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## Shabnam Suprava Das, Devangan Vaman, Lubov Stklanina WAIST-TO-HIP RATIO AND BODY FAT PERCENTAGE: INDIAN TEENAGERS VS. AFRICANS (contemporary anthropometric review)

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**Shabnam Suprava Das, Devangan Vaman, Stklanina Lubov** Waist-to-hip ratio and body fat percentage: Indian teenagers vs. Africans (contemporary anthropometric review) // Український морфологічний альманах. - 2014. - Том 17, № 2. - С. 36-38.

Ethnic- and sex-specific change points of fat percentage (BF%) and waist-to-hip ratio (WHR) should be considered in setting diagnostic criteria for disharmony in physical status to detect undiagnosed metabolic disorders. From our obtained data, the Indian and African boys have wears relatively big fat deposits, and the last ones also are predisposed to the abdominal obesity (due to the over-value of their WHR), and, since so, to the metabolic disorders.

**Key words:** waist-to-hip ratio, body fat, anthropometry, Africa, India.

**Дас Шабнам Суправа, Деванган Ваман, Стклянїна Л.В.** Співвідношення обхватів талія/стегна та відсоткова доля жирового компоненту тіла: порівняльна характеристика підлітків з Індії та Африки (сучасне антропометричне ревію) // Український морфологічний альманах. - 2014. - Том 17, № 2. - С. 36-38.

Етнічні та статеві відмінності співвідношення обхватів талії до стегон (СТ/С) та відсотку жиру тіла (ЖТ%) повинні враховуватися підчас встановлення критеріїв діагностики дисгармонійного фізичного розвитку. Згідно з отриманими даними, юнаки Індії та Африки мають досить значну жирову вагу тіла, а останні ще й схильні до абдомінального ожиріння, й через це – розвитку метаболічного синдрому, як показало їх високе СТ/Б.

**Ключові слова:** співвідношення обхватів, талія, стегна, відсоток жир, Африка, Індія.

**Дас Шабнам Суправа, Деванган Ваман, Стклянїна Л.В.** Соотношение обхватных параметров талия/бедря и процентное содержание жирового компонента тела: сравнительная характеристика подростков Индии и Африки (современное антропометрическое ревію) // Український морфологічний альманах. - 2014. - Том 17, № 2. - С. 36-38.

Етніческие и половые отличия соотношения обхватов талии к бедрам (СТ/Б) и процента жира тела (ЖТ%) должны учитываться при установлении критериев дисгармоничного физического развития. Согласно полученным данным, юноши Индии и Африки имеют достаточно большую жировую массу тела, а последние к тому же склонны к абдоминальному ожирению, и, как следствие – развитию метаболіческого синдрома, как показывает их высокое СТ/Б.

**Ключевые слова:** соотношение обхватов, талия, бедра, процент жира, Африка, Индия.

**Actuality.** Clinical trials have shown that weight reduction with lifestyles can delay or prevent diabetes and reduce blood pressure. An appropriate definition of obesity using anthropometric measures is useful in predicting diabetes and hypertension at the population level. However, there is debate on which of the measures of obesity is best or most strongly associated with diabetes and hypertension and on what are the optimal cut-off values for body fat percentage (BF%) and waist-to-hip ratio (WHR) in this regard. Some researchers have found that the WHR is a significant measure of female attractiveness. Women with a 0.7 WHR are usually rated as more attractive by men from Indo-European cultures. Preferences may vary, according to some studies, ranging from 0.6 in China, South America, and some of Africa to 0.8 in Cameroon and among the Hazda tribe of Tanzania. Steven Gaulin of the University of California, Santa Barbara, found that children whose mothers had wide hips and a low waist-hip ratio scored highest cognitive abilities. The WHR has been used as an indicator or measure of the health of a person. Research shows that having a large amount of tummy fat ("apple-shaped" bodies) when compared to having fat around the Bottom or thighs makes you more likely develop type 2

diabetes. WHR has been found to be a more efficient predictor of mortality of heart attack in older people than waist circumference or BMI. Evidence suggests that WHR is an accurate somatic indicator of reproductive status. Among girls with identical body weights, those with lower WHRs show earlier sex steroid (estradiol) activity. By western standards, women in foraging populations have high numbers of pregnancies, high parasite loads, and high caloric dependence on fibrous foods. These variables change across cultures, suggesting that the normal range of female WHR was often higher than in western cultures. The another parameter is the body fat percentage, which exposes not only the fatness of the person and fit level, but often used in population studies to determine the coronary artery disease risk factor, associated with obesity. Obesity has reached epidemic proportions in India in the 21<sup>st</sup> century, with morbid obesity affecting 5% of the country's population. India is following a trend of other developing countries that are steadily becoming more obese. Overweight/obesity affects more than one quarter of the adult population in sub-Saharan Africa, school children were overweight, ranging from 6.4% in Western Africa to 17.0% in Northern Africa [1]. If secular trends continue, adult

overweight/obesity in sub-Saharan Africa will exceed 28% by 2030 [2].

