Original article

A School Based Study on Over-nutrition And it's Determinants in an Urban Area of Kolkata

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Abstract

Background: The World Health Organization has declared overweight as one of the top ten health risks in the world. The magnitude of overweight and obesity ranges from 9% to 27.5% and 1% to 12.9%, respectively among Indian children. **Objective:** This study was done to estimate over-nutrition among school students and its' predictors. **Methodology:** A facility based cross-sectional study was conducted among 151 students of mid adolescent age studying in class VII - IX during July - September, 2017 in Kolkata. Informed consent was obtained from the school authority and parents. A structured questionnaire was used to collect data on various characteristics. Scoring for unhealthy food habit was done. Over-nutrition was determined by comparing BMI with WHO age-gender specific chart for children aged 5-19 years. Analysis was done using SPSS (v 16). **Results:** A total of 33.1% students falls in over-nutrition category. On bivariate logistic regression, factors significantly associated were maternal education [OR 2.36, 95% CI (1.1-5.1)], status of physical activity [2.95, 95% CI(1.6-5.9)], frequency of eating out [OR 3.42, 95% CI (2.3-5.1)], skipping breakfast[OR 1.4, 95% CI (1.2-1.6)], screen time [OR 5.4 95% CI (2.6-11.8)] and hours spent sitting idle [OR 1.37, 95% CI (1.2-1.6)]. On multivariable analysis, frequency of eating out [AOR 5.1, 95% CI (2.46-10.4)], skipping breakfast [AOR 1.75, 95% CI (1.28-2.4)] and screen time [AOR 0.14, 95% CI (0.04-0.5)] remained significantly associated. **Conclusion:** Over-nutrition is not very uncommon among school children pertaining to changing lifestyle. Health education and training should be given due importance at par with academics.

Key words: Over-nutrition, screen time, unhealthy food score

Introduction

Obesity has emerged as one of the global health problems with 200 million school-aged children world-wide have BMI above WHO defined normal cut-off, of which 40-50 million are obese [1]. Globally, this prevalence varies from over 30% in USA to less than 2% in sub-Saharan Africa [2]. The World Health Organization (WHO) has declared overweight as one of the top ten health risks in the world and one of the top five in developed nations [3,4]. It is a potential public health issue that is emerging in the developing countries[5,6] This is dreaded to be a major socioeconomic and public health burden that will

be faced by these countries in the near future[5,6]. It is increasingly being observed with the changing lifestyle of families with increased purchasing power, increasing hours of inactivity due to television, video games, and computers, which are replacing outdoor games and other social activities [7]. The prevalence is higher in the urban than in the rural areas. Various studies done in India indicate a rising trend in the prevalence of overweight and obesity in children and adolescents [8-16]. The magnitude of overweight ranges from 9% to 27.5% and obesity ranges from 1% to 12.9% among Indian children[17-18].This may have major implications

towards increasing prevalence of non-communicable disease (NCD) like diabetes, hypertension and cardiovascular disease in early adulthood [19,20]. The most important consequence of childhood obesity is its persistence into adulthood with all its health risks that include cardiovascular diseases, diabetes, osteoarthritis, gallbladder disease, and some sex hormone sensitive cancers. It is more likely to persist when its onset is in late childhood or adolescence. Almost half of overweight adults were overweight as children, and two-thirds of children in the highest BMI quartile transitioned into the highest BMI quartile as young adults [21].

Hence close monitoring of overweight prevalence in children and adolescents and taking timely preventive measures will be an effective approach in dealing with the problem of obesity. Thus, significance of estimating prevalence of childhood obesity and its associated factors need to be emphasized by the social scientists. With this background in mind, this study was planned and done.

