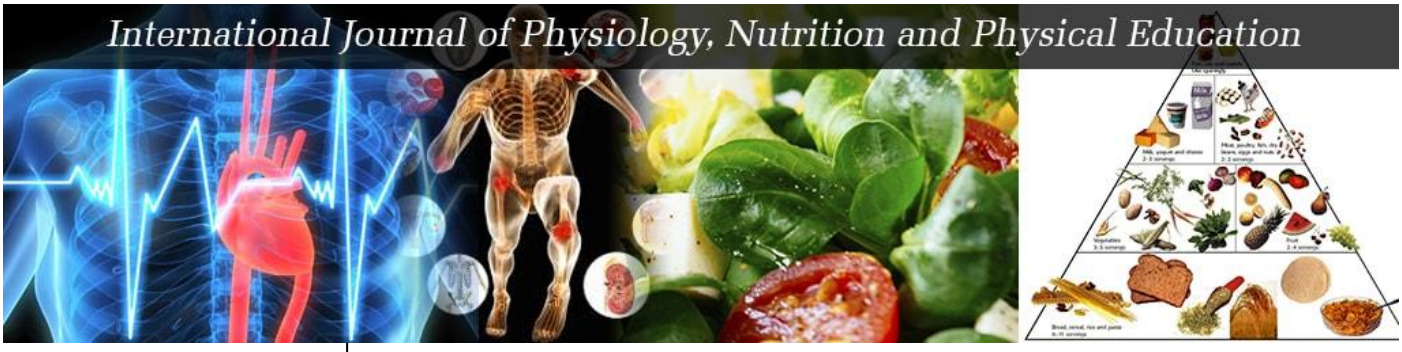

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Anthropometric measurements and body composition of 14 years old children

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Abstract
The purpose of the present study was to evaluate and compare the anthropometric measurements and body composition components of the 14 years old rural and urban children from Punjab. For the purpose of the study, 60 children (30 rural and 30 urban) were selected to participate in the study. Height of the subjects was measured with the stadiometer. Body mass was assessed by using the portable weighing machine. Widths and diameters of body parts were measured by using digital caliper. Girths and lengths were taken with the flexible steel tape. Skinfold thicknesses were measured with the help of Harpenden skinfold caliper. The independent samples t-test revealed that the rural children were significantly taller (p<0.05) and heavier (p<0.05) than their urban counterparts. The rural children had significantly greater total arm length (p<0.01), upper arm length (p<0.05), lower arm length (p<0.05), upper leg length (p<0.05) than the urban children. Circumferences and diameters were also significantly greater in rural children as compared to their urban counterparts. Rural children also had significantly greater lean body mass as compared to urban children. In conclusion, it is evident from the results that the rural adolescents possessed better anthropometric characteristics.

Keywords: Anthropometric measurements, rural, urban, percent body fat, lean body mass

Introduction
The children's growth and development indicate the health and quality of nutrition in a populace. The variation in anthropometrical characteristics is influenced by the time, ethnicity, socio-economic, political, and environmental aspects. The variations in body height and weight can be observed throughout the globe as well as between the rural and urban areas in the same geographical region [1, 2]. Previous nationwide study in India has reported that the growth rate is higher in urban children as compared to rural children [3]. It has been argued that environmental and cultural factors are also the causes behind urban-rural anthropometrical differences [4]. Chronic diseases are associated with being overweight and obese [5] and are now rising in developing countries at a faster rate than that experienced by developed countries [6]. The association between obesity indices and physical fitness index are well documented in different populations by several previous studies [7, 8] which show the importance of physical fitness index in obesity management in children. Health risks associated to overweight and obesity have been evaluated by using BMI, body fat% and waist to hip ratio, waist to thigh ratio. Bielicki [9] has suggested two fundamental categories of deviation in growth patterns 1) social gradients and 2) intergenerational changes. Social gradients in growth are differences in body size or maturation rate observed within a society between groups differing in some aspects of their socioeconomic situation, while intergenerational changes in growth are secular trends toward greater body size and increased tempo of maturation. This study is an attempt to provide baseline data regarding the anthropometric data of rural and urban children.

