

Correlation of Nutrition with Parental Literacy Status among School Going Adolescent Children in Telangana: A Cross-sectional Study

PREETHI SUBRAMANIAN¹, SANDHYA DASARI², SRINATH DEVULAPALLI³, SUDHARSHAN RAJ CHITGUPIKER⁴

ABSTRACT

Introduction: National Family Health Survey-4 reports that 44.8% of boys and 41.9% of girls aged 15-19 are underweight. Globally, there is a lacuna of data on early adolescent children (10-14 years).

Aim: To estimate the prevalence of malnutrition among school going adolescent children in Medchal, Telangana and also to assess the correlation between nutritional status of adolescent children and their parents' literacy level and socio-economic class.

Materials and Methods: A cross-sectional study was carried out in 1000 adolescent children aged between 10-16 years. Pilot study was conducted on 110 students to test the questionnaire comprising basic data and socio-demographic characteristics before starting the study. Weight and height were measured. Body Mass Index (BMI) was calculated and based on BMI, children were classified into undernutrition, normal, overweight and obese. Parental literacy was ascertained. Parents were divided into five categories of socio-economic class according to BG Prasad Classification. Primary endpoint measured was prevalence of malnutrition among adolescent children and secondary endpoint measured was correlation of mother's and father's literacy status

with nutritional status which was ascertained using spearman's rank correlation test. Data was analysed using Statistical Package for the Social Sciences (SPSS) version 21.0.

Results: Prevalence of undernutrition and overnutrition (overweight and obesity) was 48.5% and 4.6% respectively. There was statistically significant ($p=0.046$) difference between boys and girls with respect to prevalence of undernutrition and overnutrition. Majority of undernourished boys (49.1%) and girls (46.8%) were 13-14 years old. Spearman's rank coefficient (ρ) showed strong positive correlation between nutrition and socio-economic class ($\rho:0.706$) with moderate and weak correlation seen for mothers' education ($\rho:0.425$) and fathers' educational status ($\rho:0.333$), respectively.

Conclusion: Undernutrition remains to be a common problem among early adolescents. Socio-economic class and literacy level of parents play significant role in nutrition of adolescents. At school level, adolescent children and their teachers need to be empowered to understand better about the necessity and impact of maintaining a normal nutritional status on their future health.

Keywords: Adolescent age group, Body mass index, Malnutrition, Socio-economic status

INTRODUCTION

Adolescence is a period of transition from childhood to adulthood. This period is divided into two phases early (10-14 years) and late (15-19 years) [1]. Each phase has its characteristic set of biologic, cognitive and psychosocial milestones that forms the basis for the future [2]. There is an increase in the nutrition requirements of an individual on entering this period due to increase in growth spurt and physical activity [3].

The emphasis on the provision of not only appropriate nutrition, but also on other forms of psychosocial support during this important period has been gaining more significance globally to assure a better platform for adult life. The first step towards this would be to gauge health and developmental needs of adolescents which can be better understood by collecting quality data [4].

There is sparse literature in adolescent nutrition in India and abroad. Globally, only 1.2% of the publications were pertaining to adolescents as against more than 95% for the under-five [4]. It is more so less in the age group of 10-14 years [5]. Even in the National Family Health Survey-5 in India, there is not much data collected for the age group of adolescents (10-19 years) [6]. Considering the above factors, the present study was planned in the adolescents of age group 10-16 years.

Although, multiple socio-demographic factors play an important role in achieving the required nutrition in an adolescent, family, especially

parents have an increased impact and influence on nutrition of their children [7]. Parents' literacy status and socio-economic class have been widely regarded to be important factors affecting nutrition of adolescents. Singh SP did a study in 384 children and found that literacy level of both the parents had a statistically significant association with the nutritional status of the children [8]. Choudhary S et al., conducted a study of 270 adolescent girls and found that there was a statistically significant difference in nutrition of adolescent girls with varying levels of father's education [9]. In this study, educational status of the mother had no significant association with the nutritional status of adolescent girls. Bhattacharya H and Barua A, conducted a study among 284 adolescent girls and found that the prevalence of both stunting (41.80%) and thinness (44.26%) was much higher among girls who came from families whose mothers were illiterate. Significant association was found between the prevalence of both stunting ($p=0.001$) and thinness ($p<0.001$) with the literacy status of the mother in that study [10]. However, few studies have found no association between parental literacy and adolescent nutrition [11,12].