Methodology

A school based cross-sectional study was done in the months of July - August 2017 in Kolkata. A private secondary school located in South 24 Parganas, Kolkata was selected conveniently by the researchers. School authority were made aware about the purpose and necessity of conducting such a study. They were briefed about the method of data collection and confidentiality of the information was ensured. Students of standard 7th, 8th and 9th of the school (corresponding to the mid-adolescence age group of 12-15 years) were selected for the study. A total of 177 students were enrolled in school in these three classes. Parents of these students were approached by the school authority to obtain their informed written consent. Out of them, parents of 151 students gave consent. A pre-designed, pre-tested, structured, questionnaire containing both open and close ended questions. Review of Literature was done to enumerate various factors determining the outcome variable. Face and content validity of the instrument was checked by the experts. The tool was prepared in the bengali (that is the local language of the area). A health day was observed on 12th of August 2017 in the school premises. On this particular day, all the 151 students were first given a questionnaire. Students were briefed by the researcher regarding the questions and all their queries were solved. After submission of the filled proforma, height and weight were measured using Standard Operating Procedures:

1. Height was measured in a standing position against a hard wall with occiput, shoulder blades, buttocks, and heel touching the wall without any footwear and head-wear with non-stretchable measuring tap with the precision of 0.1 cm.

2. Weight was measured with properly calibrated digital weighing scale with a precision of 0.1 kg with participants standing in straight position without any footwear.

At the end, scientific session on ways to maintain healthy lifestyle and balanced diet was conducted and the researcher tried her level best to solve their queries.

Dependent variable – over-nutrition

Table 1: Gender wise mean height, weight and BMI of the study population (n = 151)

	Mean (SD) Height (cm)	Mean (SD) Weight (kg)	Mean (SD) BMI (kg/m2)
Overall	156.6 (7.4)	53 (11.6)	21.3 (4.3)
Girls	153.4 (5.5)	52 (10.8)	22 (4.2)
Boys	159.2 (7.7)	53.8 (12.1)	21.2 (4.3)

Table 2: Gender wise percentage of overweight and obese students among study population (n = 151)

	Overweight (%)	Obesity (%)	Thin (%)
Overall	13.2	19.9	6.6
Girls	16.4	14.9	3.0
Boys	10.7	23.8	9.5

Table 3: Univariate multivariable logostic regression of factors associated with BMI more than cut-off among the study participants (n =151)

Variable	BMI more than normal [n(%)]	COR (95% CI)	AOR (95%CI)	Adjusted P-value
Standard				
VII	14(29.2)	1	1	
VIII	23(50)	**2.43(1.1-5.6)**	3.6(0.61-21.1)	0.16
IX	13(22.8)	0.72(0.3-1.7)	1.65(0.32-8.6)	0.55
Gender				
Male	29(34.5)	1.16(0.6-2.2)	-	-
Female	21(31.3)	1		
Religion				
Hindu	45(33.1)	1		
Muslim	5(33.3)	1.01(0.3-3.1)	-	-
Type of family				
Joint	25(37.3)	1		
Nuclear	25(29.8)	0.75(0.4-1.5)	-	-
Mother's education				
Below graduate	11(21.6)	1	1	
Graduate or above	39(39)	**2.36(1.1-5.1)**	0.31(0.07-1.5)	0.14
Sleep duration				
Appropriate	14(35)	1		
Inappropriate	36(32.4)	0.82(0.4-1.8)	-	-
Physical activity				
Yes	19(22.6)	1	1	
No	31(46.3)	**2.95(1.6-5.9)**	1.7(0.45-6.42)	0.43
Watching TV while eating				
Never				
Sometimes	10(45.5)	1		
Always	32(35.2)	0.7(0.27-1.8)	-	-
Hours spent sitting idle (?)	8(21.1)	0.4(0.13-1.3)	-	-
Days of skipping breakfast during last week(?)	--	**1.37(1.2-1.6)**	1.21(0.9-1.64)	0.24
Outside meals taken in last week (?)	--	**1.4(1.2-1.6)**	**1.75(1.28-2.4)**	**<0.0001**
Food frequency score (?)	--	**3.42(2.3-5.1)**	**5.1(2.46-10.4)**	**<0.0001**
Screen time (hours/day)				
Optimum	--	1.06(0.9-1.2)	--	--
More than optimum				
	18(19.1)	1	1	
	32(56.1)	**5.4(2.6-11.8)**	**0.14(0.04-0.5)**	**0.002**

Negelkerke R square - 0.741
Hosmer-Lemeshow goodness of fit - 0.259

According to WHO, over-nutrition is defined as abnormal or excessive fat accumulation that results in overweight and obesity and thus impairs health[28].