Methodology
For the purpose of this study, total 60 male children of age group 14 years, from the various districts of Punjab were purposively selected to participate in the study. The children were from Amritsar, Jalandhar, Tarn-Taran, Kapurthala, Nawashehar and Gurdaspur districts of Punjab.

The data for the study was collected during the various camps conducted under "Catch Them Young Programme" organized by Department of Physical Education (AT), Guru Nanak Dev University, Amritsar under the aegis of Centre of excellence in sports sciences. Out of sixty male children, 30 were belonged to rural areas and 30 were from the urban areas. In different studies and countries the meaning and definition of rural and urban residence may differ according to their country norms. For the present study, an area with a minimum population of 15,000, with 75 percent of the male population is engaged in non-agricultural works is considered as urban area.

Anthropometry

Standing height was measured to the nearest 0.5 cm using a stadiometer. Body mass was assessed by using the portable weighing machine. Widths and diameters of body parts were measured by using digital caliper. Girths and lengths were taken with the flexible steel tape to the nearest 0.5 cm. Skinfold thicknesses were measured with the help of Harpenden skinfold caliper.

Body Mass Index

Body mass index (BMI) was calculated by the following formulae

BMI (Kg/m^2) = (Body mass in Kg)/ (Stature in Meters)^2 [10].

Percent Body Fat

Percentage body fat as estimated from the sum of skinfolds was calculated using equations of Slaughter et al [11].

Percent Body Fat = 1.21(triceps+subscapular) x 0.008(triceps+subscapular)x2-1.7

Total Body Fat (kg) = (%body fat/100) × body mass (kg)

Lean body mass (LBM) was calculated using the % body fat value estimated from the sum of skinfolds.

Lean Body Mass (kg) = body mass (kg) – total body fat (kg)

Statistical Analysis

Statistical analysis was performed using SPSS version 16.0 for windows (SPSS Inc, Chicago, IL, USA). All descriptive data pertaining to anthropometric measurements and body composition variables was reported as mean and standard deviation. An independent sample t-test was used to compare the mean values of anthropometric measurements and body composition variables between rural and urban children. Significance levels were set at $p<0.05$.

Results

Table 1: Comparison of height, weight, BMI and length measurements between rural and urban children

Variables	Rural (N=30)		Urban (N=30)		t-Value
	Mean	SD	Mean	SD	
Height (cm)	152.30	10.37	147.26	5.37	2.35*
Weight (kg)	47.13	10.98	40.03	3.18	3.39**
Body Mass Index (BMI) (Kg/m^2)	20.21	3.62	18.50	1.75	2.31*
Total Arm Length (cm)	70.73	5.94	65.83	4.48	3.60**
Upper Arm Length (cm)	28.90	2.49	26.23	2.04	4.52**
Lower Arm Length (cm)	41.86	3.84	39.56	3.43	2.44*
Total Leg Length (cm)	84.30	9.85	81.30	5.87	1.43
Upper Leg Length (cm)	40.13	6.62	37.03	3.40	2.27*
Lower Leg Length (cm)	44.50	4.23	43.93	3.50	0.56
Upper Arm Circumference (cm)	21.20	2.73	19.70	1.72	2.54*
Forearm Circumference (cm)	20.86	2.02	19.66	1.58	2.55*
Wrist Circumference (cm)	15.20	1.21	14.26	0.86	3.42**
Chest Circumference (cm)	72.80	7.09	69.20	4.70	2.31*
Abdominal Circumference (cm)	66.20	7.09	61.80	3.91	2.97**
Hip Circumference (cm)	77.30	7.00	70.33	4.72	4.51**
Thigh Circumference (cm)	43.13	5.04	40.76	3.72	2.06*
Calf Circumference (cm)	29.80	2.92	27.53	2.16	3.41**
Bicondylar Humerus Diameter (cm)	6.47	0.61	6.11	0.35	2.78**
Wrist Diameter (cm)	5.09	0.42	4.77	0.29	3.38**
Hand Diameter (cm)	7.47	0.58	6.96	0.419	3.89**
Biacromial Diameter (cm)	36.41	1.94	34.52	1.98	3.72**
Hip Diameter (cm)	27.25	2.48	25.94	2.04	2.23*
Bicondylar Femur Diameter (cm)	9.06	0.63	8.77	0.48	2.24*

