Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-7: 1525-1530

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-7 pp. 1525-1530**
Journal homepage: http://www.ijcmas.com

Original Research Article

A Cross Sectional Study on Nutritional Status of Adolescent Girls in Ambedkar Nagar District in Uttar Pradesh, India

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Keywords

Adolescent girls, Anthropometry, Growth

A B S T R A C T

The present study was conducted among the adolescent girls of Ambedkar Nagar District of Uttar Pradesh in order to evaluate their nutritional status. The data comprised 900 girls ranging in age from 10 to 18 years, measured cross-sectionally. The nutritional status of the girls was assessed by measuring their height, weight and BMI. Thinness and overweight were calculated by BMI against Age Z scores (BAZ) as per the method of World Health Organization (WHO); whereas stunting was calculated by Height against age (HAZ). The height and weight were at par with the standards of Indian Council of Medical Research (ICMR), whereas it was lower than from those of WHO. Though the mean and 50th percentile of height and weight in the present sample indicates their status above than the status of Indian Council of Medical Research (ICMR); but below than National Centre for Health Statistics (NCHS). The prevalence of stunting (HAZ $\leq$ -2) was found to be 17.56%, overweight (BAZ $\geq$ 1) was 0.11% whereas thinness (BAZ $\leq$ -2) was prevalent in 18.22% populations.

Introduction

Adolescence is a transition phase through which a child becomes an adult. It is characterized by rapid growth and development; physically, psychologically and socially. The foundation of adequate growth and development is laid before birth and during childhood and is followed in adolescence. Adolescent growth and development is closely linked to the diet they receive during childhood and adolescence. The growth and prosperity of a nation depend heavily on the status and development of adolescent girls. They not only constitute one tenth of population, but also influence the growth of remaining population. The foundation of adequate growth and development is laid before birth and during childhood and is followed in adolescence. Adolescent growth spurt determines final adult size. Changes in physical size and shape during the adolescent period can be inferred from various physical traits.

The assessment of pattern of growth during the adolescent period is based on a set of standard physical or anthropometric measurements (Satake et al, 1993). These measurements not only indicate the general pattern of growth during adolescent period, but also reflect a population specific growth pattern, which can serve as models for the

nutritional assessment of the population. Changes in physical size and shape during the adolescent period can be inferred from various physical traits. Thus, the present study was done to study the nutritional status and prevalence of stunting among adolescent girls of Ambedkar Nagar.

Materials and Methods

The material for the present study was based on a cross-sectional data collected from 900 adolescent girls of Ambedkar Nagar district, Uttar Pradesh (India). The age of subjects ranged from 10 to 18 years. Adolescent girls were selected on the basis of stratified random design for the present investigation. The entire district of Ambedkar Nagar was divided into four regions as North, East, West and South regions. Representative subjects were randomly selected in such a way that the entire district could be covered. The adolescent girls were selected from the 5 blocks namely Akbarpur, Tanda, Baskhari, Jalalpur and Ram Nagar.

Anthropometrical measurements consisted of height and weight. Stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. The subjects were made to stand without foot wear with the feet parallel and with heels, buttocks, shoulders, and occiput touching the measuring rod, hands hanging by the sides. The head was held comfortably upright with the top the head making firm contact with the horizontal head piece. A portable weighing machine with an accuracy of 100 gms was used to record the weight of the girls. Checking the scale with a known weight was done frequently and adjustment to zero was done every time for accurate reading. Girls were instructed to stand on the weighing machine with light clothings and without footwear and with feet apart and looking straight and weight was recorded to the nearest value. The height and weights were compared with Indian standards as described by Indian Council of Medical Research (ICMR, 1972) as well as with National Centre for Health Statistics (NCHS, 1987). The data on height and weight were analyzed separately for each age group to assess annual growth in respective measurements.

