Prevalence and contributing factors for adolescent obesity in present era: Cross-sectional Study

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ABSTRACT

Background: Adolescent obesity is a very common issue in our culture. Recent studies have shown that this is a form of global burden that may predispose factors in advanced life for many other diseases. Adolescents are a positive force for a country, responsible for their future prosperity and also for their nations. **Objectives:** The main objective of the study was to identify the prevalence of obesity among adolescents and its diverse contributing factors. **Methods:** The analysis was a cross-sectional sample method and was carried out using a sampling methodology which was not possible. Through using standardized questionnaires and using validated and calibrated heighometers and weighting devices, data was obtained from 385 participants. Body mass index (BMI) scale of the World Health Organization (WHO) has been used to create a category for obesity. BMI values greater than + 1 SD fall in the range of overweight, and levels of obese greater than + 2 SD. **Results:** It was found that 6.8% of adolescents were obese and that about 17.1% were overweight. Remaining 53.8% percent had normal category of BMI and 22.3 percent were category of underweight. A significant association of gender, socioeconomic status, dietary habits, chocolate eating habits, mode of transportation to school, sports participants, physical activity, and screen time. Adolescents who were athletic enthusiasts and those who did physical activity had a good BMI. The teens who watched more than 2 h of screen time were more obese, and these were only a few reasons that were responsible for teenage obesity. **Conclusion:** Health care practitioners and policy makers need to be aware of the prevalence and contributing factor to teenage obesity. Adolescents will embrace practices such as healthy eating habits, avoiding smoking and physical inactivity. This obesity may increase their risk of developing chronic illnesses in adulthood and later life stage.

Keywords: Adolescent, adolescent obesity, contributing factors for obesity, factors for adolescent overweight or obesity, obesity, overweight

Introduction

Adolescence is treated as a transition period from childhood to adulthood.[1,2] During this transitional phase, adolescents develop behavioral patterns and make lifestyles that can also affect their present health and future.[3] Obesity is a disease of an unhealthy or unnecessary accumulation of fat in adipose tissue to such a degree as to affect an individual's health.[4] About 1.2 billion adults

worldwide, one of every five people in the world is teenage and about 18% of the world's population are teenagers. Around 90% of the world's population lives in developing countries and only around 20% of adolescents belong to India.[5]

BMI is a standardized measure of a person 's weight (kg) measured by his/her height (m). World Health Organization (WHO) guidelines for youth, if BMI values greater than + 1 SD are categories of overweight and more than + 2 SD are categories of obesity for specific age and gender which have also been used in this report.[4]

India will become a global hub for diabetes by 2050,[6] so India's Ministry of Health and Family Welfare raising the BMI

How to cite this article: Seema S, Rohilla KK, Kalyani VC, Babbar P. Prevalence and contributing factors for adolescent obesity in present era: Cross-sectional Study. J Family Med Prim Care 2021;10:1890-4.

cut-off to tackle obesity.[7] In India, about 18.3% of age group female adolescents aged 2–17 years is either in the category of overweight or obese.[8] According to the 2015–16 National Family Health Survey (NFHS-4), the prevalence of obesity among women was 20.6%, and for men it was 18.9% of the 15–49 year age group, which is slightly higher than the NFHS-3 study (2005–06).[9]

Adolescent overweight and obese people at younger stages of their lives may develop various non-communicable diseases, such as diabetes and cardiovascular diseases.[10,11] Morbidity from cardiovascular disease, diabetes, cancers, and arthritis because of obesity was 50–100% higher among obese individuals suffering from childhood or teenage obesity.[12,13]

Owing to lifestyle changes, such as balanced organic foods to processed foods,[14,15] more cell phone and television use, a more sedentary lifestyle, and a decrease in physical activity may be risk factors for teenage obesity.[16,17]

Based on review of literature of all the articles, a research gap was identified that research studies has not been conducted on prevalence and its various contributing factors for adolescent obesity because of lifestyles in Haryana, India. The study was conducted to assess prevalence of adolescent obesity and to identify various contributing factors for adolescent obesity.

Materials and Methods

Study subject and selection

The study was an observational study using cross-sectional design. Target sample for this study were adolescents of district Rohtak, Haryana. Study period was for 2 years from May 2016 to May 2018. The total 385 adolescent of district Rohtak, Haryana were taken in this study. The sampling technique used for the study were cluster sampling technique. The sample size for adolescent participants has been calculated by using a 5% margin of error, a 95% confidence level, a 239 million population, and a 50% response distribution. Total 385 sample size were calculated for this study.

Data collection

A total of five schools in district Rohtak were randomly selected by lottery methods out of total 15 schools. Data from 77 × 5 cluster samples were collected. Data were obtained from the first 77 students who met the inclusion requirements, or until we collected data from total 77 students from each school. Data collection methods included data sheet sociodemographic variables that were reviewed by Community and Family medicine department experts. WHO BMI criteria[1] for adolescents was used for doing four categorization. The validated and calibrated heightometers and weighing machines used for this study. Before starting data collection, the calibration of both instruments was performed on each day. Inclusion criteria for the study were participants of age greater than or equivalent to 12 years; ability

to take part in the analysis and to present during data collection. Exclusion criteria for this study were students who have any physical deformities were excluded from this study. Data were collected from 6th, 7th, 8th, 9th, and 10th grade students. Students were told about the technique of studying and collecting data.

