ORIGINAL RESEARCH

Anthropometric measurements in school going children

Dr. Thakur Shailesh Kumar Singh

Associate Professor, Department of Physiology, Career Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Corresponding Author
Dr. Thakur Shailesh Kumar Singh
Associate Professor, Department of Physiology, Career Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

ABSTRACT
Background: The physical growth rate pattern refers to the typical changes in a person's size and body composition over time, from infancy through adulthood. The present study was conducted to evaluate anthropometric measurements in school going children. **Materials & Methods:**230 school-going children and adolescents,aged 5 to 16 years of both genders completed a pre-tested questionnaire on age, ethnicity, nutritional status, socio-demographic data. Anthropometric measurements such as height, weight, and Body mass index (BMI)were obtained. **Results:** The mean height (cm) in boys and girls, at 5 years was 110.6 and 108.2, at 6 years was 114.2 and 112.6, at 7 years was 120.6 and 118.4, at 8 years was 126.4 and 122.6, at 9 years was 130.6 and 126.8, at 10 years was 140.2 and 134.2, at 11 years was 142.6 and 138.2, at 12 years was 150.6 and 145.2, at 13 years was 154.8 and 150.7, at 14 years was 162.5 and 154.2, at 15 years was 167.3 and 160.2, and at 16 years was 170.2 and 164.4 cm respectively. The difference was significant (P< 0.05). The mean weight (kgs) in boys and girls at 5 years was 15.4 and 14.3, at 6 years was 19.3 and 18.2, at 7 years was 22.5 and 20.3, at 8 years was 25.8 and 22.7, at 9 years was 30.7and 25.3, at 10 years was 35.4 and 28.2, at 11 years was 37.2 and 31.8, at 12 years was 40.8and 35.4, at 13 years was 45.0 and 38.2, at 14 years was47.2 and 41.9, at 15 years was 50.6 and 44.3, and at 16 years was 54.2 and 47.2 kgs respectively. The difference was significant (P< 0.05). The mean BMI (Kg/m^2) in boys and girls at age 5 years was 16.4 and 16.5, at 6 years was 14.2 and 15.4, at 7 years was 13.7 and 14.2, at 8 years was 14.2 and 14.9, at 9 years was 13.5 and 14.0, at 10 years was 16.4 and 16.0, at 11 years was 16.9 and 17.2, at 12 years was 17.2 and 17.4, at 13 years was 17.5 and 17.9, at 14 years was 18.5 and 18.9, at 15 years was 20.5 and 20.7 and at 16 years was 21.3 and 21.8 respectively. The difference was significant (P< 0.05). **Conclusion:** Boys exhibited higher height and weight as compared to girls of same age group in school going children.
Keywords: Growth, Adolescent, Puberty

INTRODUCTION

The physical growth rate pattern refers to the typical changes in a person's size and body composition over time, from infancy through adulthood. While growth patterns can vary widely among individuals due to factors such as genetics, nutrition, and overall health, there are general trends that are observed across populations.[1]

A child's physical growth is a dynamic declaration of their overall health; it is a constant, quantitative change that refers to an increase in the size of their body as a whole or any one of its sections.[2,3]The process of growth is the outcome of a complex interplay between genetic influence, the kind and caliber of nutrients consumed, the individuals' socioeconomic status, and the relationship between physical activity and physical activity. These factors represent the population's nutritional status and standard of living.[4] A person's nutritional status is their current state of health as it relates to their intake and utilization of nutrients. Its evaluation indicates the extent and severity of nutritional disorders that are common in communities as a result of improper nutrient intake and utilization.The school age years have been referred to as the latent era of growth, during which the body gradually transforms and development rate slows.[5] Puberty is the term for the final stages of this time when a person transitions from childhood to maturity. Girls typically surpass boys during this time, and the last growth spurt happens. Rapid changes in body composition, size, and shape- all of which are sexually dimorphic- characterize the growth and development of school-age children and adolescents.[6]The present study was conducted to evaluate anthropometric measurements in school going children.