* Indicates $p<0.05$

Anthropometric measurements of rural and urban children are presented in table 1. The rural children were significantly taller (t=2.35, $p<0.05$) and heavier (t=2.39, $p<0.05$) than the urban children. The body mass index (t=2.31, $p<0.05$) was also significantly higher in the rural children as compared to their urban counterparts. Similarly, the rural children were reported to have significantly longer total arm(t=3.60, $p<0.05$), upper arm(t=2.4.52, $p<0.05$), lower arm (t=2.44, $p<0.05$) and upper leg (t=2.27, $p<0.05$) lengths than urban children. All the circumferences (upper arm, forearm, wrist, chest, abdominal, hip, thigh and calf) and diameters (bicondylar humerus, wrist, hand, biacromial, hip and bicondylar femur) were also significantly greater in rural children as compared to their urban counterparts.

Table 2: Comparison of skinfold thicknesses and different components of body composition between rural and urban children

Variables	Rural (N=30)		Urban (N=30)		t- Value
	Mean	SD	Mean	SD	
Biceps Skinfold (mm)	3.76	1.85	3.50	1.73	0.57
Triceps Skinfold (mm)	7.43	3.70	6.30	2.19	1.44
Subscapular Skinfold (mm)	7.50	3.70	5.56	2.82	2.27*
Supra-iliac Skinfold (mm)	9.30	5.84	6.16	3.73	2.47*
Percent Body Fat (%)	16.13	8.26	12.46	5.48	2.02*
Total Body Fat (kg)	7.97	4.97	5.05	2.48	2.88**
Lean Body Mass (kg)	39.15	8.55	34.98	2.88	2.53*

* Indicates $p<0.05$

Table 2 presents the skinfold thicknesses and various components of body composition of rural and urban children. The rural children had significantly greater subscapular (t=2.27, $p<0.05$) and supra-iliac (t=2.47, $p<0.05$) skinfold measurements than the urban children. The rural children were also found to have significantly greater percent body fat (t=2.02, $p<0.05$), total body fat (t=2.88, $p<0.05$) and lean body mass (t=2.53, $p<0.05$) as compared to the urban children.

Discussion

The aim of the current study was to examine differences in anthropometric measurements and body composition of Punjabi boys living in either urban or rural settings. The main findings were that rural boys had significantly higher values on the most of the parameters than their urban counterparts. In 14 years old age group, the results showed that the rural boys were significantly taller and heavier than their urban counterparts. The boys in the present study had lower height and comparable weight than the 14 years old Saudi Arabia boys, [12] however, results are in contrast to South African black children. [13] The rural boys were also found to have significantly greater body mass index than the urban boys. There were no significant differences in leg length, and lower leg length between the rural and urban boys. However, the upper leg length, arm length, upper arm length and lower arm length were significantly greater in rural boys when compared to urban boys. In a similar study on 12 years old children, Singh et al. [14] revealed the comparable findings. In case of various circumferences of the body parts, the rural boys were reported significantly greater mean values for all the circumferences i.e. upper arm, forearm, wrist, chest, abdominal, hip, thigh and calf circumferences than the urban boys. These findings are in agreement with the other study done by Singh et al. [15] The rural boys were found to have significantly greater bicondylar humerus, wrist, biacromial, hip and bicondylar femur diameters as compared to urban boys. The boys in the present study had greater biacromial diameter and comparable bicodylar humerus and bicondylar femur diameters with the 14 years old Saudi Arabia boys. [12] No statistically significant differences were noticed in biceps and triceps skinfold thickness between the two groups. The rural boys showed significantly greater mean value in subscapular and supra-iliac skinfold thickness as compared to urban boys. The both rural and urban boys in the present study have lesser skinfolds thicknesses than the Saudi Arabia boys reported by Al-Hazzaa[12]. The analysis of body composition showed that the percent body fat, total body fat and lean body mass of the rural boys were significantly higher than those of the urban boys.

