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Assessment of Nutritional Status among Adolescents in an Urban Field Practice Area of a Medical College in West Bengal, India

Authors
Dr Avijit Paul[1], Dr Soma Chakrabarti[2*], Dr Shuvankar Mukherjee[3], Prof. Dr Nabanita Bhattacharyya[4]

[1]MBBS, MD (Community Medicine), Assistant Professor, Department of Community Medicine, Calcutta National Medical College, Kolkata

[2]MBBS, DPH, MD(Community Medicine), Assistant Professor, Department of Community Medicine, Calcutta National Medical College, Kolkata

[3]MBBS, DPH, MD (Community Medicine), Assistant Professor, Department of Community Medicine, Calcutta National Medical College, Kolkata

[4]MBBS, MD (Community Medicine), Professor and HOD, Department of Community Medicine, Calcutta National Medical College, Kolkata

*Corresponding Author
Dr Soma Chakrabarti
E – 1/ 5, Saltee Spacio, 1, Mall Road, Kolkata – 700080, India

Abstract
Good nutrition and appropriate lifestyle behavior are essential for optimum growth and development of adolescents. Since malnutrition during adolescence affects the future of not only the individuals but the society as a whole, so this present study was carried out among adolescents in slums with the aim of asessng their nutritional status and to find out the sociodemographic factors influencing malnutrition among them. A cross-sectional, descriptive, observational study was carried out in three randomly selected slums in the urban field practice area of Calcutta National Medical College. A sample of 291 adolescents were selected following complete enumeration technique among the permanent residents of those slums. A predesigned, pretested, structured schedule was used for collecting data regarding nutritional status and sociodemographic factors. The study population was found to be comprised of 123 (42.3%) males and 168 (57.7%) females. According to BMI, among the study population 21 (7.2%) were obese, 30 (10.3) were over-weight, 135 (46.4%) were normal, 90 (30.9%) were thin and 15 (5.2%) were very thin. Gender, religion, education of parents, type of family and socio-economic status were found significantly associated (p<0.05) with different categories of BMI. Thus strengthening adolescent health through adolescent health clinics will ameliorate their nutritional and other health related problems.
Keywords: *Adolescents, Nutritional status, BMI for age, urban.*

Introduction

The term adolescence is derived from the Latin word "adolescere" meaning "to grow up", the World Health Organization (WHO) defines adolescents as individuals aged 10-19 years.[1] Adolescence is often divided into early (10-13

years), middle (14-16 years) and late (17-19 years) adolescence.[2] There are around 350 million adolescents comprising about 22% of the population in countries of the South-East Asia Region (SEAR).[3] The adolescence is defined as the period of transition between childhood and adulthood and is characterized by an exceptionally rapid rate of growth.[4] It is one of the most rapid and formative phases of human development.

Adolescence is a window of opportunity not only for a healthy and productive adulthood but also a period of risk as health problems can have serious consequences immediately or later in life. It is the time when the nutrient requirements of the body are high. Inadequate nutrition in adolescence can potentially retard growth and sexual maturation, and can put them at high risk of chronic diseases particularly if combined with other adverse lifestyle behaviours.

According to 2011 census of India, 20.9% of total population is adolescents, and in West Bengal they comprise 7.2% of total population.[5,6]

The prevalence of malnutrition is a major public health concern in most of the developing countries in Asia. India, with its vast size, socioeconomic disparities, illiteracy etc. is not an exception to it. So, a large number of adolescents suffer from chronic malnutrition which adversely impacts their health and development. Addressing the nutritional needs of adolescents could be an important step towards breaking the vicious cycle of intergenerational malnutrition, chronic diseases and poverty. Hence, assessment of nutritional status, particularly among adolescents, plays a very crucial role in formulating future developmental strategies for the country.

Though a lot of national health programmes have been implemented to combat the menace of malnutrition among adolescents, yet till date the problem still persists. Also, most of the studies on adolescent nutrition had been conducted in the rural setup. Since data in urban setup is very hard to come by, not only in India but also in West Bengal, this study was carried out among the adolescents with the following objectives:

1) To assess the nutritional status of the adolescents residing in the selected slums of the urban field practice area of Calcutta National Medical College, Kolkata.

2) To find out the association, if any, between socio-demographic profile and nutritional status of the study population.

Materials & Methods

Type of study: Descriptive observational study
Study design: Cross sectional
Place of study: Urban field practice area of Calcutta National Medical College (CNMC), Kolkata
Study duration: 6 months
Study population: Adolescents who were permanent residents of the area

Exclusion Criteria

i. Seriously ill adolescents
ii. Adolescents who had not given informed consent
iii. Adolescents with any congenital disorder.

Sample size: Total sample size consisted of 291 adolescents.

