq kengligi” – asosiy guruhdagi o'smir qizlarda – 1,37 ± 0,26, qiyosiy guruhdagilarda – 1,40 ± 0,12 va nazorat guruhdagilarda – 1,61 ± 0,04 ko'rsatkichlarida tasdiqlanadi [R1-2 >0,05; R1-3 > 0,05; R2-3 > 0,05].

Kuydagi 1 – jadvalda va 2 – rasmda tadqiqot guruhlaridagi o'smir qizlar yetuklik shakllarining indeks ko'rsatkichlariga ko'ra qiyosiy taxilini tavsiflari keltirilgan.

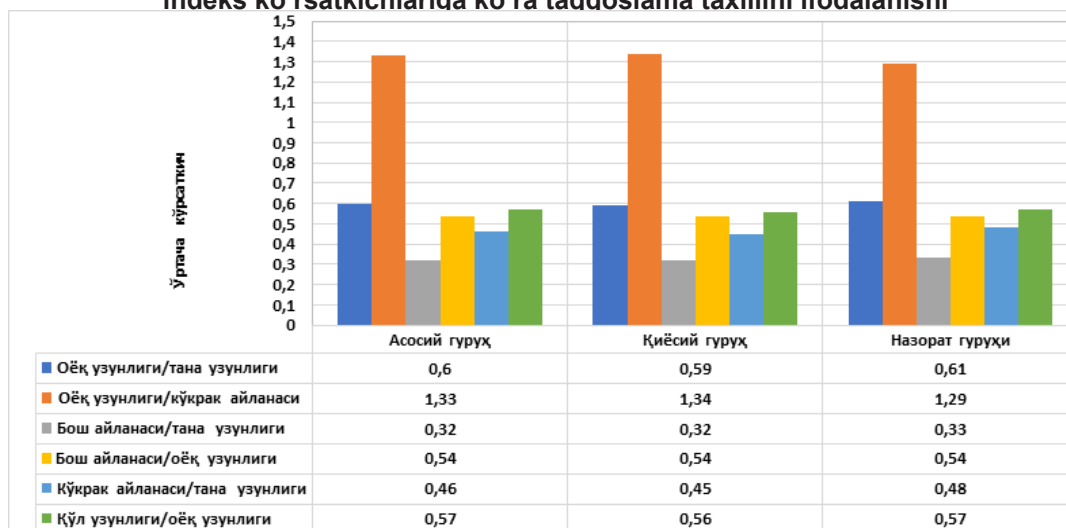
Jadval 1

**Tadqiqot guruhlaridagi o'quvchi-qizlar va o'smir qizlar jismoniy rivojlanishining indeks ko'rsatkichlariga ko'ra taqqoslama taxlili**

№	Indeks ko'rsatkichlari	Asosiy Guruh 1 (n=869)	Qiyosiy guruh 2 guruh2 (n=534)	Nazorat Guruh 3 (n=598)	PI-2	PI-3	P2-3
1	Brugsh indeksi	46,07±6,10	45,08±5,10	47,99±6,29	<0,05	<0,001	<0,001
2	Erisman indeksi	9,17±6,56	9,63±5,94	7,89±6,26	>0,05	<0,001	<0,001
3	Rorer indeksi	12,52±2,23	12,15±1,75	12,96±2,69	<0,001	<0,05	<0,001
4	Brok indeksi	48,02±8,20	49,59±6,74	46,43±9,57	<0,001	<0,05	<0,001
5	Livi indeksi	46,07±6,09	45,08±5,09	47,99±6,29	<0,05	<0,001	<0,001
6	Tana vazni indeksi	19,41±2,32	19,14±1,84	19,78±2,75	<0,05	>0,05	<0,05
7	Bel aylanasi/ son aylanasi	0,77±0,04	0,77±0,01	0,77±0,02	>0,05	>0,05	<0,05
8	Yelka kengligi/ chanoq kengligi chanoq kengligi	1,37±0,26	1,40±0,12	1,61±0,04	>0,05	>0,05	>0,05

