

## Research Article

# Nutritional status of adolescent girls in urban slums of Moradabad: a cross sectional study

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### ABSTRACT

**Background:** Adolescence is important and crucial period of transition from child-hood to adulthood identifies by WHO as the period from ages 10-19 years. Adolescence is marked as a period of growth spurt and maturation, determined not only by genetic and heredity factors alone but also depend on nutrition and access to health services. Nutritional status is now recognized to be a prime indicator of the health of individuals. So the present study was conducted develop a database on nutritional status of the adolescents of slums to enable the government and other non-governmental agencies to formulate policies and initiate strategies for the well-being of adolescent children.

**Methods:** This cross sectional study was conducted for a period of one year from June 2013 to May 2014 in the urban slums of Moradabad district. 8 slums were selected by random sampling for the study. Simple random sampling was used to select the individuals from each slum. A total of 408 adolescent girls were interviewed on a pilot-tested, structured and predesigned schedule through oral questionnaire method. Data was statistically analyzed utilizing SPSS (version. 17.0) for Windows.

**Results:** Maximum girls were in age group of 14-16 years (41.5%), followed by age group of 10-13 years (37.8%). 74.6% adolescents were found vegetarians. Out of 405 adolescent girls, 63 (15.6%) were underweight whereas only 14 (3.5%) were overweight No adolescent was found in obese category. Among vegetarian adolescent girls, 56 (18.5%) were underweight & 11 (3.6%) were overweight but among non-vegetarian adolescent girls this was only 7 (6.8%). This was found statistically significant.

**Conclusions:** The study shows that the nutritional status of the study population has been severely affected by dietary habits and type of oil and salt used. Hence adoption of healthy dietary habits by all individuals is critical for the prevention of nutritional disorders.

**Keywords:** Adolescence, Nutritional status, Urban slums

### INTRODUCTION

Adolescence is an important stage of growth and development in the lifespan and is a crucial period of transition from child-hood to adulthood in the life of human beings. WHO identifies adolescence as the period from ages 10-19 years. They are no longer children but are not considered adults yet.<sup>1</sup> Unique changes that occur in an individual during this period are accompanied by

progressive achievement of biological maturity. This period is very crucial since these are formative years in life of an individual when major physical, psychological and behavioural changes take place.<sup>1</sup>

Adolescence is marked as a period of *growth spurt* and *maturation*, extent of physical growth not determined by genetic and heredity factors alone but also depend on

availability of adequate nutrition, micronutrients in the diet and access to health services.<sup>2</sup>

Inadequate nutrition during adolescence can have serious consequences throughout the reproductive years and beyond. Extra nutritional requirements include increased intake of calcium, iron, iodine, minerals and proteins. Unmet nutritional needs lead to several public health problems such as stunted and retarded growth, impaired mental development, anaemia, complications during pregnancy and low birth weight babies.<sup>3</sup>

It is well documented that short stature in adolescents indicating prolonged under nutrition is associated with lower lean body mass, deficiencies in muscular strength and productivity.

There are nearly one billion adolescent in the world accounting for 20-25% population in the developing countries. This particular group of population is likely to increase in next 30 years due to population moment effect.<sup>3</sup>

Recent reports of the WHO suggest that in South East Asian Region a large number of adolescents, who constitute 20% of the population in these countries, suffer from malnutrition and anaemia, which has adverse impact on their health and development. Anthropometry is a good indicator to assess nutritional status and health risks of this group.<sup>3</sup>

Nutritional status is now recognized to be a prime indicator of the health of individuals. The World Health Organization (WHO) believes that ultimate objective of nutritional assessments is the improvement of human health.

There is very little information about nutritional status of female adolescents, particularly from urban slums in India. Therefore, there is a need to develop a database on nutritional status of the adolescents from different parts of the country to enable the government and other non-governmental agencies to formulate policies and initiate strategies for the well-being of adolescent children.

In view of the above, present study was conducted to assess the nutritional status of the adolescent girls of urban slums of District Moradabad.

## METHODS

This cross sectional study was conducted in the Department of Community Medicine, Teerthanker Mahaveer Medical College and Research Centre, Moradabad for a period of one year from June 2013 to May 2014. The study was carried out in the urban slums of Moradabad district with the broad aim of assessing the nutritional status of adolescent girls.