BMI was calculated for each each study participants.Using WHO gender and age specific percentile chart for children aged (5-19years), students were classified in 4 categories- a) Thin - Below 5th percentile b) Normal - 5th - 85th percentile c) Overweight - 85th - 95th percentile d) Obesity - Above 95th percentile

Independent variables

Socio-demographic, Lifestyle and behavioural characteristics, screen time and dietary pattern were taken. (History was taken with respect to last 7 days to minimize recall bias)

Operational definition

1. Sleep duration- Data was collected as hours of sleep during weekdays and weekend. Average hours of sleep per 24 hours was calculated using this data. As per WHO guideline, quantity of sleep required per day was taken to be 8-10 hours. More than 10 hours or less than 8 hours was considered inappropriate.

2. Physical activity- Students were asked about their self-perceived status of physical activity.

3. Hours spent sitting - Students were asked how many hours they spend on an usual holiday, sitting idle.

4. Screen time- Data regarding hours of watching television and using computers or laptops and mobile phones on both holiday and working day. Data was compiled and average duration of use per day calculated. A duration of >= 3 hours/day was considered as high screen time.

5. Food score - students were asked about frequency of consumption of 8 food items namely sweets, cakes, chocolates, cold drinks, Packaged chips, ice-cream, fast foods and junk foods during last week. A score of 1 was given to each food item with a frequency of 5 days a week or more than that. Those food items with frequency less than 5 days a week were given a score of 0. Total attainable score ranges from 0-8

Ethical issues

Confidentiality of data was ensured to the study participants. School authority was given detailed information regarding the purpose and procedure of the study. They were given a copy of the questionnaire and briefed about the questions. Then, permission was obtained from the school authority. Prior consent from parents of the students was obtained. Scientific session on ways to maintain healthy lifestyle and balanced diet was conducted and their queries were answered.

Data analysis

Data were analyzed using the SPSS (version 16). Descriptive statistics was performed. Association between the outcome variable and various independent factors was established. Binary logistic regression was done to quantify the association between over nutrition and social-demographic, lifestyle, screen time and nutritional variables.

Results

A total of 151 students were present on the day of survey. Class wise distribution of the students was 31.8% were in Std

VII, 30.5% in Std VIII and 37.7% in Std IX. Boys to girls ratio was 84:67. Age of the students ranges from 12-15 with a mean age of 13.7 (± 0.9) years. 90.1% of them were Hindu by religion and rest Muslims. Mothers' of 84.1% of the students were homemaker. 66.2% of them had completed education at least till graduation.

90.7% of the children were involved in some or other type of extra curricular activities. 55.6% of them reported to be physically active. During an usual holiday, mean duration of hours spent sitting idle was calculated to be 8.2 (± 2.2) hours. Only 26.5% of them gave a history of adequate sleep. Others were either sleeping for shorter or longer duration. 25.1% reported to have a habit of watching television while eating almost always while 14.6% never did so.

As per the data collected, information regarding screen time per day was calculated. A total of 37.7% were found to a have high screen time (>= 3 hours).

57.6% of the students reported to have a good practice of having home made breakfast everyday. When they were asked about the frequency of taking outside meal in the last week, 54.3% of them never took outside meal. The food score was found to range from 0-8 with a mean of 1.7 (± 1.9).

On doing bivariate logistic regression, factors significantly associated with BMI more than normal were class, maternal education, status of physical activity, frequency of eating out and skipping breakfast, screen time, hours spent sitting idle and frequency of consuming fast food . In the final model (multivariable), screen time, frequency of taking outside meals and skipping breakfast in a week remained significant after adjusting for other variables. Variables included in the final model explains 74.1% change in the BMI.