Rasm 2

**Tadqiqot guruhlaridagi o'quvchi-qizlar va o'smir qizlar yetuklik shakllarining indeks ko'rsatkichlariga ko'ra taqqoslama taxilini ifodalanishi**



«Oyoq uzunligi/tana uzunligi» indeksi asosiy (0,60 ± 0,05), qiyosiy (0,59 ± 0,04) va nazorat (0,61 ± 0,06) guruhlaridagi o'smir qizlarda tafovutlanib aniqlanadi [R1-2 <0,05; R1-3 < 0,05; R2-3 < 0,001]. «Oyoq uzunligi/ko'krak aylanasi» indeksi - tadqiqotning asosiy guruhdagilarda – 1,33 ± 0,21, qiyosiy guruhdagilarda – 1,34 ± 0,15 va nazorat guruhdagilarda – 1,29 ± 0,22 ko'rsatkichlar bilan qayd qilinadi [R1-2 >0,05; R1-3 < 0,001; R2-3 < 0,001]. «Bosh aylanasi/tana uzunligi» indeksi – 0,32 ± 0,02 (I - guruhda), 0,32 ± 0,02 (II – guruhda) va 0,33 ± 0,03 (III guruhda) ko'rsatkichlar bilan ifodalanib tasdiqlanadi [R1-2 <0,001; R1-3 < 0,05; R2-3 < 0,001]. Sportchi o'quvchi-qizlar va o'smir qizlarda, mavjud sport bilan shug'ullanmagan tengdoshlarida olingan indekslar bilan solishtirilganda, sezilarsiz tafovutlanib: «Bosh aylanasi/oyoq uzunligi» indeksi – asosiy guruhlarda – 0,54 ± 0,04, qiyosiy guruhlarda – 0,54 ± 0,03 va nazorat guruhlarda – 0,54 ± 0,06 ko'rsatkichlarida tasdiqlanib qayd qilinadi [R1-2 >0,05; R1-3 < 0,05; R2-3 < 0,05].

«Ko'krak ayolanasi/tana uzunligi» indeksi bo'lsa –  $0,46 \pm 0,06$ ,  $0,45 \pm 0,05$  va  $0,48 \pm 0,06$  ko'rsatkichlarda muvofiq tarzda I - , II – va III – tadqiqot guruhlarida tasdiqlanadi [R1-2 <0,05; R1-3 < 0,001; R2-3 < 0,001]. YEtuklik darajasini belgilovchi yana bir indeks – “Qo'l uzunligi/oyoq uzunligi” ko'rsatkichi I – guruhlarda –  $0,57 \pm 0,06$ , qiyosiy guruhlarda –  $0,56 \pm 0,04$  va nazorat guruhidagilarda –  $0,57 \pm 0,08$  bilan ifodalanib tavsiflanadi [R1-2 < 0,05; R1-3 >0,05; R2-3 > 0,05]. Ushbu 6 turli yetuklik shakllarini indeks ko'rsatkichlari bo'yicha ham tadqiqotning asosiy guruhiga kiruvchi o'smir – sportchi qizlar “ustuvorlik” qilishadi.

Tadqiqot ob'yekti bo'lgan o'quvchi-qizlar va o'smir qizlar ikkilamchi jinsiy belgilari – Ma I, II, III va IV, Ax I, II, III va IV va R I, II, III va IV ko'rsatkichlarini epidemiologik tavsiflari bo'yicha o'rganildi (Ma – ko'krak bezlari, Ax – qo'ltiq osti tuklanishi, R – chov sohasi tuklanishi; I, II, III va IV – ikkilamchi jinsiy belgilarining 4 – balli baholash tizimi bo'yicha ifodalanishi darajasini anglatadi) va baholandi.