Sampling Technique: 3 slums were randomly selected in the field practice area. All the adolescents who were permanent residents of these slums and outside the exclusion criteria, had been included in the study following complete enumeration technique.

Study Technique

- Interview method.
- Clinical Examination – height, weight, BMI, waist – hip ratio.

Study Tools

i. Predesigned, Pretested and Structured Schedule
ii. Measuring Tape
iii. Weighing Machine
iv. Modified B.G. Prasad scale for socio-economic status, 2018
v. WHO's BMI Chart for Adolescents

Study Variables

i. Socio-demographic Variables such as age, religion, family income etc.
ii. Variables regarding Nutritional Status such as height, weight, waist-hip ratio etc.

Study Procedure

The topic was selected and placed before the Institutional Ethics Committee for obtaining necessary clearance. All adolescents who were permanent residents of the urban field practice area of our College formed the study population. Out of 25 slums, 3 were chosen randomly from which all adolescents outside the exclusion criteria, were included in the study following complete enumeration technique. The sample thus obtained was 291. After obtaining informed consent, they were interviewed and appropriate clinical examinations were done. Body weight was determined to the nearest 0.01 kg using a Tanita scale coupled to the BOD POD® Body Composition Tracking System (Life Measurement Instruments, Concord, California, USA) with subjects wearing underwear. Height was assessed without shoes to the nearest 0.5 cm by using a stadiometer (SECA, Modell 220, Hamburg, Germany). BMI was calculated as body weight (kg) / body height (m)^2. WC was measured with the subjects standing in upright position midway between the lowest rib and the top of the iliac crest. At the end of a normal expiration, the measurement was performed with a non- elastic plastic tape positioned parallel to the floor.

All data collected were entered in MS-Excel and analysed using SPSS version 21.

Results

The study population comprised of 123 (42.3%) males and 168 (57.7%) females (Table 1). Among them 198 (68%) belonged to Hindu community and the rest 93 (32%) were Muslims and most of them 162 (55.7%) belong to nuclear family (Table 1). Mean age (year) for girls (15.91±2.78) were slightly higher than the boys (15.76±3.10). Majority of the population (57.8%) were from middle class socio-economic status. Among the adolescents 6 (2.06%) were found as school drop-out. Anthropometric measurements revealed mean height, weight, waist circumference were more in boys than the girls (Table 2). According to BMI, among the study population 21 (7.2%) were obese, 30 (10.3) were over-weight, 135 (46.4%) were normal, 90 (30.9%) were thin and 15 (5.2%) were very thin (Figure 2). Gender, religion, education of parents, type of family and socio-economic status were found significantly associated (p<0.05) with different categories of BMI (Table 1). Multinomial logistic regression found that gender, education of mother, type of family, socio-economic status, junk food consumption and regular physical exercise are significant predictors for thin to very thin BMI group whereas gender, religion, education of mother were the significant predictors for over-weight to obese group (Table 3). Among the male adolescent significant (p<0.001) difference in waist circumference found in three BMI groups which is contributed by thin & normal group (p<0.001) & thin and obese group (p<0.001). For the female population waist circumference and waist-hip ratio were significantly different (p<0.001) among the three BMI groups (Table 4).

Discussion

The present urban community based cross-sectional study among 291 adolescents including 123 (42.3%) males and 168 (57.7%) females was conducted to assess nutritional status and to correlate with socio-demographic-lifestyle factors. There are few references that are conducted in urban population, however study conducted by Ramachandra A et al. in an urban adolescent school population can be compared with the present study. The current study found that the mean weight and height for boys were more than the girls which is similar to the findings by Ramachandra et al. but unlike their study mean BMI was also more for boys. Overall prevalence of over-nutrition was 17.5% and under-nutrition was 36.1% and were significantly contributed by

gender, religion, education of the parents and socio-economic status of the adolescents. More number of obese adolescents were found in upper socio-economic groups similar to Ramachandra et al. but no significant correlation was found with physical activity and food habits of the adolescents. Multi-linear logistic regression analysis revealed gender, education of the parents and socio-economic status as the significant contributor to adolescent malnutrition.

Table 1: Association of socio-demographic and lifestyle factors with Body Mass Index   (n=291)