Thinness and overweight were calculated by BMI against Age Z scores (BAZ) as per the method of World Health Organization (WHO, 2007); whereas stunting was calculated by Height against age (HAZ). The HAZ $\leq$ -2 was considered as stunted; BAZ $\geq$ 1 as overweight and BAZ $\leq$ -2 as thinness. Data thus generated were analyzed statistically using Graph Pad Prism version 5.00 software. Statistical measures such as frequency, percentage, mean, range, standard error of mean and students' t test were employed to describe and analyze the data.

Results and Discussion

The mean and standard error (SE) for height (cm) and weight (kg) along with annual increment among adolescent girls of Ambedkar Nagar district are presented in Table 1.

The mean and SE of height (cm) was found to be 130.1± 0.43, 134.6 ± 0.26, 140.3 ± 0.20, 143.4 ± 0.12, 147.8 ± 0.27, 150.5 ± 0.19, 150.9 ± 0.22, 152.2 ± 0.20 and 152.8 ± 0.27 for 10 years, 11 years, 12 years, 13 years, 14 years, 15 years, 16 years, 17 years and 18 years of age respectively.

The mean and SE of weight (kg) was found to be 25.51 ± 0.37, 27.86 ± 0.24, 30.43 ± 0.21, 34.42 ± 0.26, 36.68 ± 0.32, 38.75 ± 0.30, 41.54 ± 0.27, 42.15 ± 0.34 and 42.29 ± 0.42 for 10 years, 11 years, 12 years, 13

years, 14 years, 15 years, 16 years, 17 years and 18 years of age respectively.

These findings on the heights and weight of girls in the present findings are below than the findings of Agarwal et al (1992) whereas; the heights and weight of girls in the present study were more than the findings of Singh et al (2006) and Sushmita (2010). This difference may be due to the fact that the subjects in above studies belonged to different geographical locations of the country. The findings in the present investigation are also better than the Indian standards as prescribed by the ICMR (1972) suggesting that the girls in the Ambedkar Nagar district are in good conformity than the average standards of the country. Same results have also been reported by Verma (2012).

Comparison of height (cm) and weights (kg) of adolescent girls of present study with ICMR and NCHS standards is represented in Table 2.

Present investigation suggests that the adolescent girls of Ambedkar Nagar district are 0.7 to 1.7 cm taller than the ICMR standards; whereas they are 8.2 to 13.7 cm shorter than their foreign counter parts (NCHS). Regarding weight, the girls in present investigation are 0.63 to 1.91 kg heaviour than ICMR standards, but 6.99 kg to 14.95 kg lighter than NCHS standards. In simpler words, the adolescent girls of present study are above the the Indian standards of ICMR, whereas they are below the standards set for their foreign counterparts by NCHS. Whatever the genetic component of these characteristics, the environment has an important influence, particularly in weight (Qamra et al, 1990). Since the peri-urban situation represents a mix of both rural and urban influences and how this gets reflected in the growth pattern among the girls of the present study was of importance to understand the changing environmental situation and its influence on growth and health status.

The prevalence of stunting, thinness, severe thinness and overweight among adolescent girls of Ambedkar Nagar District are presented in Table 3.

Stunting (HAZ < -2) was prevalent in 21.30% population of rural girls, whereas it was prevalent only in 5.24% of urban girls. In pooled population, stunting was found to be present in 17.56% girls. Thinness (BAZ < -2) was found to present in 116 (16.81%) rural girls, whereas in urban population it was present in 23 (10.95%) girls. In overall population, it was found to present in 139 (15.44%) girls. Severe thinness (BAZ < -3) was found to be present only in 21 (3.04%) rural and 4 (1.91%) urban girls. In overall population, it was present in 25 (2.78%) girls.

The number of overweight girls was found to be only one accounting for 0.11% of overall population. The single overweight girl in present study was present in urban population accounting for 0.48% of urban population.

Anand et al (1999) reported that the study in rural north India among adolescent school children recorded a prevalence of stunting (height for age) as 41 and 19.9 percent as per NCHS and Indian standards respectively; supporting the present investigation.

This statistics is low than the studies of Malhotra and Passi (2007), where they found the percentage of stunting and thinness to be 29.7% and 30.6% respectively. This difference may be due to the difference in geographical distribution of study subjects.