Sample size was calculated on the basis of following formula:

$$\frac{Z^2 * (p) * (1-p)}{L^2}$$

Where Z = Z value (e.g. 1.96 for 95% confidence level), P is 58.5% (prevalence of under nutrition among adolescents from a previous study conducted by National Institute of Nutrition, Hyderabad<sup>4, 5</sup>, Q=100-P=100-58.5=41.5, L= 5% allowable error which comes to be 373. 5% drop out and non-response rate is added. Thus sample size comes to be 392.

Among all the slums, 8 highly populous slums were selected by random sampling for the study. Simple random sampling was used to select the individuals from each slum. The total number of adolescent girls selected from each slum was 51. The first household was selected at random by lottery method. Thereafter, the other subjects were interviewed in sequence till the desired sample size was achieved.

Institutional Ethical Clearance and informed Consent to participate in the study was taken from the adolescents and their mothers after explaining the purpose and significance of study. Adolescent girls were interviewed in privacy and desired information was collected on a pilot-tested, structured and predesigned schedule through oral questionnaire method. Finally a total of 408 adolescent girls were interviewed. Out of which 405 questionnaires were complete whereas 3 questionnaires were incomplete due to non consent for anthropometry.

Body mass index (BMI) was computed by using the standard equation BMI= weight (in kg)/height (in meters). The underweight and overweight were determined by using WHO recommended age specific cut-off points of BMI based on the Nutritional Health and Nutrition Examination Survey (NHANES) reference value where the BMI-for-age below 5th percentile of NHANES value was classified as thinness (underweight) or chronic energy deficiency (CED). The BMI-for-age above 85th percentile of NHANES reference value was considered as overweight<sup>6</sup>. Modified BG Prasad's Classification was used to assess socioeconomic status<sup>7</sup>. The data was statistically analysed utilizing SPSS (version. 17.0) for Windows. Chi-square analysis was also used to analyse the differences in nutritional status between groups. The differences were considered to be statistically significant at p<0.05 level.

## RESULTS

In the present study maximum girls were in age group of 14-16 years (41.5%), followed by age group of 10-13 years (37.8%) and of 17-19 years (20.7%). Out of 405 girls, (69.1%) adolescents were from nuclear family while (30.9%) were from joint family. Maximum girls were educated between primary to middle school (59.0

(%) followed by those educated between high school to intermediate, (35.1%) and those below primary school (4.9 %). Only 1.0% was educated above intermediate. According to modified Prasad's classification maximum number of the adolescent girls (54.3%) belonged to class IV, followed by (21.0%) to class III, (12.8%) to class II, (8.6%) to class V and only (3.1%) belonged to class I. (Table 1).

**Table 1: Distribution of the adolescents according to bio-social factors.**

Variable	Total (n=405)	
	N	%
<b>Age group</b>		
10-13	153	37.8
14-16	168	41.5
17-19	84	20.7
<b>Type of family</b>		
Nuclear	280	69.1
Joint	125	30.9
<b>Education</b>		
Primary or Below	20	4.9
Above Primary to Middle	239	59.0
Hsc – Inter	142	35.1
Above Inter	4	1.0
<b>Socioeconomic status</b>		
I	13	3.2
II	52	12.8
III	85	21.0
IV	220	54.3
V	35	8.6

74.6% adolescents were found vegetarians and 25.4% were non-vegetarians respectively. About 49.9 % adolescents used saturated fat, 49.1 used PUFA and 1.0 % used MUFA. Nearly 90.6 % used iodized salt and 9.4% used non iodised salt (Table 2).

**Table 2: Dietary habits of the adolescent girls.**

Variable	No.	%
<b>A. Dietary habits</b>		
1. Vegetarian	302	74.6
2. Non Vegetarian	103	25.4
<b>B. Type of cooking oil used</b>		
1. Saturated fat	202	49.9
2. Unsaturated fat		
a. MUFA	4	1.0
b. PUFA	199	49.1
<b>C. Type of salt</b>		
1. Iodized	367	90.6
2. Non iodised	38	9.4
<b>Total</b>	405	100

Out of 405 adolescent girls, 63 (15.6%) were underweight, only 14 (3.5%) were overweight while 328

(81.0%) adolescent girls were normal. No adolescent was found in obese category (Table 3).

**Table 3: Distribution of the adolescent girls according to their BMI.**

BMI	Total (n=405)	%
Underweight	63	15.6
Normal	328	81.0
Overweight	14	3.5
Obese	0	0.0

In the present study most of the adolescent girls fall under the category of increased waist hip ratio. 249 adolescent girls (61.5%) out of 405 had an increased waist hip ratio (Table 4).

