Relationship between Body Composition of School Children and their Growth

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In recent years, the increasing tendency of obese children in Japan becomes a serious problem. When body weight is evaluated, being heavy does not always mean that the child is fat. In such a case, body composition should be considered. After his weight is divided into two components, i.e., lean body mass (LBM) and body fat, the weight can be evaluated more adequately.

Hence, the present study investigates the relationship between body composition of school children and their growth and aging.

METHODS

The anthropometric measurements of school children were made in four primary schools in the eastern part of Hiroshima Prefecture. Measurement sites for estimation of body composition were subscapular and triceps and this measurement was taken with a Eiken-type Caliper.

Body density was determined by use of the equations for boys and girls of Naganine, *et al.* (1974). After per cent of fat (fat %) was estimated from the equation of Brožek, *et al.* (1963), LBM was computed.

Table 1. Means($\bar{X}$) and standard deviations(SD) of age, height, body weight, skinfolds, Rohrer's index, per cent of fat(fat%), and lean body mass(LBM) of school children in four primary schools.

School year		Boys			Girls		
		4	5	6	4	5	6
No. of subjects		77	75	76	66	77	65
Age	$\bar{X}$	10.2	11.2	12.2	10.2	11.2	12.2
(years)	SD	0.27	0.29	0.31	0.29	0.27	0.30
Height	$\bar{X}$	134.1	139.0	146.2	134.9	140.6	147.2
(cm)	SD	5.41	6.07	8.26	5.85	7.54	6.61
Weight	$\bar{X}$	30.6	34.4	38.2	30.3	34.2	39.4
(kg)	SD	5.59	6.81	7.98	4.11	6.56	6.97
Skinfold							
Subscapular	$\bar{X}$	8.8	8.9	9.3	10.5	13.9	16.9
(mm)	SD	7.16	7.48	6.84	4.98	8.75	9.18
Triceps	$\bar{X}$	12.3	12.5	12.2	14.6	17.2	17.8
(mm)	SD	6.03	6.26	6.03	4.78	6.92	5.91
Rohrer's	$\bar{X}$	126.4	127.7	121.1	123.2	122.3	123.1
index	SD	16.22	19.51	14.43	10.94	14.68	14.76
Fat %	$\bar{X}$	18.7	18.9	18.9	24.1	27.9	30.0
(%)	SD	8.33	8.47	7.88	5.55	9.45	8.91
LBM	$\bar{X}$	24.5	27.4	30.5	22.9	24.3	27.2
	SD	2.65	3.17	4.78	2.64	3.84	3.58

RESULTS AND DISCUSSIONS

Table 1. shows the main results of the anthropometric measurements and estimations of school children in the four primary schools. Mean values of height and body weight in each school year and sex were lower than the standards of Japanese children (Meshizuka, *et al.*, 1980) by 4-5cm in height and 2-3kg in body weight. However, skinfold thicknesses at subscapular and triceps for the boys and especially the girls in the present study were thicker than those in the standards. The result was due primarily to some overfatted children whose skinfold thicknesses ranged from 20 to 30mm at each site.

Means of height, body weight, fat %, and LBM on schoolgirls are shown in Fig. 1. Each of the means in the schoolgirls who had menarche (Gm) were higher than the mean in those who had not (Gn). Whereas height, body weight, fat %, and LBM on Gm indicated little change, those on Gn increased systematically. The results confirm the previously reported tendency (Sakate, 1982).

Comparing body weight with LBM shown in Fig. 1., it seems that stored fat contributes largely the weight in both groups. Since the fat % on Gm was especially high, the revelation of secondary sex character should be considered, when body composition is investigated.

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Fig. 1 Means of height, body weight, percent of fat, and lean body mass (LBM) of schoolgirls who have had menarche (solid symbols) and who have not (open symbols).