Ethics statement

The study had been approved ethically by the Institute Ethical Committee (ECR/736/Inst/UK/2015) on dated 15.05.2014. Written authorization for data collection was received from the Principals of all five colleges. Throughout this study, informed consent was also obtained from each participant and their parents.

Data analysis

The statistical analysis was carried out using version 23.0 of the SPSS. In the research, sociodemographic variables and obesity prevalence were used to assess the descriptive statistics, that is, frequency and percentage value. Chi-square test and Odd's ratio were calculated to classify the association of sociodemographic variables with various BMI categories.

Results

Majority of participants (47.5%) were 14 years old and their mean age was 13.9 years. The ratios for males and females were 5:4. The majority (64.7%) belonged to the social class group of Class II, and belonged to the nuclear family (71.7%). The majority of participants were vegetarian (82.3%) and 60% did not regularly consume fast food but the majority (59.2%) chose to take food in front of the TV and the majority (57.9%) also did not regularly eat chocolate. Most (69.6%) used public/private mode of transport to school. Ratios for participation in sport events were 1:1. Yet a majority (64.9%) also performed physical activity. Most of them watched (52.2%) TV for more than 2 h [Table 1].

Mean adolescent height was 2.02 m, and average weight was 51.5 kg [Table 2].

BMI categories according to the WHO scale, obesity prevalence was 6.8% and overweight category was about 17.1%. Remaining 53.8% had regular category of BMI and 22.3% were category of underweight. Overall prevalence of obesity among teenagers was 23.9% [Table 3].

Among BMI with sociodemographic variables, Chi-square value showed significant association of gender, socioeconomic status, dietary habits, chocolate eating habits, mode of transportation to school, sports participants, physical activity, and screen time [Table 4].

Odd's Ratio showed adolescent of 16 years of age has 3.2 times more chances, male gender has 0.41 times more chances, belongs to class III socioeconomic status has 4.56 times more chances and having nuclear family has 1.17 times more chance for abnormal BMI, that is, overweight and obesity. Odd's Ratio

Table 1: Adolescent socio-demographic variables (*n*=385)			
Variables	**Options**	**f**	**%age**
Age	12 years	7	1.8
	13 years	101	26.2
	14 years	183	47.5
	15 years	86	22.3
	16 years	8	2.1
Gender	Male	210	55
	Female	175	44
Socioeconomic status	Class I	52	13.5
	Class II	249	64.7
	Class III	76	19.7
	Class IV	8	2.1
Type of family	Nuclear	276	71.7
	Joint	109	28.3
Dietary habits	Vegetarian	317	82.3
	Non-vegetarian	68	17.7
Regular Junk food intake	Yes	154	40
	No	231	60
Take food in front of TV	Yes	228	59.2
	No	157	40.8
Chocolate Eating Habit	Yes	162	42.1
	No	223	57.9
Mode of transportation to school	Public/Private Transport	268	69.6
	Walking/Bicycle	117	30.4
Participating in sports	Yes	190	50
	No	195	50
Physical exercise	Regularly	111	28.8
	Sometimes	250	64.9
	Never	24	6.2
Screen Time	<2 h	184	47.8
	>2 h	201	52.2
	Total	385	100

Table 2: Adolescent physical parameters (N=385)		
Variables	**Mean**	**SD**
Height	2.02	8.22
Weight	51.5	11.65

SD-Standard deviation

Table 3: Adolescent's BMI distribution according to WHO scale (*n*=385)			
Variable	**Options**	**f**	**% age**
Body Mass Index (BMI)	Overweight	66	17.1
	Obese	26	6.8
	Normal	207	53.8
	Underweight	86	22.3

f-Frequency

also showed adolescent who were non-vegetarian has 0.77 times more chances, regularly taking junk food has 0.52 times more chances, eating food in front of TV has 0.67 times more chances and who were using chocolate regularly has 0.74 times more chances for having abnormal BMI. Adolescent who are using public/private mode of transportation to school has 0.48 times more chances, who were not participating in sports has 0.35 times more chance, who were doing sometime physical exercise has 0.25 times more chance and who were watching TV more than 2 h has 0.84 times more chances for having overweight/obese [Table 4].

Discussion

Adolescent mean height was 2.02 m and the average weight was 51.5 kg. The prevalence of obesity was 6.8%, and the overweight category was about 17.1%. So the total prevalence of overweight and obesity were 23.9%. A research showed total prevalence of total 19.3% of childhood overweight and obesity in India.[18] Another study from Nigeria shows prevalence of obesity and overweight among adolescent group were 1.4% and 6.6%.[19] Remaining 53.8% had the standard category of BMI and 22.3% had the category of underweight. Further research also conducted in urban Indian school children reported overweight prevalence was 18.5% and obesity was 5.3%.[20] Further research showed that the prevalence of overweight and obesity among children aged 5–15 years was 14% and 14%, respectively.[21] So prevalence of obesity showed similar results across numerous studies across our country.

