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## **The relationship between physical fitness and anthropometric characteristics: A comparative study among rural and urban school children of India (Tamil Nadu)**

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### **Abstract**

The purpose of this study was to find out the relationship between anthropometric and physical fitness characteristics of urban and rural school children of India. It also examines whether weight status influences children's performance on fitness tests. A total of 500 school children (300 boys;  $12.48 \pm 0.41$  years) and (200 girls  $12.40 \pm 0.30$  years) participated in our study. Anthropometry (weight, height, body mass index -BMI- and waist circumference) and fitness tests (push-ups, and 60 m sprint and hand grip test) were assessed by trained physical education teachers. The results of the study showed significant differences in anthropometry and fitness values between boys and girls. The percentage of being overweight was higher in girls, when compared to the boys. Overweight and obese children were more in Urban groups. Between Urban and Rural children, Urban boys and girls were heavier, had a greater waist circumference ( $p < 0.05$ ), were taller ( $p < 0.05$ ), and showed higher performance in handgrip strength ( $p < 0.05$ ) and push-ups ( $p < 0.05$ ) but not in 60 m sprint ( $p > 0.05$ ).

**Keywords:** Anthropometric, physical fitness, BMI, waist circumference

### **Introduction**

There is agreement that regular physical activity (PA) will improve shape (PF) and health and assist within the hindrance of malady. Varied studies have shown that adults World Health Organization square measure physically active square measure healthier and have a better PF than inactive adults throughout completely different nations and populations teams. Physical education must be place within the image among young kids through regular observation of health like taking part in games, calculation of BMI and mensuration measures. "Altogether, towards the closing years of the last century, there was a consciousness by all men thinking of the necessity to face the risks of human health, safety and progress arising from the changes in environment".

### **Physical fitness**

The world greatest thinkers have stressed the importance of physical fitness in leading a productive and meaningful life, the Greek philosopher Aristotle stated that the body is the temple of soul and to reach harmony among body, mind and spirit a human being must be physically fit. Physical Fitness is a term used to refer to the functional capacity of an individual to perform certain kinds of tasks requiring muscular activity. "Physical Fitness is not only the most important key to a healthy life, but also the basis for dynamic and creative life".

### **Physical fitness in India**

Due to rapid industrialization and general improvements in living standards over the past five decades India has undergone an epidemiological transition in the profile of diseases. Due to this situation, a National plan has been developed which consist of all Primary Schools: (a) two slots of 25 minutes each are allocated for Physical Education lessons to each class weekly. (b) one slot of 25 minutes is allocated for Health Education lessons to each class weekly. In all Secondary Schools, two successive periods of 40 minutes each have been allocated to each class weekly for Physical Education lessons. 10 All State Secondary Schools and State Colleges are serviced by at least one qualified Education Officer for the teaching of Physical Education. Monitoring is done by Physical Education Organizers.

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### Rural and urban areas

Human settlements are categorized as rural or urban areas on the basis of the density of population and human formed structures in a particular area. Urban areas consist of towns and cities while rural areas contain villages and hamlets. Rural areas may develop randomly on the foundation of natural vegetation and fauna available in a region, whereas urban settlements are proper, suitable and planned settlements developed according to a process called urbanization. The urbanization process takes place in various countries under different circumstances in recent times. The differences in growth, body dimensions, body composition and fitness levels of children due to urban and rural environmental disparities have come into centre of attention during the last few years. The aim of this research was to determine the differences in the various components of physical fitness and anthropometric characteristics among urban and rural children of India.

### Need and significance of the study

- In modern sports, the anthropometric measurements and their relationship with various motor traits are an important guide for the coaches and athletes themselves for making training schedules and for classification of students are to different group according to their age, ability.
- An idea might be provided to physical education teachers and coaches about the standard of the students on physical fitness, anthropometric measurement among Indian students.
- Necessary steps might be taken by the physical education teachers and coaches to improve the physical fitness, anthropometric measurement of the Indian school children.
- Therefore, the study is important for the coaches to highlight the physically fit student and train them accordingly.

