ANTHROPOMETRIC CHARACTERISTICS OF URBAN AND RURAL SCHOOL GIRLS OF DISTRICT RAHIM YAR KHAN, PAKISTAN

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Abstract:

This study was designed to compare the anthropometric characteristics of the urban and rural primary school girls of district Rahim Yar Khan, Pakistan. The recruited participants were (n = 300) urban girls and, (n = 300) rural girls of eight to ten years old. These instruments were used to measure the anthropometric variables as skinfold calliper for fat percentage, large bone caliper for bone length, small caliper for bone width, a stadiometer for stature, weightiness balance for weight, and one-meter tape for circumferences of the upper and lower limbs. An independent t-test was implemented to inspect the variation among urban and rural primary school girls. The statistical results depicted the urban girls were significantly superior to the rural girls in weight, circumferences of waist, pelvises, thigh, lengths of the arm and hand. The higher circumferences of waist, pelvises, thigh and weight show higher body fat percentage in urban school girls students than the rural school girls students. It was assumed, the urban school girls having good nourishment opportunity from various type of restaurants. On the other hand, urban girls may less involvement in physical activities than rural school girls. As a result, the urban girls were higher in fats and body mass than rural primary school girls. It is proposed for future research to examine the effects of anthropometry and nutrition on the physical fitness of urban and rural girl students.

Keywords: *anthropometric characteristics, school girls, urban-rural*

Introduction:

Girls require special consideration for growth because inadequate food and economic resources affect their health status (Bhutta et al., 2013). A country's population consists of urban and rural population which fluctuates in size, financial activity, organizational structures, and educational facilities (Utzinger & Keiser, 2006).

The urban people adopt modern lifestyle because they find earlier and more facilities of technology than rural people (Bielicki, 1986; Sahoo et al., 2011).

It is also believed the facilities of food and living may not be equally distribute among urban and rural which increase gap amongst both population (Yip et al., 2012). It is thought an economic inequality is increasing difference of body size between the urban-rural people (Pongou et al., 2006; WHO, 2011).

As Albarwani and colleagues (2009) that the urban girls are higher in body fats because they spent less time in physical activities than the rural girls.

On the other hand, rural girls are engaged in domestics work because they having fewer modern facilities than urban girls. The way of living effects on the physical characteristics of urban girls and rural girls.

Anthropometry is a systematic way for the assessment of the human body (Marfell-Jones et al., 2012). The anthropometric variables as body mass, stature, muscles circumferences, bone width, and bone lengths would be considered as wide-range data to compare the growth and development humans. A study reported there was no significant difference among rural and urban children in Croatia (Aberle et al., 2009).

The skinfolds and BMI of Turkish urban children were higher than rural counterparts (Tinazci & Emiroglu, 2009). Al-Shamli (2010) have reported that the urban children of Oman were higher in fat and BMI than rural children. Stature and body mass would be considered as a simple way to estimate the effect of various cultures and societies on the physical growth of girls (Aziz et al., 2012).

There is a limitation of research in the field of anthropometry which investigate the body sizes of Pakistani children (Kamal et al., 2004; Mushtaq et al., 2012). There is also lack of research of comparing the anthropometric characteristics of the urban and rural girls in Pakistan.

Subsequently, the current research was planned to examine the anthropometric measures of

urban and rural girls. A null hypothesis of the study was 'the urban-rural girl students would be homogenous in their anthropometric characteristics".

Materials and methods:

A cross-sectional design was applied to examine the anthropometry of the urban and rural girls of district Rahim Yar Khan, Pakistan.

Purposive sampling technique was adopted for the selection of urban government primary school girls (n = 300), and rural government primary school girls (n = 300).

The selected participants were (urban = 9.83 ± 0.87 years) and rural girls = 9.56 ± 1.45 years). The Participants belongs to the purely urban and rural background as defined Tsimeas and colleagues (2005) distance from the trading centres, population size, the urban area consists more than ten thousand people, and rural less than ten thousand people. Anthropometric data was obtained during school time and by female investigators with the permission of district school administration.