Given these conflicting results on effect of parents' education status on nutritional status of adolescent children, the present study was designed to estimate the prevalence of malnutrition in school going adolescents in Telangana, India and to assess the correlation between nutritional status of adolescent children and their parents' literacy status and socio-economic class.

MATERIALS AND METHODS

A cross-sectional study was carried out in Medchal Mandal, Rangareddy District, Telangana, India. The study was done in school going adolescent children aged between 10-16 years during the period of June 2019- December 2019 after taking ethical committee clearance of Medciti Institute of Medical Sciences (Medciti Ethics Committee: 18/11/15; S.no. 15).

Sample size: Using a reported prevalence of 2.2% for obesity among rural adolescents [13], and an allowable error of 10%, we got a sample size of 826. Total 1000 adolescents were included in the study. This was expected to have sufficient power to detect underweight, overweight and obesity.

Inclusion criteria: All school going adolescents between 10-16 years in the selected schools present at the time of data collection who are willing to participate in the study.

Exclusion criteria: Students who had any chronic illness like congestive heart failure, childhood malignancies, tuberculosis, chronic renal failure, chronic inflammatory bowel diseases, Cushing syndrome, on medications like antidepressants and contraceptives were excluded from the study. Students of parents who failed to give consent or who failed to fill the proforma given to them as required were excluded.

Study Procedure

All the schools in Medchal Mandal were selected. Permission was obtained from Mandal Education Officer (MEO). Total strength of children from class V to X was taken from school authorities of all the schools. A systematic sampling technique was employed to achieve the sample size. The first student was selected by lottery method. After that, every third student was selected from the attendance register from V to X class, till the sample size was achieved.

A written informed consent and assent was obtained from all the principals and students who were willing to be part of the study respectively. Both the parents' consent was obtained with the help of a consent form and a proforma containing questions related to socio-economic status and their literacy level in local language, which were given to parents of the selected students via the school teachers. A self-administered questionnaire was developed based on World Health Organisation (WHO) STEPS questionnaire and the Global School Health Survey (GSHS) questionnaire for the students [14,15]. Prior to initiation of the study, 10% of sample size (110 students) was selected from a school in Medchal and questionnaire was administered. The questionnaire was explained to the school authorities and teachers. After the pretest, required corrections were made to the questionnaire and the study was commenced. At the start of the study, it was ensured that the parental consent was obtained and proforma given to parents were completed by them.

Detailed information was collected on socio-demographic characteristics and contributory factors responsible for nutritional status which was supplemented by physical examination which included weight, height and BMI. Weight was measured with weighing scale with an error of ± 100 gm. Height was measured with non stretchable tape with an error to the closest 0.1 cm. Adolescents were classified as having undernutrition, if BMI for age and sex was $< 3^{\text{rd}}$ centile, normal nutrition when it was between 3^{rd} - 85^{th} centile; overweight if BMI was $\geq 85^{\text{th}}$ centile and $< 95^{\text{th}}$ centile and obese if BMI is $\geq 95^{\text{th}}$ centile according to WHO classification [16]. Parents' socio-economic status was classified into five strata according to BG Prasad Classification [17].