MATERIALS & METHODS

The present study was conducted on 230 school-going children and adolescents,aged 5 to 16 years of both genders. Parental consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. All subjects completed a pre-tested questionnaire on age, ethnicity, nutritional status, socio-demographic data. Anthropometricmeasurements such as height, weight, and Body mass index (BMI)were obtained.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Comparison of height spurt between boys and girls

Age group	Boys	Girls	P value
5 years	110.6	108.2	0.05
6 years	114.2	112.6	
7 years	120.6	118.4	
8 years	126.4	122.6	
9 years	130.6	126.8	
10 years	140.2	134.2	
11 years	142.6	138.2	
12 years	150.6	145.2	
13 years	154.8	150.7	
14 years	162.5	154.2	
15 years	167.3	160.2	
16 years	170.2	164.4	

Table I shows that mean height (cm) in boys and girls, at 5 years was 110.6 and 108.2, at 6 years was 114.2 and 112.6, at 7 years was 120.6 and 118.4, at 8 years was 126.4 and 122.6, at 9 years was 130.6 and 126.8, at 10 years was 140.2 and 134.2, at 11 years was 142.6 and 138.212 years was 150.6 and 145.2, at 13 years was 154.8 and 150.7, at 14 years was 162.5 and 154.2, at 15 years was 167.3 and 160.2, and at 16 years was 170.2 and 164.4 cm respectively. The difference was significant (P< 0.05).

Graph I Comparison of height spurt between boys and girls
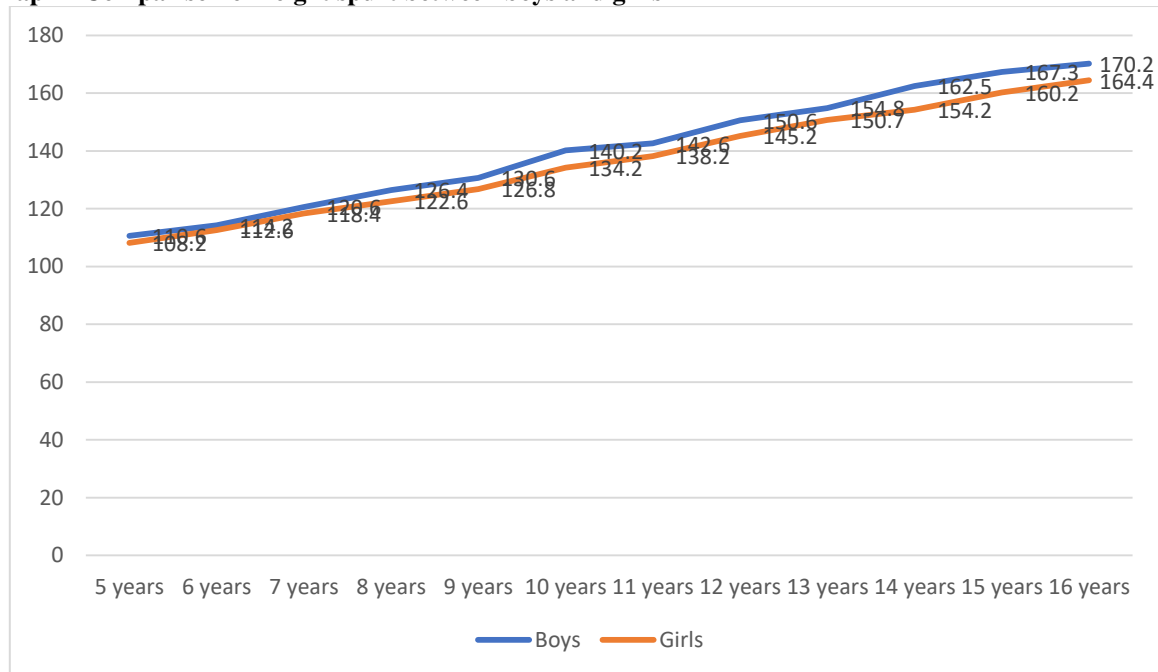
**Table II Comparison of weight spurt between boys and girls**