All participants were medically fit, without any hospital record of any chronic diseases. The process of the study was explained to participants and consent letter was signed by the parents of students.

Instruments for Data Collection

The 06 points were settled for data collection as 1) landmarking, 2) skinfold measure, 3) circumferences, 4) Spans of the bone lengths, 5) Widths of the bone, 6) tallness and weight.

These measurements were taken from the right side of the body except stature and weight as adopted (Haq, Jeffery, Bendri, Ong & Saleem, 2016). The measurement was started after marking the anatomical site of the body which provide an easy method for assessment (Marfell-Jones et al., 2012). The body sites were marked as;

Table one. Body marking of Human Body

Sr.	*Anatomical cities*	*Sr.*	*Anatomical cities*
1	Acromiale	10	Illospinale
2	Radiale	11	abdomen 5 cm from belly button
3	Mid-acromial-radiale	12	Supraspinal
4	Subscapular	13	Mid-trochanteric-tibial lateral
5	Stylion	14	Mid-thigh
6	Mid-stylion	15	Tibial-lateral
7	Mesosternal	16	Tibial medial
8	Ill-crystal	17	calf maximum
9	Trochanterian	18	Sphyrion

The Procedure of Anthropometric Measurements

A skinfold calliper was used to assess and skinfold results were recorded in millimetres. One-meter steal tape was used to test the circumferences of the body and reading was recorded in centimeter. Small and large bone callipers were used to assess bone lengths and bone breadths.

The reading of bone lengths and breadth was recorded in centimeters. Stature was assessed by using an electric stadiometer. The measurement was considered from the surface of stadiometer to vertex of the head.

A wooden box of 46 cm with scale chart at the wall was used to record sitting height, was considered from the box's surface to apex of the head. Arm span was assessed pasting a scale chart horizontally behind at the wall.

Participants were instructed to stretch their arms, and measurement was considered from the right-hand tip to left-hand tip. Triplicate criterion was adopted for all anthropometric measurements as recommended by the (ISAK) International Society for the Advancement of Kinanthropometry (Norton & Olds, 1996).

The inter-rater method was adopted for testing the reliability. Therefore, twenty subjects were a test and retested as a pilot study. The interclass correlation was implemented for testing the inter-tester reliability as adopted (Arroyo et al., 2010).

Table two. Instruments for Data Collection

Sr	*Instrument*	*Company*	*Variables/ measures*
1	Harpenden skinfold calliper	HaB Int Ltd, UK	Triceps skinfold, subscapular skinfold, biceps skinfold, iliac crest skinfold, supraspinal skinfold, frontal thigh skinfold, and calf skinfold.
2	A measuring tape	HaB Int Ltd, UK	girths of arm, forearm, chest, waist, hips, thigh and calf
3	large sliding calliper	Lafayette Instruments Company, LTD, USA	Arm length, hand length, and leg length, shoulder breadth, pelvis breadth, chest breadth
4	small sliding callipers	Lafayette Instruments Company, LTD, USA	The breadth of the elbow, and knee
5	A stadiometer	Holtain Ltd. Crymych Dyfed, UK	Stature
6	A 46 cm wooden box and a meter scale chart	Local	Sitting height
7	Stadiometer	Local	Arm Span
8	Digital standing scales	Seiko, Tokyo, Japan	Body mass

Statistical Analysis

Mean, and standard deviation of all anthropometric measures was acquired to find a basic description of all variables. An independent t-test was applied to inspect the significant difference among urban and rural girls in their anthropometric measures. The significant value was adjusted at $P < .05$.

Results and Discussion

The main finding is that a comprehensive study of the urban and rural girl students in their anthropometric measures of district Rahim Yar Khan, Pakistan. Although urban have an advantage over rural in their economic and food accessibility (Stevens et al., 2013).

Table three displays the urban girl were significantly higher in weight than rural primary school

girls. The urban girls belong to financially strong families, with good availability of food. In contrast, rural girl students belong to deprived family background, less food opportunity than urbans and have to go to school by walk.

