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ANTHROPOMETRIC CHARACTERISTICS AND PHYSICAL FITNESS OF URBAN AND RURAL 8-10 YEARS OLD SCHOOL GIRLS OF BAHAWALPUR, PAKISTAN

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ABSTRACT

Background: The assessment of anthropometric characteristics and physical fitness assist the researcher in comparing the growth and health status of urban and rural school girls. Purpose of this research was to examine anthropometric characteristics and physical fitness of urban and rural school girls of district Bahawalpur, Pakistan.

Methods: The participants were government primary schoolgirls (urban = 200), and (rural = 200), within the age of 8-10 years. The selected anthropometric and physical fitness variables were stature, body mass, skinfolds, girths, breadths, lengths, speed, standing broad jump, agility, ball throw, handgrip strength, endurance, and flexibility. A student t-test was applied to assess the difference between urban and rural school girls in their anthropometric and physical fitness measures.

Results: Results showed the urban school girl was significantly superior in body mass, iliac-crest skinfold(P< .04), abdominal skinfold(P< .04), waist girth (P< .04), hip girth (P< .01), thigh girth(P< .01), arm length, and hand length. In contrast, the rural school girls were significantly higher in speed(P< .02), agility(P< .02), ball throw(P< .02), flexibility(P< .03), run and walk (P< .04) than the urban school girls.

Conclusion: It is concluded the urban school girls were higher in skin folds and girths, indicate high body fats than rural school girls. As a result, urban school girls were lower in fitness capacity than rural because higher body fat reduces fitness performance. It is suggested the parents and school administration focus to provide such activities to improve physical fitness and reduce body fats of urban school girls. The future study focusses on investigating the effects of food intake on the anthropometric characteristics, and physical fitness of urban and rural school children.

Keyword: Physical fitness, anthropometry, rural-urban, school girls, muscular strength, body marking.

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INTRODUCTION

Demographically the rural and urban are divided based ontheir populationsize, economic activity, administrative structures, and health facilities, set-up of education, sanitation, water, and communication[1]. Bielicki [2] reports the greater body size ofurban children thanrural children because of a different lifestyle. The stature and body mass of children differ in the various parts of the world, because of distinct ethnicity and cultural background [3]. It was confirmed by Joens-Matre, Welk, Calabros, Nicklay, and Hensley [4] the rural children more engage in physical activities than the urban children. Albarwani, Phil, Al-Hashmi, Al-Abri, Jaju, and Hassan [5]have reported less participation in sports activities increase the body mass index (BMI) of urban children than rural children. It was reported the Belgian and Western Australian rural children were higher in body mass and fat than urban children because of different living and environmental condition [6]. A study contradicts with others by reporting lower body fats in rural children than urban children [7]. The physical fitness of rural school girl was better than urban girls because they pay more time in games and sports activities than urban girls [8]. On the other hand, various studies showed different results because ofbody fat and physical fitness of urban children better than rural children [9]. These contradictions among the findings of previous studies show the urban and rural lifestyles effects on the physical fitness and anthropometric characteristics on children.

The components of physical fitness differ with age and gender [10]. Several batteries can be used to measure fitness such as long-run fortesting the capacity of cardiovascular system Taylor, Buskirk, & Henschel, [11],speed and jumps for muscular strength of the lower limband flexibility for testing the range of motion at the joint[10]. The variables as weight, height, waist circumference, speed, endurance agility, leg power would use for collecting proper information of the physical fitness and anthropometric measures of school children.

Few studies in Pakistan examined the anthropometric characteristics and physical fitness of school children [12, 13].Therefore, the physical fitness and anthropometric characteristics of urban and rural school girls should be assessed Henneberg systematically, & Louw, [14]; Heyward, [15] with considering new trends of people in developing countries. According to the latest survey, the population percentage of urban areas has increased sharply than the rural areas.

There is a lack of study to examinethe physical fitness and anthropometric measures of the school girls. Therefore, this study was designed to investigate anthropometric measures and physical fitness ofurban and rural school girls. It was hypothesized; there were no significant differences among rural and urban school girls in their anthropometric characteristics and physical fitness.