STATISTICAL ANALYSIS

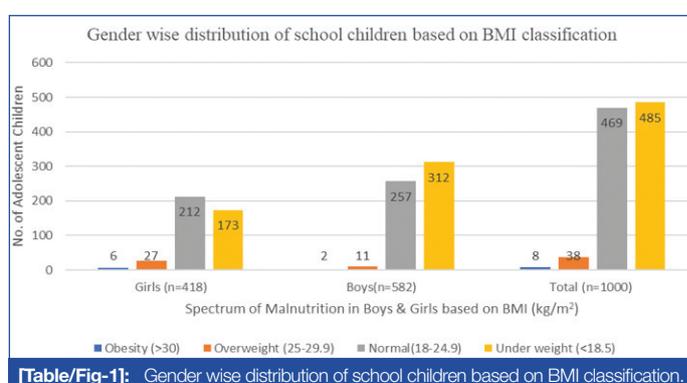
Data was analysed using SPSS version 21.0. Mean values and standard deviations were calculated for continuous variables which were expressed in percentages and frequencies. Chi-square test was used to analyse statistical significance for continuous variables.

Student t-test was used to compare the mean values. The p-value of < 0.05 was considered significant. Spearman Rank coefficient was used for correlation between ordinal variables.

RESULTS

A total of 1000 adolescent students were included in the study, out of which 582 (58.2%) were boys and 418 (41.8%) were girls. The mean age of boys was 14.58 ± 2.1 years and the mean age of girls was 13.54 ± 1.1 years. The mean height and weight of boys was 150 ± 2 cm and 49 ± 4.1 kg, respectively. The mean height and weight for girls was 145 ± 1.8 cm and 47 ± 4.4 kg, respectively. The mean height difference among boys and girls was ascertained by student t-test and was found to be statistically significant ($p=0.04$).

The overall prevalence of undernutrition and overnutrition (overweight and obesity) was 485 (48.5%) and 46 (4.6%), respectively. The prevalence of undernutrition among girls and boys was 173 (41.3%) and 312 (53.6%), respectively. The prevalence of overnutrition (overweight and obesity) among girls and boys was 33 (7.8%) and 13 (2.2%), respectively. The gender based difference between prevalence rates of undernutrition and overweight/obesity were ascertained by chi-square test and was found to be statistically significant ($p=0.046$) [Table/Fig-1].



[Table/Fig-1]: Gender wise distribution of school children based on BMI classification.

Among undernourished boys (312), 153 (49.1%) were of age 13 and 14 years; and among undernourished girls (173), 81 (46.8%) were of age 13 and 14 years [Table/Fig-2].

S. No.	Age in years	No. of undernourished boys	No. of undernourished girls
1.	10	28	10
2.	11	37	14
3.	12	62	35
4.	13	72	43
5.	14	81	38
6.	15	19	17
7.	16	13	16
	Total (n)	312	173

[Table/Fig-2]: Age and gender wise distribution of undernutrition among adolescents based on BMI.

Among the fathers, maximum belonged to high school rank (23.8%), while among mothers, most were educated up to intermediate (21.6%). Among the adolescents with undernutrition 165 (34%) mothers were illiterate and 105 (21.6%) fathers were illiterate while among the overweight/obese adolescents, 15 (32.6%) fathers were graduate and above while 16 (34.8%) mothers completed intermediate. A statistically significant difference was found between nutritional status of adolescent and education status of the parents ($p < 0.001$) [Table/Fig-3,4].

A weak positive correlation (Spearman's rho (ρ): 0.33) between father's education and adolescent's nutritional status was observed. This suggests that lower the educational status of the father, the adolescent children would be more undernourished compared to

Education of father (n=1000) (%)	Undernutrition n=485 (%)	Normal n=469 (%)	Overnutrition n=46 (%)	χ^2 test p-value
Graduate/PG (125) (12.5)	35 (7.2)	75 (16.0)	15 (32.6)	Father χ^2 139.538 p<0.001
Intermediate (186) (18.6)	72 (14.9)	102 (21.8)	12 (26.1)	
High school (238) (23.8)	78 (16.1)	152 (32.4)	8 (17.4)	
Primary school (172) (17.2)	96 (19.8)	69 (14.7)	7 (15.2)	
Read and write (142) (14.2)	99 (20.4)	39 (8.3)	4 (8.7)	
Illiterate (137) (13.7)	105 (21.6)	32 (6.8)	0 (0)	

[Table/Fig-3]: Nutritional status of adolescent children in relation to their fathers' education.