Bu xaqdagi ma'lumotlar 2 – jadvalda keltirilgan. Ko'krak bezlarini rivojlanishi I – darajasi sportchi qizlarda – 58,2%, xavaskor sportchi qizlarda – 79,6% va sportchi bo'lmagan qizlarda – 57,9% aniqlanish chastotasi bilan tasdiqlanadi [R1-2 <0,001; X2 =67,598; R1-3 > 0,05, X2 =0,020; R2-3 < 0,001; X2 =61,313].

Jadval 2

Tadqiqot guruhlaridagi o'quvchi-qizlar va o'smir qizlar ikkilamchi jinsiy belgilariga ko'ra taqqoslama taxlili

Ikkilamchi jinsiy belgilar	Sportchi qizlar1 (n=869)		Xavaskor sportchi qizlar2 (n=534)		Sportchi bo'lmagan qizlar3 (n=598)		P	X2	RR	95% CI		
	abs	%	abs	%	abs	%						
							1-2	<0,001	67,598	0,731	0,681-0,785	
I	506	58,2	425	79,6	346	57,9	1-3	>0,05	0,020	1,006	0,921-1,099	
							2-3	<0,001	61,318	0,727	0,670-0,788	
							1-2	<0,001	29,572	1,922	1,502-2,460	
II	219	25,2	70	13,1	146	24,4	1-3	>0,05	0,117	1,032	0,860-1,237	
							2-3	<0,001	23,354	1,862	1,436-2,415	
							1-2	<0,001	13,561	1,892	1,333-2,684	
III	117	13,5	38	7,1	78	13,0	1-3	>0,05	0,054	1,032	0,790-1,348	
							2-3	<0,05	10,776	1,833	1,266-2,653	
							1-2	<0,001	14,416	16,591	2,261-1,275	
IV	27	3,1	1	0,2	28	4,7	1-3	>0,05	2,436	0,663	0,395-1,114	
							2-3	<0,001	22,834	25,003	3,413-1,314	
							1-2	<0,001	20,456	0,890	0,848-0,933	
Ax	I	678	78,0	468	87,6	492	82,3	1-3	<0,05	3,969	0,948	0,900-0,998
								2-3	<0,05	6,304	0,938	0,893-0,985
								1-2	<0,05	6,875	1,582	1,116-2,242
	II	103	11,9	40	7,5	69	11,5	1-3	>0,05	0,034	1,027	0,771-1,368
								2-3	<0,05	5,312	1,540	1,062-2,233
								1-2	<0,001	12,345	2,113	1,372-3,256
	III	86	9,9	25	4,7	35	5,9	1-3	<0,05	7,653	1,690	1,157-2,469
								2-3	>0,05	0,771	1,250	0,758-2,060
								1-2	>0,05	0,029	1,229	0,111-13,521
	IV	2	0,2	1	0,2	2	0,3	1-3	>0,05	0,142	0,688	0,097-4,871
							2-3	>0,05	0,231	1,786	0,162-19,640	

P								1-2	<0,001	11,037	0,919	0,877-0,964
	I	693	79,7	463	86,7	505	84,4	1-3	<0,05	5,229	0,944	0,900-0,990
								2-3	>0,05	1,159	0,974	0,928-1,021
								1-2	>0,05	1,822	1,255	0,900-1,749
	II	96	11,0	47	8,8	61	10,2	1-3	>0,05	0,266	1,083	0,799-1,467
								2-3	>0,05	0,640	1,159	0,806-1,664
								1-2	>0,05	1,822	1,255	0,900-1,749
	III	77	8,9	22	4,1	30	5,0	1-3	<0,05	7,741	1,766	1,173-2,658
								2-3	>0,05	0,518	1,217	0,711-2,084
								1-2	>0,05	0,008	0,921	0,154-5,498
	IV	3	0,3	2	0,4	2	0,3	1-3	>0,05	0,001	1,032	0,173-6,159
								2-3	>0,05	0,013	0,893	0,126-6,317