The present study confirms the findings of Reyes, Tan and Malina (2003) rural children were significantly lighter in body mass than urban. The urban girl students have better food intake which increases their body mass than the rural girl (Lee et al., 2002).

This study also the findings of the fat parentage of urban was significantly higher than the rural children (Ujevic et al., 2013; Kangane & More, 2013).

Table three: ***Demographic and skinfolds measures of the primary school girls of rural vs. urban of district Rahim Yar Khan, Pakistan***

Variable	*Participants*	*Mean*	*STD*	*t. value*	*Sig.*
Stature (cm)	Group one	108.12	14.75	-1.98	.233
	Group two	110.24	12.43		
weight (Kg)	Group one	37.40	6.34	-3.014	.010
	Group two	39.66	7.50		
Triceps SF (mm)	Group one	8.16	1.58	.560	.473
	Group two	7.08	2.30		
Illaccrest SF (mm)	Group one	10.16	1.46	-1.20	.249
	Group two	11.44	1.26		
Supraspinale SF (mm)	Group one	9.08	1.37	-1.56	.264
	Group two	9.22	1.50		
abdomen SF (mm)	Group one	12.08	3.12	-0.98	.460
	Group two	13.32	2.40		
Frontal thigh SF (mm)	Group one	9.52	3.78	.453	.426
	Group two	9.42	2.41		
Medial Calf SF (mm)	Group one	8.65	3.35	.875	.352
	Group two	7.98	2.08		

Level of significance P <.05, SF (skinfold), group one (rural girl students), group two (urban girl students)

Table four shows the urban girl students were significantly larger in the girths of waist, pelvis, and thigh than rural girl students. It indicates the high-fat percentage of trunk among urban girl students than rural girls' students.

The current research confirms the findings of Lee and colleagues (2002) the Native Australian children were higher in abdominal fat than non-native. It was also confirming the urban children were higher in circumferences than the rural children (Adamo et al., 2010).

Table five displays the arm and hand of urban girl students were significantly lengthier than rural girl students. The current study supports the conclusions of Reyes, Tan and Malina (2003) the urban children having longer bone lengths than rural children.

Table four: Muscle's circumference ***of the primary school girls of rural vs. urban of district Rahim Yar Khan, Pakistan***

Measures	*Participants*	*Mean*	*STD*	*t. value*	*Sig.*
Upper arm (cm)	Group one	11.28	4.72	.345	.291
	Group two	12.20	3.17		
Forearm (cm)	Group one	11.55	4.64	-.189	.610
	Group two	10.67	3.29		
Chest (cm)	Group one	28.84	2.08	-.182	.261
	Group two	29.34	2.70		
Waist (cm)	Group one	48.82	3.52	-2.57	.033
	Group two	51.33	5.83		
Hip (cm)	Group one	58.48	4.64	-2.85	.010
	Group two	59.47	8.61		
Thigh (cm)	Group one	28.39	5.22	-2.30	.020
	Group two	30.70	6.93		
Calf (cm)	Group one	22.58	8.50	-1.59	.215
	Group two	21.24	6.90		

Level of significance P <.05. group one (rural girl students), group two (urban girl students)

Table five: ***Bone lengths and bone widths of the primary school girls of rural vs. urban of district Rahim Yar Khan, Pakistan***

Measures	*Groups*	*means*	*STD*	*t. value*	*Sig.*
Arm length(cm)	Group one	27.35	2.15	-2.42	.020
	Group two	30.15	1.69		
Hand length(cm)	Group one	15.38	4.65	-3.63	.000
	Group two	17.45	2.70		
Leg length(cm)	Group one	33.90	3.95	-1.59	.083
	Group two	34.62	4.18		
Bi-acromial width(cm)	Group one	25.03	3.60	-.638	.543
	Group two	26.30	3.16		
Pelvis width(cm)	Group one	53.36	6.39	-3.47	.014
	Group two	54.88	7.72		
Transvers width (cm)	Group one	29.36	9.59	-2.57	.031
	Group two	30.49	6.63		
Humerus width(cm)	Group one	5.70	1.17	.674	.501
	Group two	5.50	1.65		
Femur width (cm)	Group one	7.70	1.17	.804	.601
	Group two	8.50	0.65		

Level of significance P <.05 group one (rural girl students), group two (urban girl students)

Conclusion

The present study was planned to compare the anthropometric measures of the urban and rural primary girl students of District Rahim Yar Khan, Pakistan.