Education of mother (n=1000) (%)	Undernutrition n=485 (%)	Normal n=469 (%)	Overnutrition n=46 (%)	χ^2 test p-value
Graduate/PG (89) (8.9)	28 (5.8)	53 (11.3)	8 (17.3)	Mother χ^2 210.073 p<0.001
Intermediate (216) (21.6)	41 (8.5)	159 (34.0)	16 (34.8)	
High school (188) (18.8)	69 (14.2)	107 (22.8)	12 (26.1)	
Primary school (147) (14.7)	82 (16.9)	61 (13.0)	4 (8.7)	
Read and write (154) (15.4)	100 (20.6)	50 (10.6)	4 (8.7)	
Illiterate (206) (20.6)	165 (34.0)	39 (8.3)	2 (4.4)	

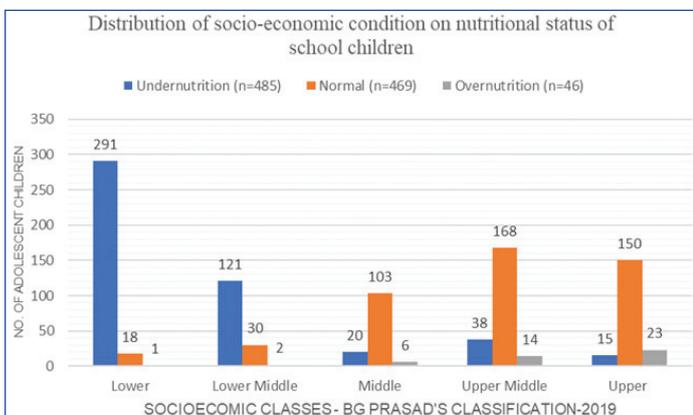
[Table/Fig-4]: Nutritional status of adolescent children in relation to their mothers' education.

those of fathers with higher educational status. Mothers' education was more positively correlated (Spearman's ρ : 0.425) with adolescent's nutritional status [Table/Fig-5].

S. No.	Variable (V)	V1_V2	
1.	Father's education (V1)	Spearman's rho	0.333
2.	Nutrition status (V2)	p-value	<0.001
V3_V4			
3.	Mother's education (V3)	Spearman's rho	0.425
4.	Nutrition status (V4)	p-value	<0.001

[Table/Fig-5]: Spearman's correlation between fathers' and mothers' education and nutrition of adolescents.

BG Prasad Classification was used to classify the parents' socio-economic status into 5 ranks as shown in [Table/Fig-6] [17]. Socio-economic status of parents and their adolescent's nutritional status were also found to have statistically significant correlation. Socio-economic status was more positively correlated (Spearman's ρ :0.706) [Table/Fig-7].



[Table/Fig-6]: Distribution of socio-economic condition on nutritional status of school children.

S. No	Variable (V)	V1_V2	
1.	Socio-economic status (V1)	Spearman's rho	0.706
2.	Nutrition (V2)	p-value	<0.001

[Table/Fig-7]: Spearman's correlation between socio-economic status and nutrition of adolescents.

DISCUSSION

In the present study, the overall prevalence of undernourished according to BMI for age was found to be 485 (48.5%). In undernutrition group, 312 (64.3%) boys had BMI <3rd centile compared to 173 (35.6%) girls which was statistically significant. Similar results were reported by Bhattacharya A et al., among 424 adolescents in the age group of 10-19 years with a prevalence of 53.31% of underweight adolescents and more boys (61.45%) were undernourished than girls (40.13%) in their study which was statistically significant similar to the present study [18].

The overall prevalence of overweight and obesity in this study was 4.6%. Girls were significantly more in number compared to boys in this group which was statistically significant. This was similar to the prevalence seen in studies by Bharati DR et al., (4.3%) and Vohra R et al., (4.91%) [19,20].

In this study, the highest prevalence of undernutrition was seen in age groups of 13 and 14 years in both boys and girls compared to other age groups. The reason behind increased prevalence of undernutrition in early adolescent period could be due to pubertal spurt with increased demands and inadequate nutritional supply and due to influence from peers. Similarly, decreasing prevalence of undernutrition with rising age in adolescents was noted in a study done by Bhattacharya A et al., [18].