Factors		BMI			χ^2	P value
		Thin to very thin	Normal	Over weight to obese		
Gender	Male (n=123)	60 (48.8)	36 (29.3)	27 (21.9)	26.37	0.000
	Female (n=168)	45 (26.8)	99 (58.9)	24 (29.4)		
Religion	Hindu (n=198)	78 (39.4)	102 (51.5)	18 (9.1)	30.54	0.000
	Muslim (n=93)	7 (29.0)	33 (35.5)	33 (35.5)		
Education of father	Up-to secondary (n=105)	27 (25.7)	45 (42.9)	33 (31.4)	23.45	0.000
	Higher secondary or more (n=186)	78 (41.9)	90 (48.4)	18 (9.7)		
Education of mother	Up-to secondary (n=132)	27 (20.5)	45 (42.9)	33 (31.4)	44.60	0.000
	Higher secondary or more (n=159)	78 (41.9)	90 (48.4)	18 (9.7)		
Type of family	Joint (n=129)	54 (41.9)	60 (46.5)	15 (11.6)	6.74	0.034
	Nuclear (n=162)	51 (31.5)	75 (46.3)	36 (22.2)		
Socio-economic status	Upper middle or more (n=123)	3 (2.4)	90 (73.2)	30 (24.4)	105.49	0.000
	Lower middle or less (n=168)	102 (66.7)	45 (26.8)	21 (12.5)		
Consume junk food	Yes (n=249)	87 (34.9)	117 (47.0)	45 (18.1)	1.05	0.591
	No (n=42)	18 (42.9)	18 (42.9)	6 (14.3)		
Regular Exercise	Yes (n=198)	78 (39.4)	84 (42.4)	36 (18.2)	4.14	0.126
	No (n=93)	27 (29.0)	51 (54.8)	15 (16.2)		

Table 2: Anthropometric measurements of the study population (n=291)

Measurements	Male (n=123)		Female (n=168)	
	Mean	SD	Mean	SD
Height (cm)	159.24	14.36	151.46	8.09
Weight (kg)	55.49	16.13	47.18	12.05
Body Mass Index (kg/m^2)	21.53	4.64	20.32	3.98
Waist Circumference (cm)	72.21	14.94	70.69	11.65
Waist Hip Ratio	0.86	0.12	0.84	0.08

Table 3: Multinomial logistic regression analysis of socio-demographic and lifestyle factors associated with Body Mass Index (n=291)

BMI	Factors		P value	OR (95% CI)
Thin to very thin	Gender	Male	0.000	12.444 (4.661 – 33.222)
		Female		
	Religion	Hindu	0.075	0.424 (0.164 – 1.092)
		Muslim		
	Education of father	≤Secondary	0.40	0.602 (0.184 – 1.965)
		≥Higher secondary		
	Education of mother	≤Secondary	0.014	0.240 (0.077 – 0.750)
		≥Higher secondary		
	Type of family	Joint	0.047	2.251 (1.010 – 5.015)
		Nuclear		
	Socio-economic status	≥Upper middle	0.000	0.004 (0.001-0.016)
		≤Lower middle		
	Consume junk food	Yes	0.024	3.325 (1.167 – 9.469)
		No		
	Regular Exercise	Yes	0.024	0.344 (0.137 – 0.868)
		No		
Over weight to obese	Gender	Male	0.000	13.542 (4.905 – 37.388)
		Female		

Religion	Hindu	0.000	0.099 (0.37 – 0.263)
	Muslim		
Education of father	≤Secondary	0.60	1.285 (0.503 – 3.279)
	≥Higher secondary		
Education of mother	≤Secondary	0.004	4.732 (1.632 – 13.721)
	≥Higher secondary		
Type of family	Joint	0.965	1.019 (0.436 – 2.381)
	Nuclear		
Socio-economic status	≥Upper middle	0.756	0.871 (0.363 – 2.090)
	≤Lower middle		
Consume junk food	Yes	0.447	0.657 (0.222 – 1.942)
	No		
Regular Exercise	Yes	0.839	1.091 (0.471 – 2.529)
	No		

*Reference category is Normal BMI

Table 4: Sex-wise comparison of mean waist circumference and waist hip ratio among different BMI categories (n=291)

Gender	BMI Category	Waist Circumference (cm)		Waist – Hip Ratio	
		Mean ±SD	ANOVA	Mean ±SD	ANOVA
Male (n=123)	Thin to very thin (n=60)	77.85 ± 16.81	F(2,120)=9.72, p= 0.000	0.86 ± 0.15	F(2,120)=0.098, p= 0.907
	Normal (n=36)	66.0 ± 10.38		0.87 ± 0.05	
	Over weight to obese (n=27)	67.89 ± 10.74		0.85 ± 0.08	
Female (n=168)	Thin to very thin (n=45)	79.93 ± 10.15	F(2,165)=29.989, p=0.000	0.88 ± 0.05	F(2,165)=9.429, p=0.000
	Normal (n=99)	68.58 ± 10.51		0.84 ± 0.09	
	Over weight to obese (n=24)	62.13 ± 7.44		0.79 ± 0.08	

