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A STUDY OF FAT PATTERNING IN URBAN AND RURAL ADOLESCENT GIRLS OF PUNJAB

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ABSTRACT

The present cross-sectional study was conducted on 300 adolescent girls (150 urban and 150 rural) in the age range of 11 to 16 years from various schools of Barnala and Mansa districts of Punjab from January to March, 2010. The objectives were to study the fat patterning of the adolescent girls and compare the differences among them due to urban and rural residency. The subcutaneous fat including skinfolds (biceps, triceps, subcapular, suprailiac and calf) and diameters (humerus bicondylar and femur bicondylar) were evaluated. It was observed that all these measurements increased in both groups but the values were more in urban girls as compared to the rural ones. It was concluded that urban girls had more fatness as compared to the ones living in rural areas.

Keywords: Anthropometry, Urban, Rural, Skinfolds, Diameters

INTRODUCTION

The adolescent period comprises nearly half of the growing period of children and it is an important phase for their development into mature adults and reflects the general standard of living and nutritional status of a population. The assessment of pattern of growth and body fat accumulation during the adolescent period is described by a variety of anthropometric measurements. These measurements not only indicate the general pattern of growth during adolescent period but also reflect a population specific growth pattern which can serve as models for the nutritional assessment of the population.

The adolescent fat wave may explain the poor tracking in fatness from childhood to

adolescence **[1]** but showed continuity greater fatness from adolescence to adulthood **[2]**. The timing of the growth spurt influences changes in subcutaneous fat accretion **[3]**. The rate of subcutaneous fat deposition and fat distribution as measured by skinfold thickness **[4-7]**.

In Bahrain, anthropometry and body composition of school children in age range from 6 to 18 years were studied and it showed that triceps and subscapular skinfolds were increased with age **[8]**. It was reported that the skinfolds increased with advancement of the age among adolescent girls **[9]**. A study on Hungarian girls residing in urban and rural areas was carried and reported that skinfolds and diameters were more in urban girls as compared to rural girls **[10]** and also reported that urban girls had better indicators of growth than rural girls **[11]**.

In West Bengal, a study on 527 school going adolescent girls of Peri-urban (Duttapukur) area of Parganas district ranging in aged from 10 to 18 years was conducted and also reported that skinfolds were increased with advancement of age **[12]**.

The present cross-sectional study was conducted to study the fat patterning of the adolescent girls and compare the differences among them due to urban and rural residency of Punjab.

MATERIAL AND METHODS

The present cross-sectional study was conducted on a sample of 300 children (150 urban and 150 rural girls) ranging in age from 11 to 16 years from Barnala and Mansa districts of Punjab. The decimal age of each individual was calculated and the subjects were further divided into six age groups. Skinfolds (biceps, triceps, subscapular, suprailiac and calf) and diameters (humerus bicondylar and femur bicondylar) were taken with the help of techniques **[13]**. Student's t-test was applied for assessing significant urban-rural differences.

RESULTS

Biceps and triceps skinfolds were more in urban girls as compared to rural girls and the total gain was 3.36 mm and 4.28 mm in urban girls and 3.16 mm and 4.68 in rural girls over the growth period of 11 to 16 years and the differences were statistically non-significant in both at all age groups (**Table 1)**.

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Urban girls had more subscapular, suprailiac and calf skinfold as compared to rural girls and the total gain was 4.48 mm, 4.48 mm, 4.04 mm in urban girls and 4.64 mm, 4.08 mm, 5.04 mm in rural girls during the growth period of adolescence. The differences were statistically significant at 13 and 14 years for subscapular and at 12, 13 and 14 years for

calf skinfold but non-significant for suprailiac skinfold at all age groups **(Table 2)**.

The mean values for Humerus bicondylar and Femur bicondylar diameters were more in urban girls as compared to rural girls and the total gain was 0.50 cm and 0.69 cm in urban girls and 0.39 cm and 0.63 cm in rural girls with the growth period of 11 to 16 years and the differences were statistically significant at 12 years for femur bicondylar but non-significant for humerus bicondylar diameter at all ages **(Table 3)**.

DISCUSSION

In the present study, it was concluded that the mean values for biceps and triceps skinfolds were increased with age **(Table 4)**. Similar results were found in other populations **[8-9, 12]** up to 15 years of age. The total gain for biceps and triceps skinfolds in our study were 2.48 mm and 3.48 mm in urban girls and 2..20 mm and 2.88 mm in rural girls, respectively; whereas it was 2.98 mm and 3.85 mm for tribal population of Visakhapatnam district, Andhra Pradesh **[9]**. In a study on adolescent girls of West Bengal **[12]**, total gain for biceps skinfold was 1.91 mm and 7.2 mm (triceps skinfold) for Bahrain population **[8]**. It was observed that the total gain for biceps and triceps skinfolds were less in the present study as compared to other populations (8. 9) but more for biceps skinfold (in present study) as compared to West Bengal population **[12]**. In the present study, the mean values of biceps skinfold were more as compared to other populations **[9, 12]** except for tribal population of Andhra Pradesh **[9]** at 15 years of age. As compared to present study, the mean values for triceps skinfold were more in Parganas district, West Bengal **[12]** and less in tribal population of Visakhapatnam district, Andhra Pradesh **[9]** in all age groups.

