

BODY COMPOSITION OF ADOLESCENT BOYS AND GIRLS

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Abstract. The relationship between body composition and body weight was investigated in a group of 111 young men and women of seventeen years of age. Specific body weight was calculated according to PASCALE's equation from subscapular skinfold thickness, and the fat percentage of body weight by using the tables by RATHBUN and PACE. From the body weight and fat percentage of body weight the amount of body fat and lean body mass were calculated. These data were compared to results obtained in persons of both sexes, of 20—29 and 60—69 years of age. The seventeen year old persons of both sexes displayed the lowest body weight, body fat and lean body mass values, as well as the smallest subscapular skinfold thicknesses. All of these parameters increase with age, and no difference in lean body mass between the adults of 20—29 and 60—69 years in both sexes was found. The lowest correlation coefficients were found in seventeen year old young men and girls between body weight and subscapular skinfold thickness (0.33), between body weight and lean body mass (0.93). In the same group, the correlation coefficient between body weight and body fat was higher in young men (0.64) than in girls (0.57).

Key words: body composition, subscapular skinfold, adolescent boys and girls.

Introduction

It is well-known that there are methods of analyzing the proportion of the fat amount and lean body mass in the organism. Thus an insight into the body composition of the human organism at the various different stages of ontogenesis is possible. The body weight and the thickness of various skinfolds are used for this purpose, in their basis body composition is determined.

The present study is striving to get insight into the body weight of 17-year-old boys and girls. Body weight refers to the fat amount and lean body mass in the organism.

Material and Methods

Fifty-seven boys and 54 girls, 17 years old, were subjected to the study. Groups of adult individuals of both sexes between 20—30 and 60—69 years of age were taken for comparison. There were 57 men and 114 woman in the 20—30 years old age group. Data of 101 men and 67 women were analyzed in the agegroup of 60—69 years. All studied individuals were natives of the Vojvodina, Jugoslavia.

The results obtained were analyzed by variational statistical methods. The correlation coefficients and regression curves were calculated (HADŽIVUKOVIĆ 1973).

Body weight was measured on a decimal scale and subscapular skinfold thickness with John Bull's calipers applying a constant pressure of 10 gm per 1 sq.mm. of skin.

For calculating the per cent of body fat, the specific body weight was calculated according to the equation of PASCALE L. R.:

$$D = 1.0896 - 0.0179 \cdot x$$

where D is the specific body weight, x the skinfold thickness at the level of the right scapular angle, expressed in centimetres.

The fat content in per cent is obtained by reading off the corresponding values in RATHBUN and PACE'S (1945) table of specific body weight. The amount of body fat is calculated from the body weight and the fat percentage in the organism. By subtracting the body fat amount in kilograms from the body weight in kilograms the lean body mass in kilograms is obtained.

Results and Discussion

Table 1 presents the results of the author's studies of his findings in adult and elder individuals by sex.

Table 1

Body composition according to sex and age

Parameters	♂					
	17		20—30		60—69	
	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD
Body weight, kg	64.94	7.63	71.10	9.14	74.15	13.79
Fat, kg	8.99	2.45	11.91	3.86	14.30	6.69
Lean body mass, kg	55.77	6.13	59.23	6.61	59.52	8.13
Subscapular skinfold, mm	99.12	29.53	134.84	43.71	156.67	65.03
N	57		57		101	
Parameters	♀					
	17		20—30		60—69	
	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD
Body weight, kg	54.89	5.16	61.36	10.72	69.75	10.84
Fat, kg	9.82	2.53	14.28	6.09	20.35	7.53
Lean body mass, kg	45.20	4.41	47.07	6.31	49.40	6.31
Subscapular skinfold, mm	148.44	42.22	206.66	64.60	268.48	83.13
N	54		114		67	