METHODOLOGY

Participants

This research design is a cross-sectional toexamine the anthropometric characteristics and physical fitness of urban and rural school girls of district Bahawalpur, Pakistan. Purposively, 400 government primary school girls were recruitedfor data collection (n = 200) from urban, and (n = 200) from rural. Data was collected from five tehsils of Bahawalpur district as Hasilpur, Khairpur, Yazman, Ahmadpur,and Bahawalpur city. The selected participants were physically fit without any previous hospital record of chronic disease. The age of selected participants were urban girls (9.89 ± 1.97 years) and rural girls (9.51 ± 2.39 years). The date of birth of selected girls was also confirmed from the school admission register. The procedure of data collection was briefed to participants, school administration and written consents were obtained. The permission for data collection obtained from the district education officer. The urban and rural area were defined such as the distance of population from the trading centers and size of the population in between 100000-50000, and 10000 inhabitants [16]. The criteria for the urban population was adopted as guided Tsimeas, Tsiokanos, Koutedakis, Tsigilis, and Kellis [17], an urban area more than 10000 inhabitants, and a rural area less than 10000 inhabitants.

Data Collection of the Anthropometric Measures

Six platforms were arranged for anthropometric measurements as 1)body-marking, 2) skinfolds, 3)girths, 4)lengths, 5)breadths, 6)stature and body mass. The procedure of anthropometric measurements was started with the landmarking of anatomical sites of the participants which provide systematics to complete measurement[18]. Anatomical sites were marked as acromial, subscapular, radial, mid-acromial-radial, stylion, mid-stylion, mesosternal, ilocristale, illospinale, abdomen 5 cm from belly button, supraspinal, trochanter, mid-trochanteric-tibial lateral, mid-thigh, tibial-lateral and calf maximum. Triplicate criterion was adopted for all measurements andall participants in barefooted with light clothes. The guidelines of the International Society for the Advancement of Kinanthropometry (ISAK) were followed during the anthropometric measurement[19]. All measures were taken by the female investigator after two months of pilot practice.

A Harpenden skinfold caliper (HaB Ltd, UK) was used to asses thickness of subscapular, triceps, biceps, iliac-crest, supraspinal, abdomen, frontal thigh, and calf skinfold measurements. The reading model was 0.2 millimeters for skinfolds measure. Measuring tapehas used the assessment of girths of arm, forearm, chest, waist, hips, thigh and calf. The reading model for girths was 0.1cm. Large and sliding caliper (Lafayette Ltd, USA)was used for the measurement ofarm length, hand length, leg length, shoulder breadth, pelvisbreadth, transverse breadth, elbow breadth,and knee breadth. The reading model for lengths and breadths was 0.1cm. A stadiometer (Holtain Ltd, UK) was applied for the assessment of stature, which was determined from the surface of the stadiometer and to vertex- thehighest point

of the skull. Weight (body mass) was assessed by using a digital weighing scales (Seiko, Japan) with a minimum reading of 0.1kg.

Assessment of the Physical Fitness

Eight physical fitness tests were measured to determinethe fitness of school girls as guided by the European physical fitness test.

Aerobic Test; 600-meters running and walk test was obtained to estimate endurance capacity of school girls[20]. Participants could complete distance either in running or walking. The time duration ofthe running and walking-taskwas recorded in seconds.

Flexibility; Each participant was instructed to be in the seated position, feet placed against the prepared wooden box, to push slidingrulerwith the tip of finger, bystretching hands, without jerking, forward bending their trunk, try topush ruler as much as forward, and always keepknees straight and stretch position. Fingers of both hands move in the samedirection and distance.Three trial were given forsubscribing better result.

Standing Broad Jump; an explosive legstrength was assessed through the performance of forwardingjump. The jump was performed from standing position, with flexion and extension of knees, backward and forward swinging of arms, andjump as far as possible parallel to the ground, must landat both feettogether and stand upright after the jump. Three trial was given to find better results, andthe best performance was obtained asthe finalscore.

Sit-Ups; Trunk strength was recorded through the performance of sit-ups in 30 seconds. Participants were instructed tolay down at the floor, with straightback, hands grip neck from the back, flex knees at 90°, feet flatted at the mat. The sit-ups start by swing forward of the trunk from laying position, returnto the sitting position, elbowstouching knees, the grip of hands remains behindtheir neck duringthe sit-up's performance. Correctly performed sit-ups in 30 seconds were recorded as the finalscore.

Sprint Test; 30-meters sprint was performed from the standing start position. The performance was recorded in seconds from the starting point to the finishing line. The participants were instructed to start burst running toward the finish line after the caution or signal of instructor.