Age group	Boys	Girls	P value
5 years	15.4	14.3	0.05
6 years	19.3	18.2	
7 years	22.5	20.3	
8 years	25.8	22.7	

9 years	30.7	25.3	
10 years	35.4	28.2	
11 years	37.2	31.8	
12 years	40.8	35.4	
13 years	45.0	38.2	
14 years	47.2	41.9	
15 years	50.6	44.3	
16 years	54.2	47.2	

Table II, graph II shows that mean weight (kgs) in boys and girls at 5 years was 15.4 and 14.3, at 6 years was 19.3 and 18.2, at 7 years was 22.5 and 20.3, at 8 years was 25.8 and 22.7, at 9 years was 30.7 and 25.3, at 10 years was 35.4 and 28.2, at 11 years was 37.2 and 31.8, at 12 years was 40.8 and 35.4, at 13 years was 45.0 and 38.2, at 14 years was 47.2 and 41.9, at 15 years was 50.6 and 44.3, and at 16 years was 54.2 and 47.2 kgs respectively. The difference was significant (P< 0.05).

Graph I Comparison of weight spurt between boys and girls
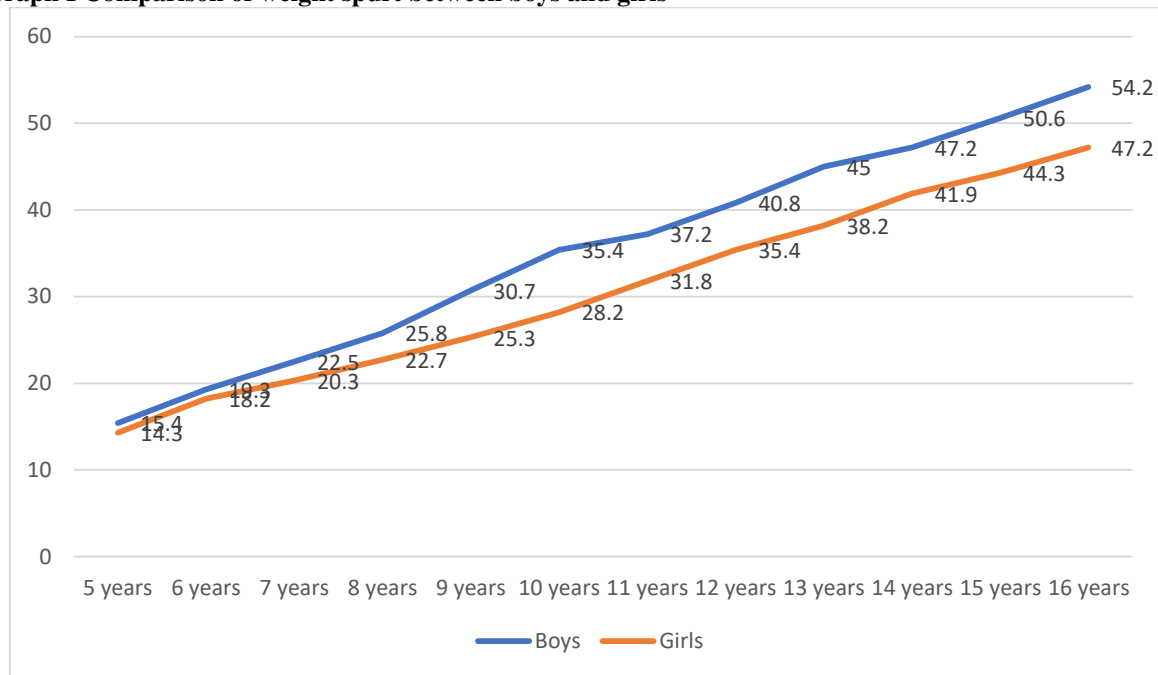
Table III Comparison of BMI between boys and girls