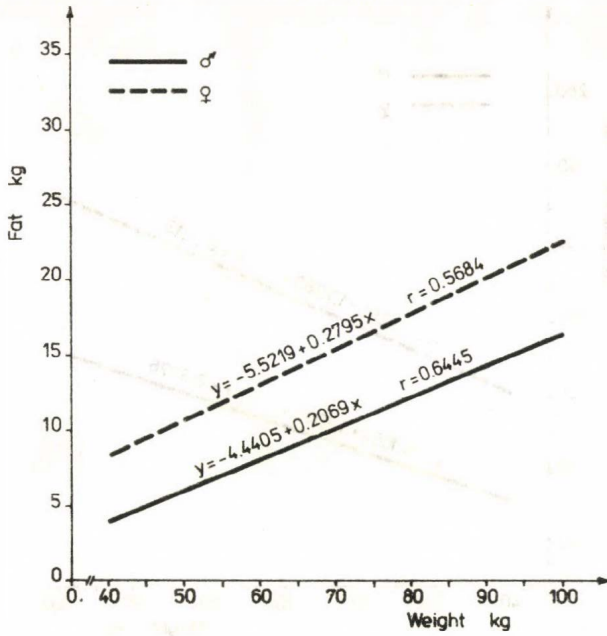


Fig. 1: Relation between body weight and body fat in 17 year old boys and girls

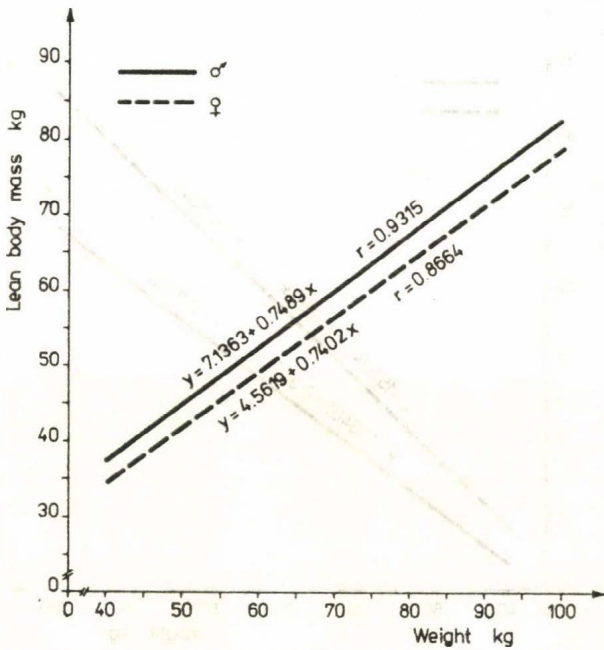


Fig. 2: Relation between body weight and lean body mass in 17 year old boys and girls

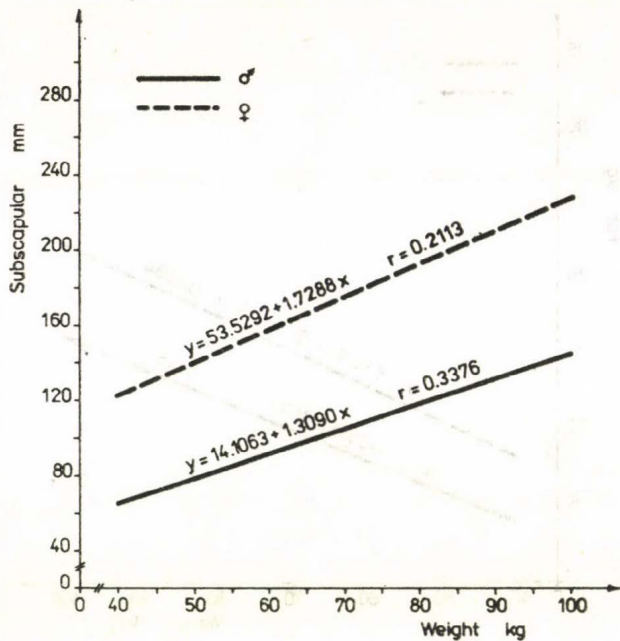


Fig. 3: Relation between body weight and subscapular skinfold in 17 year old boys and girls