### Review of related literature

1. Faton Tishukaj, Ismet Shalaj (2017) <sup>[15]</sup> conducted a study on Physical fitness and anthropometric characteristics among adolescents living in urban or rural areas of Kosovo. The subjects were chosen from two urban and two rural schools of Kosovo. Anthropometric and physical fitness parameters were determined from a total of 354 adolescents. The results of the study showed here is a high prevalence of overweight and obesity, especially in 14 to 15 year old boys in Kosovo which does not differ between rural and urban areas. Worse physical performance is associated with a higher risk for overweight and obesity highlighting the importance for intervention.
2. Paul Zongo, Stephane Frayone (2017) evaluated anthropometric characteristics and physical fitness in 556 Melanesian adolescents from rural and urban New Caledonia. Body weight, height, skinfold thickness, lean body mass, percentage body mass, physical fitness (power, agility, speed, maximal aerobic speed, estimated VO<sub>2</sub>max). The results of the study concluded that rural Melanesian adolescents are more active, with good physical fitness (especially boys).

3. Kanwar Mandeep Singh (2017) <sup>[16]</sup> compared the physical fitness parameters of the rural and urban children from Punjab. A total of 60 children (30 rural and 30 urban) aged 12 years old were selected to participate in the study. The following variables were assessed 30m dash, 800m run, standing broad jump, vertical jump and grip strength test. The results revealed that the physical fitness of the rural children were better than the urban children.

### Objectives of the study

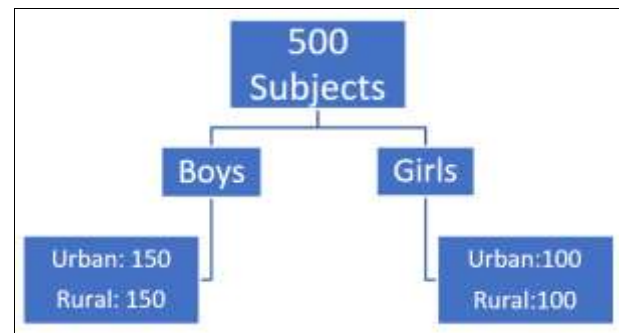
- To compare the anthropometric status of the students of those schools being selected and thereby to find out the superiority of such measures over the other.
- The study will help to formulate physical education program for the development of fitness, control of obesity and for better physiological functioning.
- The present study will help in determining the obesity level of the children through the selected measures and hence can be used to educate the children about the impact of obesity.

### Research question

Whether there will be significant differences in Physical fitness among rural and urban school children.

### Methodology: Samples and sampling technique

The researcher selected 500 subjects for the study which were further classified as.



Simple random sampling was used to select the subjects. The age of the subjects ranged from 12-13 years.

- **Method:** Experimental method was adopted by the researcher.
- **Anthropometric variables:** Height was measured by the help of a stadiometer, weight and BMI were measured by weighing machine.
- **Physical fitness variables:** 60 m dash was measured by stopwatch, muscular strength was measured by the number of pushups in 20s and handgrip test was measured by hand dynamometer
- **Tools:** Physical fitness tests were conducted on the subjects to obtain the data and the SPSS 17.0 was used to analyze the data.
- **Statistical technique:** Independent t-test was applied for comparing the two groups.

### Data Interpretation

**Table 1:** Descriptive statistics for Urban and Rural boys in relation to physical fitness and anthropometric measures

	All			Boys(Urban)			Boys(Rural)		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Age (years) Anthropometry	300	12.48	0.41	150	12.40	0.32	150	12.52	0.26
Weight (kg)	300	41.13	3.78	150	43.87	4.12	150	39.43	3.13
Height (cm)	300	149.4	4.51	150	151.65	4.62	150	145.8	4.22
BMI (Kg/m2)*	300	17.6	2.18	150	-		150	-	
WC (cm)	300	28.1	1.57	150	29.57	1.98	150	26.53	0.73
Weight z-score	300	0.75	1.10	150	0.90	1.11	150	0.69	0.75
Height z-score	300	-0.03	0.57	150	-0.03	1.02	150	-0.05	0.89
BMI z-score	300	1.15	1.03	150	1.33	1.27	150	1.05	0.87
Normal weight (%)	76.47			69.47			99.40		
Overweight (%)	13.32			26.33			0.60		
Obese (%)	10.21	5.20	0.00	1					
<b>Physical fitness</b>									
Handgrip (kg)	300	5.53	1.88	146	8.07	0.67	148	5.20	1.01
Push-ups (s)	300	60.14	16.87	143	84.49	12.40	149	72.42	11.30
60 m sprint (s)	296	3.45	0.59	146	5.45	0.43	146	3.40	0.41

The table above described the number of subjects, mean and standard deviation of the rural and urban boys of both physical fitness variables and anthropometric variables.