Age group	Boys	Girls	P value
5 years	16.4	16.5	0.05
6 years	14.2	15.4	
7 years	13.7	14.2	
8 years	14.2	14.9	
9 years	13.5	14.0	
10 years	16.4	16.0	
11 years	16.9	17.2	
12 years	17.2	17.4	
13 years	17.5	17.9	
14 years	18.5	18.9	
15 years	20.5	20.7	
16 years	21.3	21.8	

Table III shows that mean BMI (Kg/m^2) in boys and girls at age 5 years was 16.4 and 16.5, at 6 years was 14.2 and 15.4, at 7 years was 13.7 and 14.2, at 8 years was 14.2 and 14.9, at 9 years was 13.5 and 14.0, at 10 years was 16.4 and 16.0, at 11 years was 16.9 and 17.2, at 12 years was 17.2 and 17.4, at 13 years was 17.5 and 17.9, at 14 years was 18.5 and 18.9, at 15 years was 20.5 and 20.7 and at 16 years was 21.3 and 21.8 respectively. The difference was significant (P< 0.05).

DISCUSSION

The period of adolescence is when the body gets ready forthe dietary requirements for nursing, pregnancy, andenormous burdens that women may eventually face.[7]Thus, teenage girls are especially susceptible to theconsequences of starvation.[8] Overweight teenage femalesmight not reach their full potential prior to their firstexpecting a little child and are probably going to give birth to onecompared to those above the age of twenty, becausereduced placental function and increased nutritional competitionbetween the developing teenager and the developing fetus.[9]The present study was conducted to evaluate anthropometric measurements in school going children.

We found that mean height (cm) in boys and girls, at 5 years was 110.6 and 108.2, at 6 years was 114.2 and 112.6, at 7 years was 120.6 and 118.4, at 8 years was 126.4 and 122.6, at 9 years was 130.6 and 126.8, at 10 years was 140.2 and 134.2, at 11 years was 142.6 and 138.2, at 12 years was 150.6 and 145.2, at 13 years was 154.8 and 150.7, at 14 years was 162.5 and 154.2, at 15 years was 167.3 and 160.2, and at 16 years was 170.2 and 164.4 cm respectively. Buckler et al[10] in their study comparison was made with the Tanner standards: male puberty developed a little later but growth continued longer, so that the adult men were taller and heavier. Girls showed a similar timing of puberty to the Tanner standards but were lighter at all ages and ultimately slightly taller as growth was not completed until later. It is important to know the pubertal state when interpreting growth changes in children.

We observed that the mean weight (kgs) in boys and girls at 5 years was 15.4 and 14.3, at 6 years was 19.3 and 18.2, at 7 years was 22.5 and 20.3, at 8 years was 25.8 and 22.7, at 9 years was 30.7and 25.3, at 10 years was 35.4 and 28.2, at 11 years was 37.2 and 31.8, at 12 years was 40.8and 35.4, at 13 years was 45.0 and 38.2, at 14 yearswas 47.2 and 41.9, at 15 years was 50.6 and 44.3, and at 16 years was 54.2 and 47.2 kgs respectively. Dasgupta et al[11] estimated cross-sectional growth of sitting height (SH), subischial length (SL, estimated as height minus sitting height), height of the anterior superior iliac spine (HIS), and total arm length (TAL) of Bengali school boys (Calcutta), aged 7.0-16.0 years. Preece-Baines model 1 (PB1) fits to the cross-sectional means of the four traits estimate the average ages at maximum increment at 12.41 years for SL, at 12.43 years for HIS, at 12.97 for TAL, and at 13.74 years for SH. Maximum increment of the upper and lower segment of the body are reached at an earlier age in the present study than in a longitudinal analysis of semi-urban Bengali boys from the suburban area of Calcutta. Socioeconomic differences and secular trend might explain this shift towards earlier maturation.