Subscapular and suprailiac skinfolds also increased with age **[9, 12]** and when the present study was compared to other population groups up to 15 years of age **(Table 5)**, it was observed that the total gain for subscapular skinfold was less and also less for suprailiac skinfold **[9, 12]** but more for suprailiac skinfold as compared to Andhra Pradesh population **[9]** in urban group of the present study. The mean values for subscapular and suprailiac skinfolds were more in Peri-urban (Duttapukur) area of Parganas district of West Bengal **[12]** in all age groups as compared to present study. As compared to our study, we found that the mean values for subscapular skinfold were less at 11 years of age and more at 15 years and for suprailiac skinfold, the differences in values were negligible at 11 years but difference was observed at 15 years of age in tribal population of Andhra Pradesh **[9]**.

It was concluded that the urban girls had more fatness as compared to the ones living in rural areas. This may be attributed to less physical activity, diet and better living condition of urban girl as compared to rural girls. Therefore, a better knowledge of the critical periods for the development of adiposity, stunting and its sequelae is required. This may help to focus on preventive and therapeutic efforts of developmental stages, when these efforts are likely to be most cost effective.

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Table 1: Biceps and Tricep Skinfolds (mm) in Urban and Rural Adolescent Girls

Age	Biceps Skinfold (mm)			Triceps Skinfold (mm)		
	Urban	Rural	t-value	Urban	Rural	t-value
11	7.20	6.84	0.54	9.56	9.12	0.44
12	8.40	7.96	0.55	11.52	11.0	0.61
13	8.60	8.12	0.56	12.48	11.28	1.39
14	9.00	8.56	0.53	12.60	11.80	0.72
15	9.68	9.04	0.68	13.04	12.00	1.15
16	10.56	10.0	0.59	13.84	13.80	0.04

NOTE: *Significant at 5% Level

Table 2: Subscapular, Suprailiac and Calf Skinfolds (mm) in Urban and Rural Adolescent Girls

Age	Subscapular Skinfold (mm)			Suprailiac Skinfold (mm)			Calf Skinfold (mm)		
	Urban	Rural	t-value	Urban	Rural	t-value	Urban	Rural	t-value
11	9.36	8.60	0.88	8.80	8.60	0.23	11.96	10.48	1.55
12	10.96	9.92	0.98	10.88	9.36	1.46	14.44	11.92	2.37*
13	12.48	9.96	2.96*	11.28	9.40	1.91	14.48	12.40	2.14*
14	12.76	10.56	2.07*	11.32	10.64	0.75	14.76	12.56	2.66*
15	13.12	11.52	1.50	12.04	11.16	0.79	14.88	13.24	1.84
16	13.84	13.24	0.58	13.28	12.68	0.65	16.00	15.52	0.45

NOTE: *Significant at 5% Level

Table 3: Humerus Bicondylar and Femur Bicondular Diameters (cm) in Urban and Rural Adolescent Girls From 11 to 16 Years

Age	Humerus bicondylar diameter (cm)			Femur bicondylar diameter (cm)		
	Urban	Rural	t-value	Urban	Rural	t-value
11	5.27	5.19	0.88	7.12	7.08	0.28
12	5.37	5.29	0.70	7.55	7.10	2.81*
13	5.42	5.38	0.30	7.70	7.26	0.29
14	5.57	5.46	1.03	7.73	7.62	0.76
15	5.69	5.57	1.30	7.75	7.64	0.77
16	5.77	5.58	1.41	7.81	7.71	1.11

NOTE: *Significant at 5% Level

Table 4: Comparison of Biceps and Triceps Skinfolds (mm) of Present Study with Different Population

Age	Biceps skinfold				Triceps skinfold			
	Present study (2010)		Banerjee et al (2009)	Rao et al (2005)	Present study (2010)		Gharib and Rasheed (2009)	Rao et al (2005)
	Urban	Rural			Urban	Rural		
11	7.20	6.84	6.58	7.11	9.56	9.12	16.5	9.05
12	8.40	7.96	7.59	7.47	11.52	11.0	17.8	10.20
13	8.60	8.12	7.30	8.54	12.48	11.28	22.1	11.76
14	9.00	8.56	7.84	9.06	12.60	11.80	23.4	12.78
15	9.68	9.04	8.49	10.09	13.04	12.00	23.7	12.90

Table: 5 Comparison of Subscapular Skinfold and Suprailic Skinfolds (mm) of Present Study with Different Population

Age (years)	Subscapular skinfold				Suprailiac skinfold			
	Present study (2010)		Banerjee *et al*., 2009	Rao *et al.*, 2005	Present study (2010)		Banerjee *et al*., 2009	Rao *et al*., 2005
	Urban	Rural			Urban	Rural		
11	9.36	8.60	10.61	8.52	8.80	8.60	12.24	8.82
12	10.96	9.92	12.92	9.74	10.88	9.36	14.62	9.90
13	12.48	9.96	14.04	12.05	11.28	9.40	16.10	11.67
14	12.76	10.56	13.63	13.51	11.32	10.64	15.09	12.52
15	13.12	11.52	17.20	14.21	12.04	11.16	16.70	11.60