Discussion

In this study, a total of 33.1% of the school children of mid-adolescent age were found to have higher than BMI. Many studies with students of similar age group had been in various parts of the country. A similar study was done in Lucknow [22] in the year 2011. They found prevalence of over-nutrition to be 4.91% and this lower than the current study. But the important correlates explained in their study were physical activity, frequency of consumption of fast-foods, class, education and occupation of father. In this current study also, class, physical activity and frequency of fast food consumption were found to significantly related. The difference in prevalence can be explained by different dietary patterns and genetic influence. As a done in Kolkata in the year 2012 [23] concluded that overweight (28.5%) and obesity (4.2%) is prevelant among bengalee school children of wealthier families. In Chennai, Jagadesan et al [24] found a

similar prevalence of 21.4% in the year 2014. In Mehsana, Gujarat [25] in the year 2013 a study found nearly 33.88% students to be overweight and 10.67% students were found to be obese. They also showed average fast food intakes and screen time was higher in obese as compared to their normal peers. A recent study in Pondicheery [26] showed that the prevalence of overweight and obesity in their study population to be 9.7% and 4.3%, respectively. This is much lower as compared to the current study, but there was no difference in prevalence between males and females and the prevalence as the class advances. This statement is in accordance with our study. If we again focus on the scenario in Kolkata, a population based cross-sectional study in the urban schools of Kolkata [27] with 979 participants showed a prevalence of childhood obesity to be 2.25 per 100 children. On the whole, prevalence of overweight and obesity was 20.74%.

Conclusion

A significant proportion of school students were found to fall in the category of overweight and obesity. Modifiable lifestyle characteristics such as screen time and dietary habits were found to be significantly associated with over-nutrition. Overweight and obesity are burning issues of public health importance that can be never be over-emphasized. They does not only impair the health of an individual in all the possible dimensions but it also may affect the productivity of the concerned child and thus community and nation as a whole. An unhealthy childhood will impair the holistic development of the child, community and thus the country.

Health education and training should be given due importance as a part of the course curriculum of the younger children. Physical activity is as essential a part of the life as the studies and academic performances are. This thought need be inculcated not only in the younger minds but also in the minds of their parents.

Conflict of interest: None declared.

Source of Support: Nil

Limitations:

As no sampling could be done, so results of this regression model done with the study data would hold importance among students of similar background studying and residing in similar set-up.

Recall bias may alter some of the responses.

References

1. International Association for the Study of Obesity. Obesity the global epidemic. Available from: http://www.iaso.org/(Assessed on 28-05-18)

2. Lostein T et al.Obesity in children and young people, a crisis in public health, Obesity review 2004; 5: 485

3. Kaur S, Sachdev HP, Dwivedi SN, Lakshmy R, Kapil U. Prevalence of overweight and obesity amongst school children in Delhi, India. Asia Pac J Clin Nutr 2008;17:592-6.

4. WHO (World Health Organization). The World Health Report: Reducing Risks, Promoting Healthy Life. Geneva: World Health Organization; 2002.

5. Shetty P S. Obesity in children in developing societies: Indicator of economic progress or a prelude to a health disaster? Indian Pediatr 1999;36:5-11

6. Kaur S, Sachdeva HP, Dwivedi SN, Lakshmy R, Kapil U. Prevalence of overweight and obesity amongst scholl children in Delhi, India. Asia Pac J Clin Nutr 2008; 17: 6-592

7. Singh M, Sharma M. Risk factor for obesity in children. Indian Paediatr. 2005;42:183–5.

8. Chatterjee P. India sees parallel rise in malnutrition and obesity. Lancet. 2002; 360:1948.

9. Ramachandran A, Snehalatha C, Vinitha R, Thayyil M, Kumar CK, Sheeba L, *et al*. Prevalence of overweight in urban Indian adolescent school children. Diabetes Res Clin Pract. 2002;57:185-90.

10. Mohan B, Kumar N, Aslam N, Rangbulla A, Kumbkarni S, Sood NK, *et al*. Prevalence of sustained hypertension and obesity in urban and rural school going children in Ludhiana. Indian Heart J. 2004;56:310-4.