Agility Test; 5x5x5 metersfast run of threezig-zag were drawn. Participants haveto run forward as fast as possible after the caution of "go", then turn left for the 5-meter run, then turn right for 10-meter, again turn, back for 5 meters and final pivoted toward the starting line. Two trials were given, andthe best performance was recorded as the final score, which was recorded in seconds.

Handgrip Strength; an adjustable digital hand dynamometer (Takei, Tokyo, Japan) was used for hand grip strength. Participants were instructed to grip the dynamometer by their dominant hand, in relax standing position, feet apart onthe side without touching the external object. Squeeze the dynamometer forcefully and exert the force of forearm for 3-5 seconds. The result was recorded in kilograms, three trial was given to each participant, and the best effort was recorded forthe final score.

Reliability and Validity

Inter-tester reliability was used for testing the competency of investigator and instruments. Therefore, physical fitness and anthropometric measurements of (n=20) participants were taken as a pilot test with the interval of one day. The coefficient of variance (% CV) was applied for finding the statistics results of inter-tester reliabilityin the following of [21].

Data Analysis

The simple statistics as a mean and standard deviation of all variables was obtained. An Independent t-test was applied to examine difference among rural and urban school girls of the district Bahawalpur, in their anthropometric characteristics and physical fitness measures. The $p<.05$ value was adjusted for all measures.

RESULTS

Table 1 shows the urban school girl were significantly heavier($P< .00$) than the rural school girl.

Table 1: Demographic data of the rural and urban school girls

Variables	Groups	Mean	Std. D	t-value	Sig.
Height (cm)	Rural girls	98.72	19.66	-1.07	.28
	Urban girls	101.50	20.84		
Body mass (Kg)	Rural girls	34.29	7.24	-3.54	.00
	Urban girls	36.39	7.25		

The significant value was $P< .05$.

Table 2: Skinfold measures of the rural and urban schoolgirls

Variables	Groups	Mean	Std. D	t-value	*Sig.*
Triceps skinfold	Rural girls	6.47	1.71	.550	.58
	Urban girls	6.40	1.29		
Illac-crest skinfold	Rural girls	9.39	1.36	-2.10	.04
	Urban girls	10.52	1.56		
Abdomen skinfold	Rural girls	10.09	1.37	-2.851	.04
	Urban girls	12.22	1.50		
Thigh skinfold	Rural girls	9.51	1.68	-1.454	.65
	Urban girls	10.45	1.89		
Calf skinfold	Rural girls	9.80	4.38	.950	.34
	Urban girls	9.53	2.12		

The significant value was $P< .05$.

Table 2 shows the rural school girlwas significantly faster than urban school girlin iliac crest skinfold ($P< .04$), and abdominalskinfold ($P< .04$).

Table 3: Segmental girth of the rural and urban school-girls

Variables	Groups	Mean	Std. D	t-value	Sig.
Upper arm girth	Rural girls	10.48	2.82	.791	.43
	Urban girls	10.22	2.07		
Forearm girth	Rural girls	10.30	1.22	-.272	.79
	Urban girls	10.37	2.39		
Chest girth	Rural girls	16.74	2.60	-1.38	.17
	Urban girls	17.04	2.70		
Waist girth	Rural girls	14.92	1.81	-2.07	.04
	Urban girls	16.03	3.97		
Hip girth	Rural girls	48.28	5.45	-2.81	.01
	Urban girls	49.98	6.27		
Thigh girth	Rural girls	32.74	2.46	-2.70	.01
	Urban girls	31.43	4.91		
Calf girth	Rural girls	19.85	3.57	-1.24	.22
	Urban girls	18.87	2.58		

The significant value was $P< .05$.

Table 3 shows that the urban school girlwassignificantly higher in waist girth($P< .04$), hip girth($P< .01$), and thigh girth($P< .01$), than from the rural schoolgirl of the district Rahim Yar Khan.

Table 4: Bonelengths and breadth ofthe rural and urban school girls

Variables	Groups	Mean	Std. D	t-value	Sig.
Arm length	Rural girls	22.52	4.37	1.52	.08
	Urban girls	23.06	3.92		
Hand length)	Rural girls	17.68	3.57	1.43	.07
	Urban girls	18.44	3.09		
leg length	Rural girls	32.04	4.05	-1.85	.06
	Urban girls	33.03	3.98		
Shoulder breadth	Rural girls	22.03	2.60	-.608	.54
	Urban girls	21.30	2.16		
Hip breadth	Rural girls	51.36	10.75	-1.67	.09
	Urban girls	52.88	11.45		
Transverse breadth	Rural girls	17.70	4.17	.674	.50
	Urban girls	16.50	2.65		

The significant value was $P< .05$.