**Table 2:** Comparative table of physical fitness and anthropometric of urban and rural boys

Variables (n)	Urban (150)		Rural (150)		
<b>Anthropometric Variables</b>					
	M	SD	M	SD	t(cal)
Weight (kg)	43.87	4.12	39.43	3.13	2.11*
Height (cm)	151.65	4.62	145.8	4.22	2.25*
WC	29.57	1.98	26.53	0.73	1.03
BMI	19.51	3.60	18.73	2.79	2.25*
<b>Physical fitness</b>					
Handgrip	8.07	0.67	5.20	1.01	1.07
Push-ups	84.49	12.40	72.42	11.30	2.51*
60m sprint	5.45	0.43	3.43	0.41	2.14*

Significant 0.05 level \*indicates  $p < 0.05$   
WC- waist circumference

The table 2 presents anthropometric and physical fitness variables of the rural and urban children. The urban children were found to be taller ( $t=2.25, p<0.05$ ). The urban boys were significantly heavier ( $t = 2.11, p< 0.05$ ) than the urban children. Similarly, the urban children were reported to have significantly greater body mass index ( $t = 2.25, p< 0.05$ ) as compared to children residing in the rural areas. The urban boys were found physically better than their urban counterparts in pushups ( $t= 2.51, p<0.05$ ). The rural boys were above their urban counterparts in speed ( $t= 2.14<0.05$ )

**Table 3:** Descriptive statistics for Urban and Rural Girls in relation to physical fitness and anthropometric measures

Variables	All			Girls (Urban)			Girls (Rural)		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Age (years) Anthropometry	200	12.30	0.30	100	12.20	0.10	100	12.34	0.14
Weight (kg)	200	41.90	4.44	100	42.18	4.12	100	40.04	3.09
Height (cm)	200	150.76	3.31	100	151.73	4.61	100	148.45	2.12
BMI (Kg/m2)*	200	18.26	1.18	100	-		100	-	
WC (cm)	200	28.30	3.52	100	29.40	1.99	100	28.55	1.65
Weight z-score	200	0.55	0.04	100	0.40	1.27	100	0.45	0.35
Height z-score	200	-0.01	0.45	100	-0.01	0.42	100	-0.01	0.46
BMI z-score	200	0.12	0.02	100	1.33	0.34	100	3.00	0.78
Normal weight (%)		67.27		64.32			77.78		
Overweight (%)		19.60		21.18			22.22		
Obese (%)		13.13		14.50			0		
<b>Physical fitness</b>									
Handgrip (kg)	200	3.41	0.76	100	6.03	0.43	100	3.21	0.01
Push-ups (s)	200	40.12	12.78	100	64.4	10.21	100	52.43	8.33
60 m sprint (s)	196	2.42	0.23	100	3.34	0.24	100	1.43	0.24

The table 3 above described the number of subjects, mean and standard deviation of the rural and urban boys of both physical fitness variables and anthropometric variables.

**Table 4:** Comparative table of physical fitness and anthropometric of urban and rural girls, Anthropometric

Variables	Girls (Urban N=100)		Girls (Rural N=150)		tcal
	M	SD	M	SD	
Weight (kg)	42.18	4.12	40.04	3.09	2.01*
Height (cm)	151.73	4.61	148.45	2.12	2.21*
WC	29.40	1.99	28.55	1.65	1.70
<b>Physical fitness</b>					
Handgrip	6.03	0.43	3.21	5.03	0.0
Push-ups	52.40	10.20	64.43	2.42*	
60m sprint	3.34	0.24	1.43	0.24	2.02*

Significant 0.05 level

\*indicates  $p < 0.05$

WC- waist circumference

The table 4 presents anthropometric and physical fitness variables of the rural and urban children. The urban children were found to be taller ( $t=2.21$ ,  $p<0.05$ ). The urban girls were significantly heavier ( $t = 2.01$ ,  $p < 0.05$ ) than the rural children. Similarly, the urban children were reported to have significantly greater body mass index ( $t = 2.25$ ,  $p < 0.05$ ) as compared to children residing in the rural areas.

The rural girls were stronger than the urban girls in push-ups ( $t=2.42$ ,  $p<0.05$ ). It was also observed that in speed, the rural girls were faster than the urban girls ( $t=2.02$ ,  $p<0.05$ )

### Discussion of findings

The principle aim of the current study was to examine the potential differences in anthropometric measurements and physical of Indian children both boys and girls living in urban and rural settings. The main findings were that urban children of India had significantly higher values on the most of the parameters of anthropometric variables and physical fitness variables than their urban counterparts. It was found that in both genders urban children were significantly heavier and taller than rural children. These results contradict with various studies published on the children of the Punjab. Matsuura *et al.*, (1974)<sup>[17]</sup> reported contrasting findings on Thai and Indonesian children. Similarly, the findings of the present study are in line with various studies reported on children in other countries. It has been found that Hungarian, Brazilian, Spanish, Greek and Mexican urban children have greater height and weight than their rural counterparts.