11. Khadilkar VV, Khadilkar AV. Prevalence of obesity in affluent school boys in Pune. Indian Pediatr. 2004;41:857-8.

12. Marwaha RK, Tandon N, Singh Y, Aggarwal R, Grewal K, Mani K. A study of growth parameters and prevalence of overweight and obesity in school children from Delhi. Indian Pediatr. 2006;43:943-52.

13. Sharma A, Sharma K, Mathur KP. Growth pattern and prevalence of obesity in affluent schoolchildren of Delhi. Public Health Nutr. 2007;10:485-91.

14. Kotian MS, S GK, Kotian SS. Prevalence and determinants of overweight and obesity among adolescent school children of South Karnataka, India. Indian J Community Med. 2010;35:176-8.

15. Khadilkar VV, Khadilkar AV, Cole TJ, Chiplonkar SA, Pandit D. Overweight and obesity prevalence and body mass index trends in Indian children. Int J Pediatr Obes. 2011;6:216-24.

16. Chakraborty P, Dey S, Pal R, Kar S, Zaman FA, Pal S. Obesity in Kolkata children: Magnitude in relationship to hypertension. J Natural Sci Bio Med. 2012;2:101-6.

17. Ramachandran A, Snehlatha C, Vinitha R, Thayyil M, Kumar CK, Sheeba L. Prevalence of overweight in urban Indian adolescent school children. Diabetes Res Clin Pract 2002;57:90-185

18. Sharma A, Sharma K, Mathur KP. Growth pattern and prevalence of obesity in affluent school children of Delhi. Public Health Nutr 2007; 10: 91-485

19. Shah B, Anand K, Joshi P, Mahanta J, Mohan V, Thankappan K, *et al*. Report of the Surveillance of Risk Factors of Non-communicable Diseases (STEPS 1 and 2) From Five Centers in India – WHO India – ICMR initiative. New Delhi*.*

20. Obesity: Preventing and managing the global epidemic.Technical Report Series No. 894. Geneva: WHO; 2000. World Health Organization.

21. Deshmukh-Taskar P, Nicklas TA, Morales M, Yang SJ, Zakeri I, Berenson GS. Tracking of overweight status from childhood to young adulthood: the Bogalusa Heart Study. Eur J Clin Nutr 2006;60:48–57

22. Rajaat Vohra, Bhardwaj P, Srivastva JP, Vohra A, Overweight and obesity among school-going children of Lucknow city, J of Family and Community Medicine,2011 May-Aug; 18(2): 59–62.doi: 10.4103/2230-8229.83369

23. Arpita Mandal, Gopal Chandra Mandal, Prevalence of overweight and obesity among the urban adolescent english Medium School Girls of Kolkata, India; Italian J of Public Health; 2012, vol 9no 3

24. Jagadesan S, Harish K, Miranda P, Unnikrishnan R, Anjana RM, Mohan V, Prevalence of overweight and obesity among school children and adolescents in Chennai; J of Indain pediatric 2014 Jul;51(7):544-9.

25. Jigna sameer Shah, poonam K Patel, Bhoomika Patel, Determinants of overweight and obesity among school children in Mehsana District, India; Annals of Tropical Medicine and Public Health2013; Volume 6 : 408-412

26. R Vishnu Prasad, joy Bazroy, Zile Singh; Prevalence of overweight and obesity among adolescent students in Pondicherry, South India; International J of Nutrition, pharmacology and Neurological Diseases, 2016; Volume 6 : 72-75

27. Partha Chakarborty, Subrata Dey, Ranabir Pal, Sumit Kar, Forhad Aktar Zaman, Shrayan Pal, Obesity in Kolkata children: Magnitude in relationship to hypertension; J of Natural Sciences, Biology and Medicine; 2011 Jan-Jun; 2(1): 101–106. doi: 10.4103/0976-9668.82310

28. WHO(World Health Organization). Obesity. Assessed on 28-05-18. Available from: http://www.who.int/topics/obesity/en/

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