We observed that mean BMI (Kg/m^2) in boys and girls at age 5 years was 16.4 and 16.5, at 6 years was 14.2 and 15.4, at 7 years was 13.7 and 14.2, at 8 years was 14.2 and 14.9, at 9 years was 13.5 and 14.0, at 10 years was 16.4 and 16.0, at 11 years was 16.9 and 17.2, at 12 years was 17.2 and 17.4, at 13 years was 17.5 and 17.9, at 14 years was 18.5 and 18.9, at 15 years was 20.5 and 20.7 and at 16 years was 21.3 and 21.8 respectively. Prashant et al[12]assessed the nutritional status of adolescent girls in a slum community. 223 adolescent girls of age 10-18 years were selected randomly. Data was collected by interviewing the adolescent girls using predesigned, pre tested, semi-structured schedule. Parents interview was taken whenever necessary. Anthropometric measurements were recorded using standardized methodology as recommended by World Health Organization (WHO). Standard operational definitions were used. Overall prevalence of stunting was found to be 47% and 28.3% as per NCHS and Indian standards respectively. Prevalence of underweight was 42.6% and 22.9% as per NCHS and Indian standards respectively. Prevalence of thinness was 20.6% as per Indian standards.

The limitation of the study is small sample size.

CONCLUSION

Authors found that boys exhibited higher height and weight as compared to girls of same age group in school going children.

REFERENCES

1. Khan MR, Ahmed F. Physical status, nutrient intake and dietary pattern of adolescent female factory workers in urban Bangladesh. Asia Pac J Clin Nutr 2005; 14: 19-26.
2. Singh N, Mishra CP. Nutritional status of adolescent girls of a slum community of varanasi. Indian J Public Health 2001; 45: 128-134.
3. Venkaiah K, Damayanti K, Nayak MU, Vijayaraghavan K. Diet and nutritional status of rural adolescents in India. Eur J Clin Nutr 2002; 56: 1119-1125.
4. Srihari G, Eilander A, Muthayya S, Kurpad AV, Seshadri S. Nutritional status of affluent Indian school children: what and how much do we know? Indian Pediatr 2007; 44: 204- 213.
5. Sivakumar B, Nair KM, Sreeramulu D, Suryanarayana P, Ravinder P, Shatrugna V et al. Effect of micronutrient supplement on health and nutritional status of schoolchildren: biochemical status. Nutrition 2006; 22 (Suppl): S15-S25.
6. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Singh RP et al. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull 2006; 27: 311-315.
7. Horjus P, Aguayo VM, Roley JA, Pene MC, Meershoek SP. School-based iron and folic acid supplementation for adolescent girls: findings from Manica Province, Mozambique. Food Nutr Bull 2005; 26: 281-286.
8. Shahabuddin A K, Talukder K, Talukder MK et al. Adolescent nutrition in a rural community in Bangladesh. Indian J Pediatr 2000; 67: 93-98.
9. Das D K, Biswas R. Nutritional status of adolescent girls in a rural area of North 24 Paraganas District, West Bengal. Indian J Public Health 2005; 49: 18-21.

5

10. Buckler JMH. IN: A longitudinal study of Adolescent growth.Great Britain, SpingerVerlag London Limited. 1990.
11. Dasgupta P and Das S.R. A cross-sectional growth study of trunk and limb segmentsof the Bengali boys of Calcutta. 1997;24 (4):363-369.
12. Prashant K, Shaw C. Nutritional status of adolescent girls from an urban slum area in South India. The Indian Journal of Pediatrics. 2009 May;76:501-4.

10. Buckler JMH. IN: A longitudinal study of Adolescent growth.Great Britain, SpingerVerlag London Limited. 1990.