**Table 4: Waist hip ratio of the urban slum adolescent girls.**

Waist hip ratio	Total (n=405)	%
Normal waist hip Ratio	156	38.5
Increased Waist hip Ratio	249	61.5
Total	405	100

Out of 302 vegetarian adolescent girls, 56 (18.5%) were underweight & 11 (3.6%) were overweight. Among 103 non-vegetarian adolescent girls, 7 (6.8%) were underweight and 3 (2.9%) were overweight. This was found statistically significant. Among 202 adolescent girls those who are using saturated fat, 19 (9.4%) were underweight & 7 (3.5%) were overweight. Out of 199 girls, 44 (22.1%) were underweight and 7 (3.5%) were overweight. This was found statistically significant. Among 367 adolescent girls those who were using iodized salt, 63 (17.2%) were underweight and 11 (3.0%) girls were overweight. Out of 38 girls those who were using non-iodised salt, 3 (7.9%) girls were overweight. This was found statistically significant (Table 5).

## DISCUSSION

Out of 405 adolescent girls surveyed, majority were aged between 14-16 years (41.5%) and were from nuclear families (69.1%). A very large number of the adolescent girls, 385 (95.06%) were educated above primary school level. Majority belonged to socioeconomic class IV (54.3%) as per Modified Prasad's classification.

In the present study 74.6% adolescents were vegetarians and 25.4% were non-vegetarians. The ratio between vegetarians and non-vegetarians was 3:1. This predominance of vegetarian habit might be due to some cultural constraints (either in consumption or declaration of consumption of nonvegetarian diet). In the finding reported by Saluja N et al<sup>8</sup> in 2011, 54.18% people were

**Table 5: Nutritional status in relation to dietary characteristics.**

Dietary Characteristics	Nutritional Status						Chi-Sq(df), p-value	
	No. Studied	Underweight		Overweight		Normal		
		N	%	N	%	N		%
<b>Dietary habits</b>								
Vegetarian	302	56	18.5	11	3.6	235	77.9	
Non Vegetarian	103	7	6.8	3	2.9	93	90.3	
8.41 (2), .015								
<b>Type of cooking oil used</b>								
Saturated fat	202	19	9.4	7	3.5	176	87.1	
MUFA	4	0	0	0	0	4	100.0	
PUFA	199	44	22.1	7	3.5	148	74.4	
11.7 (2), 0.003								
<b>Type of Salt</b>								
Iodized	367	63	17.2	11	3	293	79.8	
Non iodised	38	0	0	3	7.9	35	92.1	
9.55 (2), .008								

vegetarians and 45.82% were non-vegetarians. About 49.9% used saturated fat and 49.1% used PUFA. Nearly 90.6 % used iodized salt.

In the present study 15.6% adolescent were undernourished (thinness) while 3.5% adolescents were overweight. A meta-analysis of nine studies in 2012 showed 12.6 per cent of children to be overweight and 3.3 per cent to be obese indicating the seriousness of the situation.<sup>9</sup> A review of a few select studies during 2001 to 2012 showed a prevalence of overweight among children aged 10-19 years to be 9.9 to 19.9 per cent; high in both boys (3 to 15.1%) than in girls (5.3 to 13.3%) indicating early onset of obesity affecting more of urban school adolescents (3.4 to 6.5%) as compared to 0.6 per cent among the rural adolescents with significant gender variations.<sup>10-18</sup>

Vohra R et al<sup>19</sup> in 2011 in Lucknow found the prevalence of overweight and obesity was 17% and 0.73% respectively among school-going children. Important correlates were children playing out-door's games for less than 30 minutes and those consuming fast food. Average daily intakes of energy, protein, iron and calcium were significantly less than ICMR Recommended Dietary Allowances among school going adolescent girls of Lucknow.<sup>20</sup>

In the present study 61.5% adolescents had increased waist hip ratio.

Ramachandran A et al<sup>21</sup> in a cross sectional study carried out in 2010 in three Asian regions, namely south Asia (India, Pakistan), East Asia (China, Korea, Taiwan) and south east Asia (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) showed a higher prevalence of ratio in these countries, especially in south Asia.

## CONCLUSION

It is clear from the study that the nutritional status of the study population has been severely affected by dietary habits and type of oil and salt used. Hence adoption of healthy dietary habits by all individuals is critical for the prevention of nutritional disorders. Therefore Nutrition education to the adolescents should focus on communication for behavioural change based on identified cultural and institutional constraints to good nutrition, detrimental attitudes and practices toward food and eating behaviour.

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