Ma II ko'rsatkichlari ushbu guruhlarda muvofiq bo'lib – 25,2%, 13,1% va 24,4% chastotalarda aniqlanish bilan kuzatiladi [R1-2 <0,001; X2 =29,572]. Ma III – sportchi qizlarda – 13,5%, xavaskor sportchi qizlarda – 13,0% ko'rsatkichlarda tasdiqlanadi [R1-2 <0,001; R1-3 >0,05; R2-3 < 0,05]. Ma IV ushbu guruhlarda muvofiq xolda – 3,1%, 0,2% va 4,7% dan chastotalar bilan qayd qilinadi [R1-2 <0,001; R1-3 >0,05; R2-3 < 0,001]. O'quvchi-qizlar va o'smir qizlarda qo'ltiq osti tuklanishini ifodalaniishi darajalari quyidagicha aniqlanish chastotalari bilan tavsiflanadi: 1) Ax I – sportchi qizlarda – 78,0%, xavaskor sportchi qizlarda – 87,6% va sportchi bo'lmagan qizlarda – 82,3% chastotalarda kuzatiladi [R1-2 <0,001; X2 =22,834; R1-3 > 0,05, X2 =3,969; R2-3 < 0,05; X2 =6,304]; 2) Ax II ushbu guruhdagilarida muvofiqlik bilan – 11,9%, 7,5% va 11,5% dan tasdiqlanadi [R1-2 <0,05; X2 =6,875; R1-3 > 0,05, X2 =0,034; R2-3 < 0,05; X2 =5,312]; 3) sportchi qizlar, xavaskor sportchi qizlar va sportchi bo'lmagan qizlarda, bizning taxlillarimizga ko'ra, Ax III – 9,9%, 4,7% va 5,9% dan tarqalish chastotalarida muvofiq kuzatiladi; 4) Ax IV sportchi qizlar populyatsiyasida – 0,2%, xavaskor sportchi qizlar populyatsiyasida – 0,2% va sportchi bo'lmagan qizlar populyatsiyasida – 0,3% aniqlanish chastotalari bilan tasdiqlanadi. Chov sohasi tuklanishini ifodali aniqlanishi darajalari sportchi qizlarda, xavaskor sportchi qizlar va sportchi bo'lmagan qizlarda xoslik va tafvut bilan quyidagi tarqalish chastotalarida tavsiflanib tasdiqlanadi: 1) P I – 79,7%, 86,7% va 84,4% dan [R1-2 <0,001; R1-3 < 0,05, R2-3 > 0,05]; 2) R II – 11,0%, 8,8% va 10,2% dan [R1-2 > 0,05; R1-3 > 0,05, R2-3 > 0,05]; 3) R III – 8,9%, 4,1% va 5,0% dan [R1-2 > 0,05; X2 =1,8228; R1-3 < 0,05, X2 =7,771; R2-3 > 0,05; X2 =0,518]; R IV – 0,3%, 0,4% va 0,3% dan [R1-2 > 0,05; X2 =0,008; R1-3 > 0,05, X2 =0,001; R2-3 > 0,05; X2 =0,013].

Xulosa. 1.Yuqorida keltirilgan 6 turli yetuklik shakllarini indeks ko'rsatkichlari bo'yicha ham tadqiqotning asosiy guruhiga kiruvchi o'quvchi qizlar va o'smir – sportchi qizlar "ustuvorlik" qilishadi. 2.O'quvchi-qizlar va o'smir sportchi qizlarning yetukligi va yoshiga xamda maxorati darajasiga muvofiqligini baholab borishda ushbu qayd qilingan ma'lumotlar muhim o'rin tutadi. Ularni vaqtida korreksiyalash-reproduktiv va somatik o'tkir xamda surunkali kasalliklarni profilaktikasida, davolash tadbirlarini o'tkazishda salmoqli ahamiyat kasb etadi. 3.Ikkilamchi jinsiy belgilarni rivojlanishi sport bilan shug'ullanuvchi o'quvchi-qizlar va o'smir qizlarda, sportchi bo'lmaganlarga qaraganda kuchliroq rivojlanadi. Aksariyat ularning aniqlanishi, sezilarli va kuchli tafvut bilan, I va II darajali ifodalaniishi tasdiqlanadi.

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