### Conclusion

This study investigated the anthropometric and physical fitness characteristics of urban and rural school children in India, focusing on differences in weight status and performance on fitness tests. Our findings highlight significant variations between urban and rural children across several parameters. Urban children, both boys and girls, exhibited higher values in anthropometric measurements such as weight, height, and waist circumference compared to their rural counterparts. Moreover, urban children demonstrated superior performance in physical fitness tests including handgrip strength and push-ups.

Interestingly, while urban children generally outperformed rural children in most aspects, there was no significant difference in the 60-meter sprint test between the two groups, indicating that sprinting ability may be less influenced by environmental factors like urbanization.

The prevalence of overweight and obesity was notably higher among urban children, particularly in girls. This underscores the need for targeted interventions and educational programs to address health disparities and

promote healthier lifestyles among children, especially in urban settings.

Overall, this study contributes to our understanding of how environmental factors influence the physical development and fitness levels of school children in India. Future research could explore additional variables and longitudinal studies to further elucidate these findings and inform effective public health initiatives aimed at improving children's fitness and well-being.

### References

1. Johnson BL, Nelson JK. Practical Measurements for Evaluation in Physical Education. 3rd ed. Delhi: Surject Publication; c1982.
2. Bompa TO. Periodization: Theory and Methodology of Training. 4<sup>th</sup> ed. Champaign, Illinois: Kinetics Publishers; c1999.
3. Brzycki M. Plyometrics: A giant step backwards. Athl J; c1986. p. 72.
4. Agashe CD, Karkare A. Comparative study between tribal and non-tribal sports-person of Chhattisgarh related to their motor fitness. Tribal Health Bull, 2003 Jul, 9(1&2).
5. Saha GC, Haldar S. Comparison of health related physical fitness variables and psychomotor ability between rural and urban school going children. J Exerc. Sci. Physiother. 2012;8(2):105-108.
6. Sallis JF, Simons-Mortan BG, Stone EJ, Corbin CB, Epstein LH, Faucette N, *et al.* Determinants of physical activity and interventions in youth. Med Sci. Sports Exerc. 1992;24(6):248-257.
7. Henneberg M, Louw GJ. Cross-sectional survey of growth of urban and rural 'Cape Coloured' schoolchildren: Anthropometry and functional tests. Am J Hum Biol. 1998;10:73-85.
8. Kangane S, More S. Study on percentage body fat of 13 years school going boys in Nashik district. Variorum Multidiscip e-Res J. 2013;4(2):1-3.
9. Kaur B, Singh G. A comparative study of anthropometric characteristics and motor abilities between urban and rural sports girls. Br J Sports Med., 2010, 44(1).
10. Shivakumar S, Gajanana PB, Prakash SM. Influence of regional disparity on physical fitness of urban adolescent girls. Int. J Eng. Sports Sci. 2014;1(6):1-4.
11. Bagchi A, Raizada S. Anthropometric and physical variables as predictors of off-spin performance in cricket: A multiple regression study. Int J Sports Sci Fit. 2015;5(2):314-322.
12. Gangey O, Kerketta I. Relationship between selected motor fitness and playing ability of volleyball players. Int. J Acad. Res. Dev. 2016;1(6):25-26.

13. Garay A, Levine L, Carter YE. Genetic and anthropological studies of Olympic athletes. New York: Academic Press; c1974.
14. Harish PM. Relationship of anthropometric variables with basketball playing ability. *Acad. Sports Scholar*. 2015;4(4):1-4.
15. Tishukaj F, Shalaj I, Gjaka M, Ademi B, Ahmetxhekaj R, Bachl N, *et al*. Physical fitness and anthropometric characteristics among adolescents living in urban or rural areas of Kosovo. *BMC Public Health*. 2017 Dec;17:1-5.
16. Singh KM, Singh M, Singh P, Choudhary A. Relationship between the Anthropometric Variables and Throwing Skill in Male Softball Players. *European Journal of Physical Education and Sport Science*; c2017 Oct 3.
17. Matsuura S, Morimoto T, Tashiro Y, Higashinakagawa T, Muramatsu M. Ultrastructural and biochemical studies on the precursor ribosomal particles isolated from rat liver nucleoli. *The Journal of Cell Biology*. 1974 Nov 1;63(2):629-640.