Conclusion

It is concluded that the differences exist in anthropometric measurements and body composition of adolescents on the basis of place of residence as studied herein. The way of life and food habits and the constituents of food, the more activity oriented routine, more open spaces and play fields compared to cities in the rural areas might be the major factors contributing in the differences among adolescents from different settings.

References

1. Meredith HV. Growth. 1979; 43:95.
2. Pena Reyes ME, Tan SK, Malina RM. Urban–rural contrasts in the physical fitness of school children in Oaxaca, Mexico. American Journal of Human Biology. 2003; 15:800-813.
3. Indian Council of Medical Research: Growth and physical development of Indian infants and children. (ICMR Technical Report Series No. 18. ICMR, New Delhi, 1972.
4. Adair LS, Vanderslice J, Zohoori N. Urban-rural differences in growth and diarrhoeal morbidity of Filipino infants. In: Schell LM, M Smith, A Bilsborough (Eds.): Urban ecology and health in the Third World, Cambridge University Press, Cambridge, 1993.
5. Reddy KS. Cardiovascular disease in non-Western countries. N Engl J Med. 2004; 350(24):2438-40.
6. Raymond SU, Leeder S, Greenberg HM. Obesity and cardiovascular disease in developing countries: a growing problem and an economic threat. Curr Opin Clin Nutr Metab Care. 2006; 9(2):111-6.
7. Berkey CS, Rockett HRH, Gillman MW, Colditz GA. One year changes in activity and in inactivity among 10- to 15-year-old boys and girls: relationship to change in body mass index. Pediatrics. 2003; 111:836-43.
8. Shaikh WA, Patel MC, Singh SK. Association of physical activity and physical fitness with blood pressure profile in Gujarati Indian adolescents. Indian J Physiol Pharmacol. 2011; 55(4):322-328.
9. Bielicki T. Physical growth as a measure of economic well-being of populations: The twentieth century. In F Falkner and JM Tanner, eds.: Human Growth. A Comprehensive Treatise. Plenum Press, New York. 1986; 3:283-305.
10. Meltzer A, Muller W, Annegers J, Grines B, Albright D. Weight history and hypertension. Clinical Epidermiology. 1988; 41:867-874.
11. Slaughter MH, Lohman TG, Boileau RA, Horswill CA, Stillman RJ, Van Loan MD, *et al*. Skinfold equation for estimation of body fatness in children and youth. Human Biology. 1988; 60:709-723.
12. Al-Hazzaa HM. Anthropometric measurements of Saudi boys aged 6-14 years. Annals of Homan Biology. 1990; 17(1):33-40.
13. Cameron N, Kgamphe JS, Leschner KF, Farrant PJ.

Urban-rural differences in the growth of South African black children. Annals of Human Biology. 1992; 19:1.
14. Singh KM, Singh M, Singh K. Comparison of anthropometric measurements and body composition among the 12 years old rural and urban children. International Journal of Physiology, Nutrition and Physical Education. 2017; 2(1):262-265.
15. Singh KM, Singh M, Singh K. Anthropometric Characteristics and Body Composition of the Rural and Urban Children. Int J Cur Res Rev. 2017; 9(7):33-38.