Figure 1: Distribution of study population according to socio-economic status (n=291)
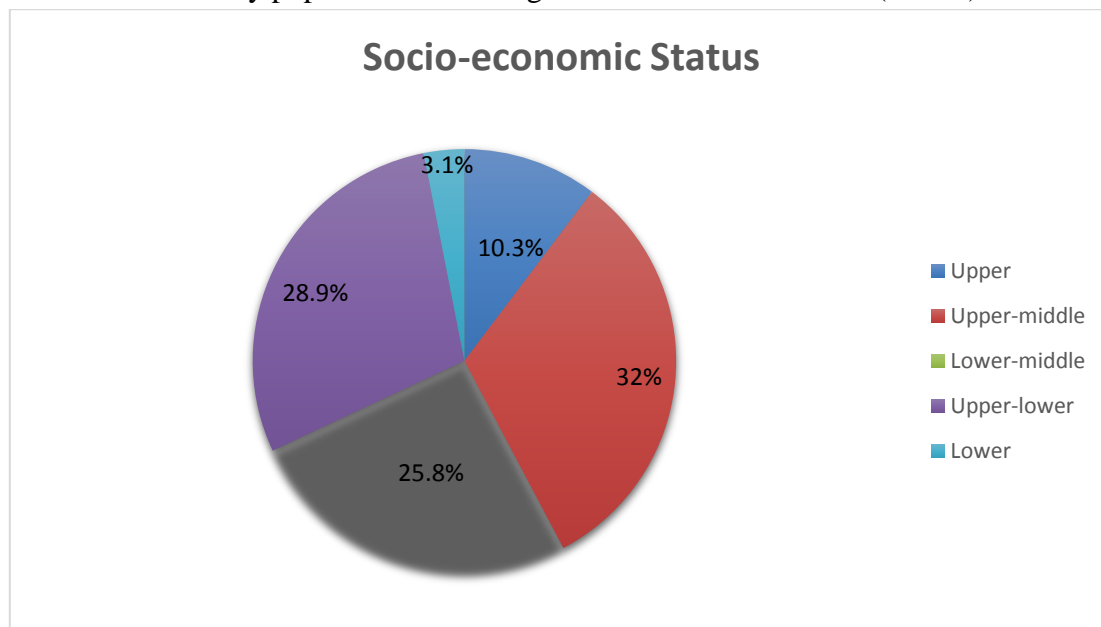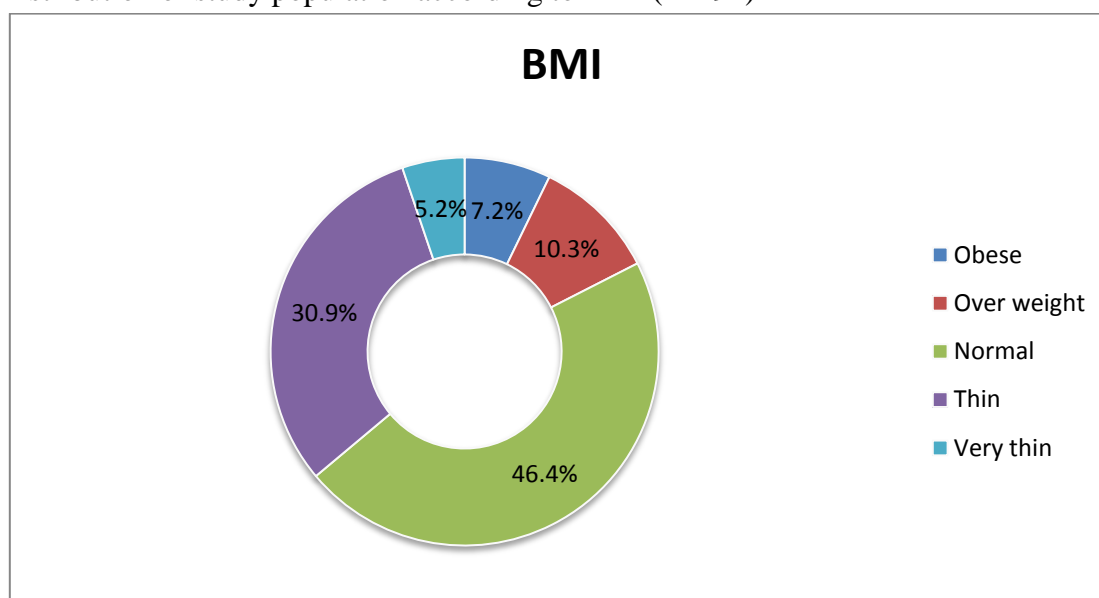
Figure 2: Distribution of study population according to BMI (n=291)

BMI

- Obese 7.2%
- Over weight 10.3%
- Normal 46.4%
- Thin 30.9%
- Very thin 5.2%

Conclusion

The study conducted in urban field practice area evaluated nutritional status of the adolescents in terms of both over-weight and thinness. Gender, parental education and socio-economic status are the contributing factors. Study with larger population and catering wider geographical area would have been more relevant. Strengthening adolescent health through adolescent health clinics will ameliorate their nutritional and other health related problems.

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