Table 5 shows the rural school girl were significantly higher than the urban school girl in agility zigzag run ($P< .02$), in 30-meter dash ($P< .02$), ball throw ($P< .02$), 600-meter run and walk ($P< .04$), sit and reach test of flexibility ($P< .03$).

Table 5: Physical fitness of the rural and urban school girls

Variables	Groups	Mean	Std. D	t-value	Sig.
Agility (sec)	Rural girls	20.16	2.51	-3.54	.02
	Urban girls	21.31	2.55		
30m dash(sec)	Rural girls	18.53	3.06	-2.36	.02
	Urban girls	19.13	3.22		
Stand broad jump (cm)	Rural girls	114.32	10.93	1.52	.13
	Urban girls	110.79	09.41		
Hand strength (kg)	Rural girls	13.21	3.93	1.37	.15
	Urban girls	14.30	2.30		
Ball throw (meter)	Rural girls	18.00	5.58	2.19	.02
	Urban girls	16.68	3.33		
Flexibility (inch)	Rural girls	8.73	3.56	2.59	.03
	Urban girls	7.33	1.87		
600-meter run and walk (sec)	Rural girls	255.48	10.75	-2.35	.04
	Urban girls	275.24	9.93		

The significant value was $P< .05$.

DISCUSSION

This is a comprehensive analysis of the anthropometric characteristics and physical fitness of urban and rural school girls of district Bahawalpur, Pakistan. The selected variables for the study were stature, body mass, skinfolds, girths, breadths, lengths, 600-meter run for aerobic capacity, zig-zag run for agility, sit and reach test for flexibility, 30-meter dash for speed, standing broad jump for lower limb power, ball throw and hand grip for forearm strength. Data was collected from (n = 200) rural and, (n = 200) urban girls of government primary schools, the age range was 8-10 years.

Results indicate the urban school girls were significantly heavier, higher in abdominal skinfolds, and abdominal girths than rural school girls. Thebody mass, abdominal skinfolds and abdominal girthsexhibithigher abdomen fats in urban school girls than rural school girls. The current study supports the findings of He, Horlick, Thornton, Wang, Pierson, Heshka, and Gallagher [22] that abdominal fat of Indigenous (urban) school girls were higher than Caucasian (rural) girls. The urban school girls have easy access for good quality of food and transportation for school than rural school girls. This difference shows economic inequality among the urban-rural population [23, 24]. It is concluded the urban girls higher in body fats than the rural school girls.

On the other hand, rural school girls have significantly better than urban school girls in the performance of sprint race, agility, flexibility, standing broad jump, ball throw. Literature shows a similar finding that rural adults were significantly higher in fitness than theurban[4]. The current study supports the finding that Australian rural children higher in cardiorespiratory fitness thantheir urban counterparts[24]. The findings of the current study contradict as urban Mexican childrenperformed better physical fitness than rural children[8]. On the other hand, a study

reported there was no difference between rural and urban Greece adult in physical fitness [17].

CONCLUSION

The rural and urban population consist of different geographical regions which showed inconsistent results [16]. These in consistencies are affected by socio-economic-cultural because many rural areas have minimal facilities of quality of food and transportation for schools than urban school girls.

Results of present study advocate the rural participants lower in fat because of higher participation in walking, local games, and domestic work than urban counterparts. On the other hand, Bahawalpur district consists of five tehsils, the south-east side is covered with dessert, and north-west with River of Satluj and Chenab. Rural girlswalk to reach school andtake lunch at home after school timing.

It speculates rural life provides more opportunities for girls to participate in physical activities which reduce their body fats and improve fitness status than the urban school girls.

Future Works and Recommendations

The present study isimitated in a few parameters as; it is a cross-sectional study, and difficult to observe the reflection of the residence place onthe anthropometric characteristics and physical fitness of rural and urban girls. Second, it is a lack of socio-economic information on the background of rural and urban school girls.

Therefore, it is recommended that food intake, educational background and economic status of urban and rural school girl would be considered forfuture research.

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