The relation between father's literacy status and adolescent nutrition was statistically significant with a positive correlation. Similar observation was made by Singh SP in his study of adolescents in rural Andhra Pradesh [8]. Choudhary S et al., and Singh SK et al., also found a similar correlation between father's education and nutrition of adolescent girls [9,21]. However, a study done by Bhattacharya H and Barua A, did not find father's literacy status and adolescent nutrition to have significant relation [10].

Mothers' education and nutrition of adolescents had positive correlation and was statistically significant. This finding was similar to studies done by Bhattacharya H and Barua A, and Singh SK et al., [10,21]. Unlike present study, Ganga Nagamani N and Krishna veni A, reported no significant effect of mother's education on adolescents' nutritional status [11].

Literacy and socio-economic status have a close relation and are interdependent variables in a person's life. Research has also shown that illiteracy limits knowledge and practices, necessarily not only for self-care, but it also has a negative impact on household health, hygiene and nutrition [22].

So, correlation of socio-economic status of parents with adolescent nutrition was done which was statistically significant and had a strong positive correlation with nutritional status of adolescents. As the socio-economic status of the parents rise, there is less prevalence of undernutrition in the upper class. Similar influence of socio-economic status on nutrition of adolescents has been observed in other studies [9,23]. We would like to suggest that more community level programs may be required in the future to address the nutritional needs of 10-16 years adolescent children (both boys and girls).

Limitation(s)

A detailed dietary intake of the adolescent children was not included in the study.

CONCLUSION(S)

Undernutrition remains to be a common problem among early adolescents. Socio-economic class and literacy level of parents play significant role in nutrition of adolescents. Since, much time is spent at school, teachers and other faculty should also be involved to enlighten the children regarding their nutritional status and its importance on health.