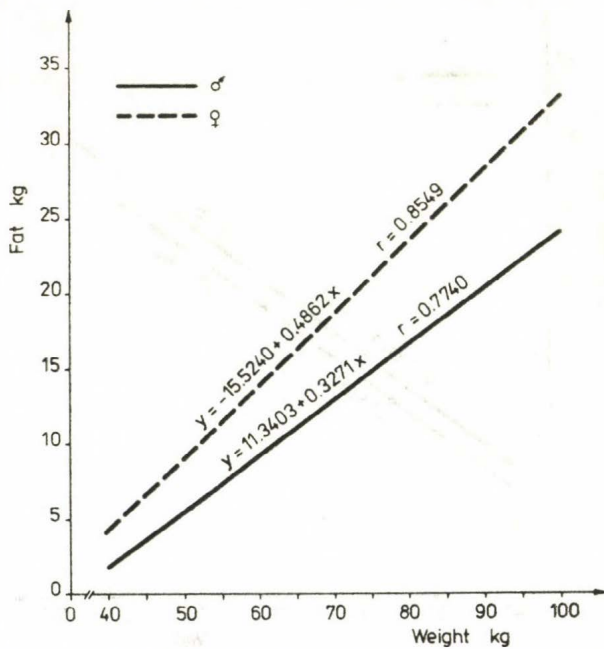


Fig. 4: Relation between body weight and body fat in 20-30 year old men and women

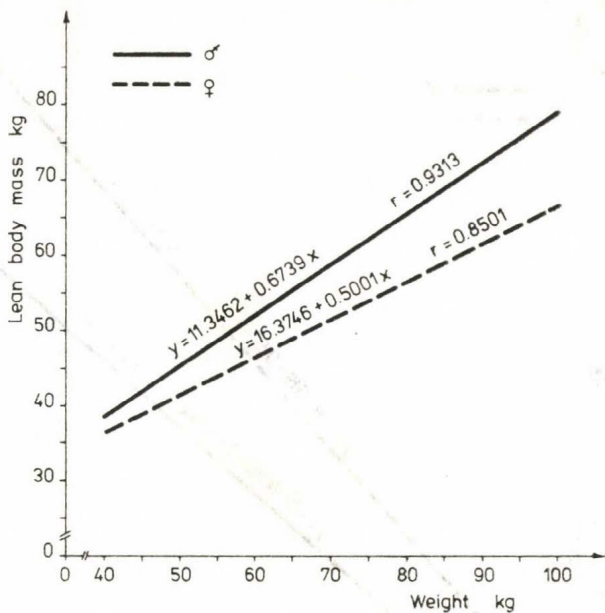


Fig. 5: Relation between body weight and lean body mass in 20–30 year old men and women

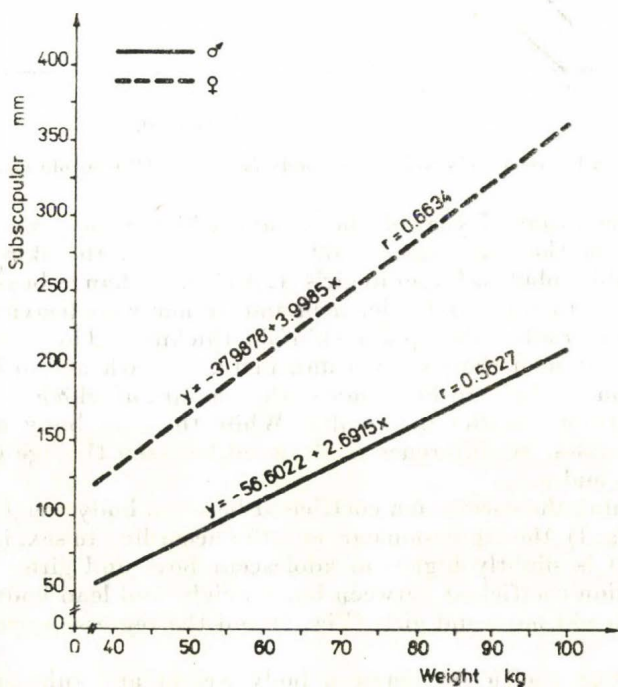


Fig. 6: Relation between body weight and subscapular skinfold in 20–30 year old men and women