Table.1 Mean and SE of height and weight at different ages of adolescent girls of Ambedkar Nagar, Uttar Pradesh

Age (y)	N	Height (cm)	Weight (kg)
10	56	130.1± 0.43	25.51 ± 0.37
11	104	134.6 ± 0.26	27.86 ± 0.24
12	140	140.3 ± 0.20	30.43 ± 0.21
13	168	143.4 ± 0.12	34.42 ± 0.26
14	132	147.8 ± 0.27	36.68 ± 0.32
15	99	150.5 ± 0.19	38.75 ± 0.30
16	83	150.9 ± 0.22	41.54 ± 0.27
17	65	152.2 ± 0.20	42.15 ± 0.34
18	53	152.8 ± 0.27	42.29 ± 0.42

Table.2 Comparison of Height (cm) and Weight (kg) of Adolescent girls of Ambedkar Nagar of Uttar Pradesh with ICMR and NCHS standards

Age (yr)	N	Height (cm)			Weight (kg)		
		Present study	ICMR	NCHS	Present study	ICMR	NCHS
10	56	130.1	128.40	138.3	25.51	23.6	32.5
11	104	134.6	133.60	144.8	27.86	26.4	37.0
12	140	140.3	139.20	151.5	30.43	29.8	41.5
13	168	143.4	143.90	157.1	34.42	33.3	46.1
14	132	147.8	147.50	160.4	36.68	36.8	50.3
15	99	150.5	149.60	161.8	38.75	38.8	53.7
16	83	150.9	151.00	162.4	41.54	41.1	55.9
17	65	152.2	151.50	163.1	42.15	42.4	56.7
18	53	152.8	151.70	163.7	42.29	42.4	56.6

Table.3 Prevalence of Stunting, Thinness, Severe Thinness and Overweight among Adolescent girls of Ambedkar Nagar District (N= 900)

	Stunting (HAZ < -2)		Thinness (BAZ < -2)		Severe Thinness (BAZ < -3)		Overweight (BAZ > 1)	
	N	%	N	%	N	%	N	%
Rural	147	21.30	116	16.81	21	3.04	0	0
Urban	11	5.24	23	10.95	4	1.91	1	0.48
Pooled Population	**158**	**17.56**	**139**	**15.44**	**25**	**2.78**	**1**	**0.11**

Patil et al (2009) studied underweight in rural adolescent girls of Ratnagiri district of Maharashtra and found it to be 67.8% & 69.3% respectively as per proposed Asian and WHO criteria. Adolescent girls who were categorized as overweight by Asian and criteria were 2 % and 2.4% respectively. Thus the present study supports the findings

of Patil et al (2009) showing a decreased trend in overweight among adolescent girls.

In a study Oldwage-Theron and Egal (2010) reported that 2.8% of the total group of respondents was severely stunted, and that 11.3% were stunted. The BMI-for-age indicated that 12.0% were overweight, and more so among the girls (15.7%) than the boys (8.3%).

In a study in Bangladesh, Alam et al (2010) found that 26% of the girls were thin, with body mass index (BMI)-for-age <15th percentile), 0.3% obese (BMI-for-age >95th percentile), and 32% stunted (height-for-age ≤2SD).

The results of present investigation also supports the findings of Maliye et al (2010); where they found that none of the adolescent girls in the Wardha district were overweight or obese.

In conclusion, the mean value of height and weight among adolescent girls of Ambedkar Nagar indicate positive correlation with age; and they were in concurrence with the ICMR standards though they were somewhat lower than NCHS standards. The mean and 50th percentile of height and weight in the present sample indicates their status above than the status of Indian Council of Medical Research (ICMR); but below than National Centre for Health Statistics (NCHS). This trend in the physical growth as observed in height and weight may serve as the growth standards for girls of Ambedkar Nagar district of Uttar Pradesh. Present investigation also suggests that though there is prevalence of stunting, thinness, severe thinness and overweight among adolescent girls of Ambedkar Nagar district; it is much lower than earlier reports of other places.

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