REFERENCES

- [1] WHO. The global strategy for women's, children's, and adolescents' health (2016-30). 2015. Available from: <http://www.who.int/life-course/partners/global-strategy/ewec-globalstrategyreport-200915.pdf?ua=1>. [Accessed on 7 May 2021].
- [2] Cynthia M. Holland-Hall. Adolescent Physical and Social Development. In: Nelson Textbook of Pediatrics 21st ed, Kliegman et al (eds). Philadelphia Elsevier 2020; pp 1014-1020.
- [3] Jain K, Garg SK, Singh JV, Bhatnagar M, Chopra H, Bajpai SK. Reproductive health of adolescent girls in an urban population of Meerut, Uttar Pradesh. Indian J Public Health. 2004;48(4):155-56.
- [4] Bundy DAP, de Silva N, Horton S, Patton GC, Schultz L, Jamison DT; Disease Control Priorities-3 Child and Adolescent Health and Development Authors Group. Investment in child and adolescent health and development: Key messages from Disease Control Priorities, 3rd Edition. Lancet. 2018;391(10121):687-99. PMID:29153316.
- [5] Mokdad AH, Forouzanfar MH, Daoud F, Mokdad AA, El Bcheraoui C, Moradi-Lakeh M, et al. Global burden of diseases, injuries, and risk factors for young people's health during 1990-2013: A Systematic Analysis for the Global Burden of Disease Study 2013. Lancet. 2016;387:2383-401.
- [6] International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), India, 2019-20: Telangana. Mumbai: IIPS. Accessed from National Family Health Survey (NFHS-5) (rchiips.org).
- [7] Jenkins S, Horner SD. Barriers that influence eating behaviors in adolescents. J Pediatr Nurs. 2005;20(4):258-67. Doi: 10.1016/j.pedn.2005.02.014. PMID: 16030505.
- [8] Singh SP. Malnutrition among primary school children in Hyderabad, Andhra Pradesh, India. International Journal of Technical Research and Applications. 2014;2:36-39.
- [9] Choudhary S, Mishra C, Shukla K. Correlates of nutritional status of adolescent girls in the rural area of Varanasi. Internet J Nutr Wellness. 2008;7(2):01-10.
- [10] Bhattacharyya H, Barua A. Nutritional status and factors affecting nutrition among adolescent girls in urban slums of Dibrugarh, Assam. Natl J Community Med. 2013;4(1):35-39.
- [11] Ganga Nagamani N, Krishna veni A. A study on nutritional status among adolescent girls in urban slums of Visakhapatnam City, Andhra Pradesh State. IOSR Journal of Dental and Medical Sciences. 2015;14(6):24-26.
- [12] Mokhtari F, Kazemi A, Ehsanpour S. Effect of educational intervention program for parents on adolescents' nutritional behaviors in Isfahan in 2016. J Edu Health Promot. 2017;6:103.
- [13] Deshmukh PR, Gupta SS, Bharambe MS, Dongre AR, Maliye C, Kaur S, et al. Nutritional status of adolescents in rural Wardha. Ind J Pediatr. 2006;73:139-41.
- [14] The WHO STEP wise approach to chronic disease risk factor surveillance (STEPS) World Health Organization, Geneva. For further information: https://www.who.int/ncds/surveillance/steps/STEPS_Instrument_v2.1.pdf [Accessed 7 May 2021].
- [15] Centre for Disease Control and Prevention -Global School-based Student Health Survey. Available from: <https://www.cdc.gov/gshs/questionnaire/index.htm> [Accessed 7 May 2021].
- [16] World Health Organization. BMI- for- age (5-19 years). Available from: www.who.int/tools/growth-reference-data-for-5to19-years/indicators/bmi-for-age [Accessed 7 May 2021].
- [17] Pandey VK, Aggarwal P, Kakkar R. Modified BG Prasad Socio-economic Classification, Update- 2019. Indian J Comm Health. 2019;31(1):123-25.
- [18] Bhattacharya A, Basu M, Chatterjee S, Misra RN, Chowdhury G. Nutritional status and morbidity profile of school-going adolescents in a district of West Bengal. Muller J Med Sci Res. 2015;6:10-15.
- [19] Bharati DR, Deshmukh PR, Garg BS. Correlates of overweight & obesity among school going children of Wardha city, Central India. Indian J Med Res. 2008;127(6):539-43. PMID: 18765871.
- [20] Vohra R, Bhardwaj P, Srivastava JP, Srivastava S, Vohra A. Overweight and obesity among school-going children of Lucknow. J Fam Community Med. 2011;18(2):59-62.
- [21] Singh SK, Garg G, Davey S, Raghav SK, Muzammil K, Singh JV. Impact of educational status of parents on nutritional status of adolescent girls: A cross-sectional study. Natl J Community Med. 2014;5(3):266-69.
- [22] Thengal N. Social and economic consequences of illiteracy. International Journal of Behavioral Social and Movement Sciences. 2013;2(2):124-32.
- [23] Deka MK, Malhotra AK, Yadav R, Gupta S. Dietary pattern and nutritional deficiencies among urban adolescents. J Family Med Prim Care. 2015;4:364-68.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Paediatrics, Mediciti Institute of Medical Sciences, Hyderabad, Telangana, India.
2. Assistant Professor, Department of Paediatrics, Mediciti Institute of Medical Sciences, Hyderabad, Telangana, India.
3. Civil Assistant Surgeon, Department of Paediatrics, District Hospital Mahabubabad, Hyderabad, Telangana, India.
4. Professor and Head, Department of Paediatrics, Mediciti Institute of Medical Sciences, Hyderabad, Telangana, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sandhya Desari,
Flat No. 203, Sushant Sri Sai Estates B, Bhagyanagar Coop Housing Society, KPHB,
Hyderabad-500072, Telangana, India.
E-mail: sandhyadasari@gmail.com

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jun 03, 2021
- Manual Googling: Jul 01, 2021
- iThenticate Software: Jul 07, 2021 (13%)

ETYMOLOGY: Author Origin

Date of Submission: **May 20, 2021**Date of Peer Review: **Jun 12, 2021**Date of Acceptance: **Jul 03, 2021**Date of Publishing: **Aug 01, 2021**