**Aim of the study** to detect ethnic differences with anthropometric measures and predisposition to the dysproportionality in physical status and obesity in people of Indian and African origins and to present the study population characteristics such as the body proportions and fit level among the young counterparts from the different racial and geographical territories.

**Materials and methods.** A total of 1000 teenager (460 girls, 540 boys) in the age group 17-21 years old were recruited from the India and Africa (district towns and rural villages). Anthropometric measurements were carried out according to the WHO technical instructions [3]. The participants

were barefoot and dressed in their normal light clothing. Weight was measured using a digital scale. The thickness of the skinfolds on the trunk and limbs was measured by the body caliper to establish the tendency of the subcutaneous fat depositions. The participants' waist and hip circumferences were measured after marking of the anatomical sites. Waist-to-hip ratio (WHR) formula =  $G_w / G_h$ , where  $G_w$  = waist girth,  $G_h$  = hip girth. It does not matter which units of measurement you use, as long as it is the same for each measure. The value of the WHR estimated as following (Table 1).

Body fat percentage (BF%) was calculated after the Jackson, A.S. & Pollock, M.L. (1985) [4] and estimated as follows (Table 2).

**Table 1.** WHR meanings and grades:

acceptable			unacceptable		
mark	excellent	good	average	high	extreme
male	< 0,85	0,85 - 0,90	0,90 - 0,95	0,95 - 1,00	> 1,00
female	< 0,75	0,75 - 0,80	0,80 - 0,85	0,85 - 0,90	> 0,90

**Table 2.** BF% equations.

Equations for males		Equations for females	
% body fat = $1.1533 - (0.0643 \times \log \text{ of the 4 skinfolds (triceps, biceps, subscapular and suprailiac in mm)})$		% body fat = $1.1369 - (0.0598 \times \log \text{ of the total of the 4 skinfolds (triceps, biceps, subscapular and suprailiac in mm)})$	
<b>Ratings for BF %</b>	male	female	
<i>lean</i>	< 12	< 17	
<i>acceptable</i>	12 - 21	17 - 28	
<i>moderately overweight</i>	21 - 26	28 - 33	
<i>overweight</i>	> 26	> 33	

**Results.** As soon as the waist-to-hip ratio shows the gender variability (Table 3), it was seen that females of the both races have the “good” WHR. Indian males are only have the optimal WHR, best for the health prognosis, and the African males are in the bed physical condition, because their average WHR exceeds the normal level, so that the African boys are more predisposed to the abdominal adiposity and the relative metabolic disorders, than the Indians.

Results of the calculations of the BF% were unexpected: the males of the both races reveals the relatively large fat deposition (acceptable moderate body fat), the female Indians are in the best physics and stay lean, and the African ladies are moderately overweight (Table 4).

**Table 3.** WHR – our results in observed populations.

gender	Males	Females
Indians	excellent 0,84	good 0,79
Africans	average 0,94	good 0,77

**Table 4.** BF% in observed populations.

Male Indian: acceptable moderate -15%	Female Indian: lean - 14,5%
Male African: acceptable moderate -16,9%	Female African: moderately overweight- 28%

**Table 5.** Thickness of the skinfolds in Indians and Africans of different genders ( $M \pm \sigma$ ).

Thickness of the skinfolds (cm)	abdominal	calf	subscapular	suprailiac
Male Indians	1,14±0,05	0,89±0,92	1,39±0,98	1,11±0,23
Male Africans	0,96±0,02	0,70±0,76	1,13±0,67	0,92±0,09
Female Indians	1,21±0,05	1,18±0,90	1,40±0,45	1,21±0,12
Female Africans	1,24±0,03	1,17±1,02	1,41±0,97	1,27±0,23

During the comparison of the absolute mean values of the skinfold's thickness the racial differences were not obvious, but the sexual dimorphism became evident when we compare the males with the females (Table 5): the thicker abdominal and subscapular skinfolds were featured for the African ladies, that mean the predisposition to the trunk fat deposition for the African females. Indian ladies accumulate the fat mostly around their pelvic girdles.

**Conclusion.**

1. Clinical trials have shown that weight reduction with lifestyles can delay or prevent diabetes and reduce blood pressure. An appropriate definition of obesity and waist-to-hip ratio using anthropometric measures are useful in predicting metabolic dysfunctions at the population level.

2. This study reveals some dangerous tendencies in modern teenage populations: Indian and African boys have wears relatively big fat deposits, and the last ones also are predisposed to the abdominal obesity, and, since so, to the metabolic disorders.

3. The absolute measurements of the body skinfold's thickness reveal the absence of the racial, but obvious sexual dimorphism.

**Perspectives of the further research.** Ethnic- and sex-specific change points of BMI and WC

should be considered in setting diagnostic criteria to detect undiagnosed or newly diagnosed metabolic disorders. Our data would be compared with the respective values of the WHR and BF%, getting from the another racial teenage populations.

**LITERATURE.**

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