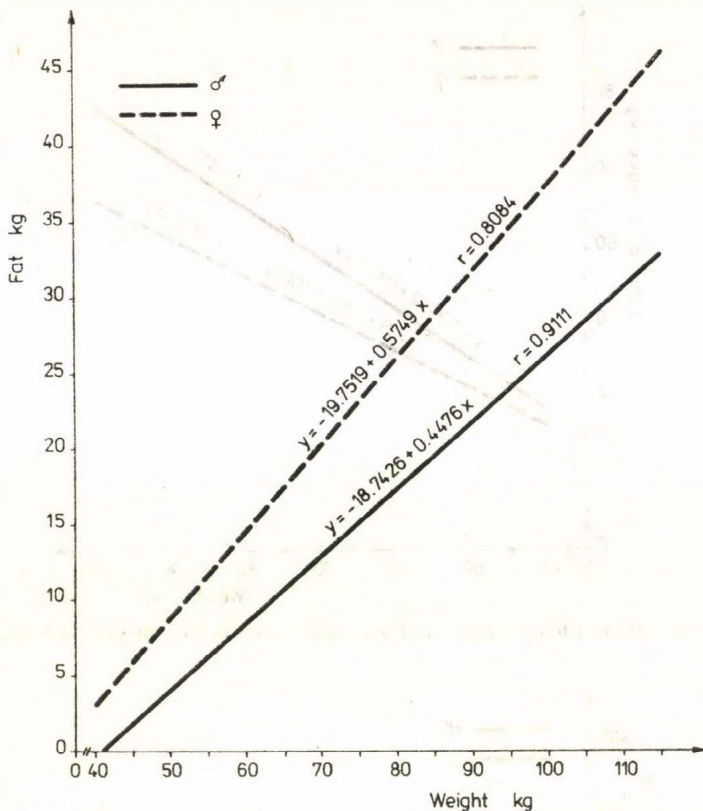


Fig. 7: Relation between body weight and body fat in 60—69 year old men and women

It is to be seen that 17 year old boys have a higher body weight (64.94 kg) than the girls of the same age (54.89 kg). However, the skinfold thickness below the shoulder blade is larger in girls (1.4844 mm) than in boys (0.9912 mm). The same applies to adult and older men and women with heavier body weight and more considerable subscapular skinfold thickness. The body fat content is higher in adult men than women and increases with age in both sexes. It has not relation to the lean body mass, the amount of which in the organism is in all age groups smaller in females. While the lean body mass increases with age in females, no difference is observed between the age groups 20—30 and 60—69 in males.

By determining the correlation coefficient between body weight and amount of body fat (Fig. 1), the regression curves differ according to sex, i.e. the correlation coefficient is slightly higher in adolescent boys and girls.

The correlation coefficient between body weight and lean body mass is very high in 17 year old boys and girls (Fig. 2) and the regression curves have the same trend.

The correlation coefficient between body weight and subscapular skinfold thickness is lower in 17 year old girls than boys; being more variable in girls (Fig. 3).