Results showed the urban girl students were significantly higher in body mass, waist circumferences, pelvises circumferences, thigh circumferences, arm length, hand length, hip width, and transvers breadths than from the rural girl students.

This variance shows a higher percentage of fat amongst urban girls than rural girls. The higher fat of urban girls depicts easy and better accessibility of food and less participation in physical activities.

In contrast, the rural girl students having less opportunity of food, more participation in physical activities as go to school by foot and help parent in domestic work. It is concluded, less participation in physical activities increase fat in school girls.

The findings of the present study support the finding of previous studies that the urban children of Greeks, and Spanish urban children were higher in weight than the rural (Chillon et al., 2011; Tambalis et al., 2010).

The significant conclusions of this study, it is a wide-range of analysis of the urban and rural girls of district Rahim Yar Khan.

Geographically, Rahim Yar Khan is surrounded by desert and most of the rural population live in deserts with least sources of food, transportation. Finding of this research will assists the higher authorities of Pakistan to understand the growth and health status of the rural girl students. Furthermore, it will help to improve the financial conditions of rural by providing them the basic facilities of food, transports and education.

Future Works

It is recommended for future, the physical fitness, dietary plane, parent's education and income would be considered for future studies.

References

Aberle, N., Blekic, M., Ivanis, A. & Pavlovic, I. (2009). The comparison of anthropometrical parameters of the four-year-old children in the urban and rural Slavonia, Croatia, 1985 and 2005. Collegium Antropologicum, 32(2):447-451.

Adamo, K. B., Sheel, A. W., Onywera, V., Waudo, J., Boit, M., & Tremblay, M. S. (2011). Child obesity and fitness levels among Kenyan and Canadian children from urban and rural environments: a KIDS-CAN Research Alliance Study. International Journal of Pediatric Obesity, 6(sup3), e225-232.

Albarwani, D., Phil, S., Al-Hashmi, K., Al-Abri, M., Jaju, D., & Hassan, M. O. (2009). Effects of overweight and leisure-time activities on aerobic fitness in urban and rural adolescents. Metabolic syndrome and related disorders, 7(4), 369-374.

Al-Shamli, A. (2010). Physical activity and physiological fitness status of 10th grade male students in Al-Dhahirah region, Sultanate of Oman. Current Research Journal of Social Sciences 2(2), 99-109

Arroyo, M., Freire, M., Ansotegui, L., & Rocandio, A. M. (2010). Intraobserver error associated with anthropometric measurements made by dietitians. Nutricion hospitalaria, 25(6).

Aziz, S., Ain, W. N., Majeed, R., Khan, M. A., Qayum, I., Ahmed, I., & Hosain, K. (2012). Growth centile charts (anthropometric measurement) of Pakistani pediatric population. JPMA-Journal of the Pakistan Medical Association, 62(4), 367.

Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., & Maternal and Child Nutrition Study Group. (2013). Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? The lancet, 382(9890), 452-477.

Bielicki, T. 1986. Physical growth as a measure of economic well-being of populations: the twentieth century. In: Falkner F, Tanner JM, editors. Human growth. A comprehensive treatise, vol 3. New York: Plenum Press. p 283–305.

Chillon, P., Ortega, F.B., Ferrando, J. A., & Casajus, J. A. (2011). Physical fitness in rural and urban children and adolescents from Spain. Journal of Science and Medicine in Sport, 4(5), 417-23

Haq, M. Z., Lee, J. L. F., Bin Dasril, B., Boon, O. K., & Saleem, M. (2016). Morphological characteristics of Malaysian national cricket batsmen. International Journal of Physiotherapy, 3(1), 58-65.