Significant association was found with male gender which indicated that incidence for obesity and overweight are more among male gender in adolescent age group. A systematic review also showed that prevalence of overweight among boys are more than girl.[22] Class III socioeconomic status (lower middle class) adolescent showed significant association indicating that more chance for having overweight or obese in Class III socioeconomic status. A study also showed similar association of low socioeconomic status with adolescent obesity because of less intake of fruits and vegetables.[23] Further Research also shows that on rising the burden of obesity among the Asian population found overweight prevalence and obesity was only 22% higher among the high socioeconomic class community.[24,25] Significant association was found with non-vegetarian dietary habits and adolescent obesity, adolescent who were using chocolate showed a significant association with overweight/obesity which are new association we found in this study.

Adolescent who were using public/private mode of transportation to the school showed a significant association with overweight/obesity. Less physical activity are causing higher BMI in adolescent age group. The teens who watched more than 2 h of screen time were more obese and there were only a few reasons that were responsible for teenage obesity. Studies have also shown that viewing television more often encourages obesity in teenagers.[16]

Conclusion

Adolescent obesity is a global health issue that is distributed unevenly between and within regions is likely to have a dynamic causative network. The ongoing pandemic of obesity, particularly, that is, of childhood obesity has been emerged as a huge challenge for epidemiologists, program

Variables	Options	BMI Category		Chi square value	OR [95% CI]
		Abnormal	Normal		
Age	12 years	2	5	0.514 [0.673]	1
	13 years	24	77		1.28 [0.23-7.04]
	14 years	44	139		1.26 [0.24-6.74]
	15 years	21	64		1.22 [0.22-6.76]
	16 years	1	8		3.2 [0.23-45.19]
Gender	Male	65	145	5.609 [0.001*]	0.41 [0.25-0.67]
	Female	27	148		1
Socioeconomic status	Class I	14	38	5.421 [0.001*]	0.34 [0.04-2.96]
	Class II	75	174		0.29 [0.04-2.36]
	Class III	2	73		4.56 [0.37-56.08]
	Class IV	1	8		1
Type of family	Nuclear	61	215	0.867 [0.458]	1.17 [0.69-1.99]
	Joint	26	78		1
Dietary habits	Vegetarian	73	244	4.464 [0.004*]	1
	Non-vegetarian	19	49		0.77 [0.43-1.39]
Regular Junk food intake	Yes	48	106	4.144 [0.007]	0.52 [0.32-0.83]
	No	44	187		1
Take food in front of TV	Yes	61	167	1.414 [0.238]	0.67 [0.41-1.1]
	No	31	126		1
Chocolate Eating Habit	Yes	44	118	2.754 [0.042*]	0.74 [0.46-1.18]
	No	48	175		1
Mode of transportation to school	Public/Private Transport	74	194	4.389 [0.005*]	0.48 [0.27-0.84]
	Walking/Bicycle	18	99		1
Participating in sports	Yes	28	162	6.126 [0.000*]	1
	No	64	131		0.35 [0.21-0.58]
Physical exercise	Regularly	10	101	15.785 [0.000*]	1
	Sometimes	70	180		0.25 [0.13-0.52]
	Never	12	12		0.1 [0.04-0.28]
Screen Time	<2 h	41	143	7.689 [0.000*]	1
	>2 h	51	150		0.84 [0.53-1.35]

OR- Odd's ratio, CI- Confidence interval, *Significant at 0.05 level

managers, and policy makers around the world. The economic implications of childhood overweight and obesity will be huge. So by combining with the closely related burden of non-communicable diseases this threatens to offset by global countries as well as India. To deconstruct the dynamic interplay between multiple factors that cause childhood obesity and to draw a suitably informed picture of its biomedical and socio-environmental determinants, we found a stronger evidence base from Indian research as well.

Health care professionals and policy-makers need to be mindful of new adolescent issues that are developing. Understanding these are the few variables that help researchers determine which lifestyle change they need. At Primary health care (PHC), primary health physicians are first physicians who confront to adolescent obesity. So as primary health physicians we can educate our community people to plan and adopt healthier lifestyle and activities in schools or at home for adolescent group. Then our adolescent group or next generations will remain away from these problems, that is, fight with obesity like engaging in more and more outdoor activity, increasing daytime physical activity, shifting eating habits, decreasing watching TV time and preventing a sedentary lifestyle.

Acknowledgments

Declaration of patient consent

The authors certify that they have obtained all appropriate participant consent forms. In the form the participants(s) has given their consent for their images and other clinical information to be reported in the journal. The participants understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed

Financial support and sponsorship

Conflicts of interest

There are no conflicts of interest.

Recommendations

Policymakers should prepare for improved administration-level preparation of their academic programs and more incentives in schools and colleges outside of them.

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