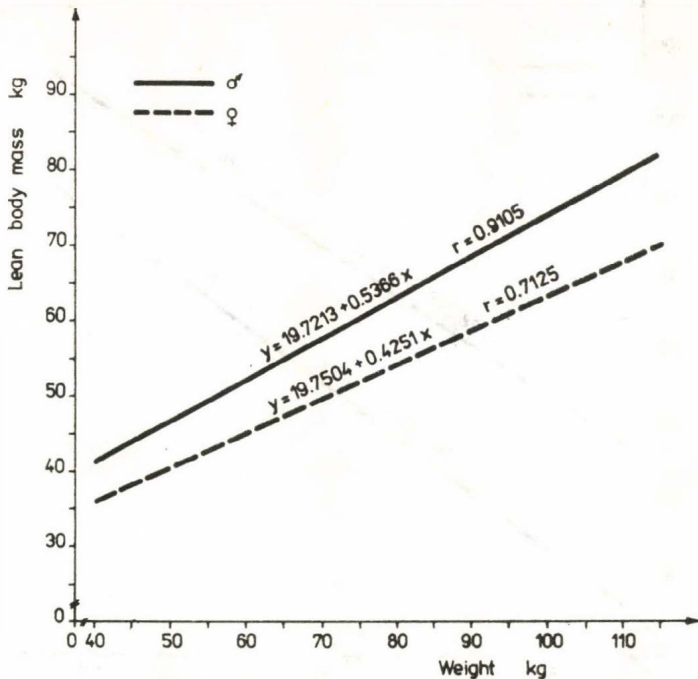


Fig. 8: Relation between body weight and lean body mass in 60—69 year old men and women

In the 20—30 years old of both sexes adults, the correlation between body weight and body fat is much higher than in 17 year old boys and girls, with a considerably higher variability of fat amount depending on the body weight (Fig. 4).

The correlation between body weight and lean body mass in 20—30 year-old individuals is as high as in 17 year old boys and girls (Fig. 5).

However, the correlation between body weight and subscapular skinfold thickness is markedly stronger, being within the limits of the stronger correlation (Fig. 6).

In 60—69 year old individuals the correlation between body weight and body fat amount is very strong in both sexes with higher variability in females (Fig. 7).

The correlation between body weight and lean body mass in older persons is very strong in men and strong in women, with a higher variability of individual findings in males (Fig. 8).

The interrelationship between body weight and subscapular skinfold thickness in the oldest individuals is very strong in men, strong in women, with higher variability of individual values in females (Fig. 9).

The studies set forth here show that adolescent individuals of both sexes differ in their body composition from adults of the age groups of 20—30 and 60—69 years. They display the smallest body weight, body fat amount and subscapular skinfold thickness. Their correlation coefficients between body

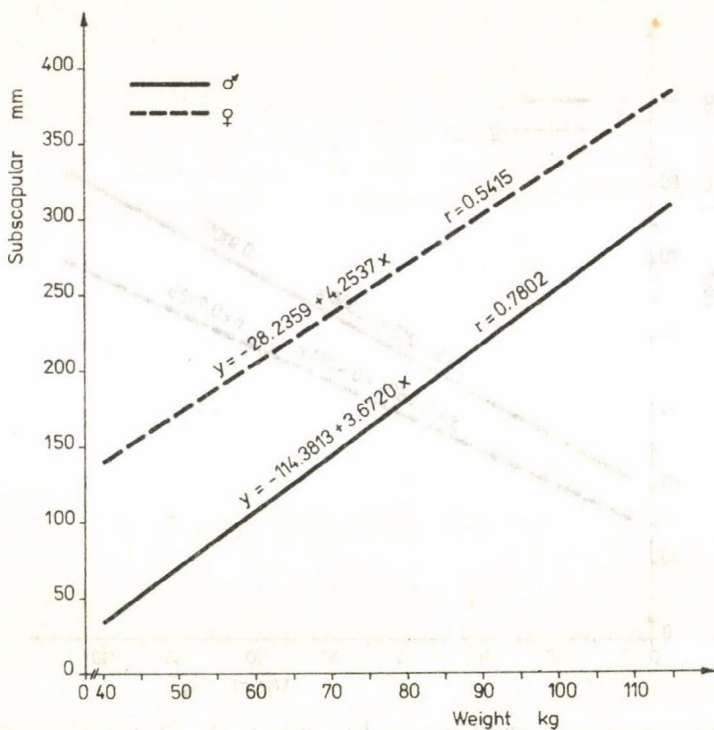


Fig. 9: Relation between body weight and subscapular skinfold in 60–69 year old men and women

weight and body fat amount as well as between body weight and subscapular skinfold thickness, respectively are the lowest. The correlation between body weight and lean body mass is very strong in 17 year old boys and girls, showing a trend to decrease with the increasing age in the females.

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