Kangane, S., & More, S. (2013). Study on percentage body fat of 13 years school going boys in Nashik district. Variorum Multi-Disciplinary e-Research Journal, 4(2), 1-3.

Kamal, S. A., Firdous, S., & Alam, S. J. (2004). An investigation of growth profiles of the Pakistani children. Int J Biol Biotechnol, 1, 707-17.

Lee, A. J., Darcy, A. M., Leonard, D., Groos, A. D., Stubbs, C. O., Lowson, S. K., ... & Riley, M. D. (2002). Food availability, cost disparity and improvement in relation to accessibility and remoteness in Queensland. Australian and New Zealand journal of public health, 26(3), 266-272.

Marfell-Jones, M., Stewart, A., & De Ridder, H. (2012). ISAK accreditation handbook. Upper Hutt, New Zealand: International Society for the Advancement of Kinanthropometry.

Mushtaq, M. U., Gull, S., Mushtaq, K., Abdullah, H. M., Khurshid, U., Shahid, U., & Akram, J. (2012). Height, weight and BMI percentiles and nutritional status relative to the international growth references among Pakistani school-aged children. BMC pediatrics, 12(1), 31.

Norton, K., & Olds, T. (1996). Anthropometrica: a textbook of body measurements for sports and health courses. University of New South Wales Press, Sydney, Australia.

Pongou, R., Salomon, J. A., & Ezzati, M. (2006). Health impacts of macroeconomic crises and policies: determinants of variation in childhood malnutrition trends in Cameroon. International journal of epidemiology, 35(3), 648-656.

Reyes, M. P., Tan, S. K., & Malina, R. M. (2003). Urban–rural contrasts in the growth status of school children in Oaxaca, Mexico. Annals of human biology, 30(6), 693-713.

Sahoo, K., Hunshal, S., & Itagi, S. (2011). Physical growth of school girls from Dharwad and Khurda districts of Karnataka. Karnataka Journal Agricultural Science, 24(2), 221-226.

Stevens, G. A., Finucane, M. M., De-Regil, L. M., Paciorek, C. J., Flaxman, S. R., Branca, F., ... & Ezzati, M. (2013). Nutrition impact model study G: global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and nonpregnant women for 1995-2011: a systematic analysis of population-representative data. Lancet Global Health, 1(1), e16-25.

Tambalis, K. D., Panagiotakos, D. B., & Sidossis, L. S. (2011). Greek children living in rural areas are heavier but fitter compared to their urban counterparts: A comparative, time-series (1997-2008) analysis. The Journal of Rural Health, 27(3), 270-277.

Tinazci, C., & Emiroglu, O. (2009). Physical fitness of rural children compared with urban children in North Cyprus: a normative study. Journal of physical activity and health, 6(1), 88-92.

Tsimeas, P. D., Tsiokanos, A. L., Koutedakis, Y., Tsigilis, N., & Kellis, S. (2005). Does living in urban or rural settings affect aspects of physical fitness in children? An allometric approach. British journal of sports medicine, 39(9), 671-674.

Ujevic, T., Sporis, G., Milanovic, Z., Pantelic, S., & Neljak, B. (2013). Differences between health-related physical fitness profiles of Croatian children in urban and rural areas. Collegium antropologicum, 37(1), 75-80.

Utzinger, J., & Keiser, J. (2006). Urbanization and tropical health—then and now. Annals of Tropical Medicine & Parasitology, 100(5-6), 517-533.

World Health Organization. (2011). Waist circumference and waist-hip ratio: report of a WHO expert consultation, Geneva, 8-11 December 2008.

Yip, W. C. M., Hsiao, W. C., Chen, W., Hu, S., Ma, J., & Maynard, A. (2012). Early appraisal of China's huge and complex health-care reforms. The Lancet, 379(9818), 833-842.