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Pediatrics

TO STUDY OBESITY AND MODIFIABLE FACTORS ASSOCIATED IN SCHOOL GOING CHILDREN IN RAIPUR CITY.

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ABSTRACT Transforming INDIA and drift of society towards Non communicable diseases is bringing huge attention of research workers toward expanding obesity and modifiable factors behind the screen. Scanty playground area in school to lack of physical activity to switchin towards over-sedentary lifestyle and fastness in food has grown the roots of obesity way far in depth. Continuation of overweight and obesity in adulthood and increases the burden of cardiovascular disease is another dreaded point of interest.AIM and **OBJECTIVES:** is to study the modifiable risk factors associated with obesity among school children aged 6-18 years in Raipur City of Chhattisgarh and the prevalence of overweight and obesity.

MATERIAL AND METHODS: A cross sectional study conducted in urban schools of Raipur from March 2015 to April-2016. Equal number of government (15) and non-government schools (15) were selected by cluster sampling method and all children of 6 to 18 years age group were studied. SAMPLE SIZE was calculated using formula 4pq/l2 which was 1648. Materials like weighing machine, portable stadiometer, non stretchable measuring tape, and BMI percentile curves were used. The prevalence of obesity was calculated and associations between modifiable factors was established using Spearman's chi square test. ($p<0.05$). Data was analyzed using SSPS(version 16.0).

RESULTS: factors that are significantly associated with obesity are small duration of physical exercise, scanty playground area, studying in non government school, Increased intake of high energy empty nutrition food, travelling school in vehicles, female gender and Prevalence of obesity is 13.46% and Prevalence of overweight is 10.54%.

CONCLUSION: Scheduled physical routine and religious dietary habbit should be taught in community best as possible. Schools should have large playground area enough to provide safe outdoor playactivity for children.

KEYWORDS : overweight, obesity, BMI, physical activity, dietry habbit

Introduction

Situation of excess body fat leading to health impairment is defined as Obesity[1,2]. Age and Sex specific normograms for BMI have been developed for defining overweight and obesity [3]. A colossal epidemic, Obesity in itself contributes to 2.6 million deaths globally per annum [5]. Being an independent risk factor for Cardiovascular disease obesity is considered to increase the morbidity and reduce the life expectancy. Obesity pandemic has been described by some eminent researchers [1]. The exploding prevalence of obesity in developing countries is hugely related to reduction in the energy expenditure with same; rather increased calorie intake on other hand has resulted from rapid urbanization and mechanization. Increase in energy intake due to increased purchasing power and availability of high fat/energy-dense fast food [4]. Childhood obesity is basically linked with consuming junk food, social status, life style of family, time spent on television/ computers, lack of outdoor play and inadequate playground areas [5]. Obesity data based on school children in India shows the prevalence of 5.6 – 24% . The wide range of data could be due to regional differences and non-uniformity in the criteria used to classify socio economic status. Overweight and obesity is associated with increased risk of the metabolic syndrome, Type-II Diabetes Mellitus (T2DM), Hypertension, Dyslipidaemia, polycystic ovarian syndrome (PCOS) and coronary heart disease (CHD). In a surprising fact many of these metabolic derangements start in early childhood [6].

Aim of the study

1. Assessing, analyzing, evaluating and establishing association between modifiable factors (physical exercise, food habits, school play ground area, school travelling mode) and obesity in school children.

Objectives

1. To study the prevalence of obesity among 6-18 year old urban school children in Raipur City of Chhattisgarh.
2. To identify any variation as per age, gender, sex and type of school (government and non government).

Materials and Methods

Study design: Cross sectional observational study.

Study setting: This was a cross sectional study conducted in urban schools of Raipur City from March2015 to April-2016 after obtaining approval from ethical committee.

Inclusion criteria: All the children of age between 6 and 18 years present in selected schools.

Exclusion criteria: 1.Age <6yrs and >18yrs. 2. Those with Height or Weight error during data handling. 3. Children not willing to participate. 4. Physically challenged children. 5. Children on drugs like steroids. 6. Children having metabolic or endocrine disorder causing obesity.

Participants: Equal number of government (15) and non government schools (15) were selected by cluster sampling method and children were included from the age group of 6 to 18 years studying in these schools who fulfilled the inclusion criteria.

Variables: Weight, Height, BMI, Waist circumference, Hip circumference.

Data source: list of all schools in Raipur city was obtained from state education board of Chhattisgarh.

Sample size was calculated using formula which was 1648.

Materials: used in study were weighing machine i.e bathroom scale (digital with 0.5kg error), measuring tape (non stretchable), portable stadiometer and BMI percentile curves.

Statistical method: The association between modifiable factors and obesity was established using Spearman's chi square test. ($p<0.05$) and prevalence data of obesity and overweight being calculated. Data was analyzed using SSPS [Statistical package for the Social Sciences] (version 16.0). Atlanta Odds ratio (OR) and Confidence Interval (CI) calculator was used to calculate Odds ratio and 95% confidence interval. Children were categorized into three groups by using age- and sex-specific percentiles of BMI.

a) Obese (>95 th percentile),
b) Overweight (≥85th percentile) and

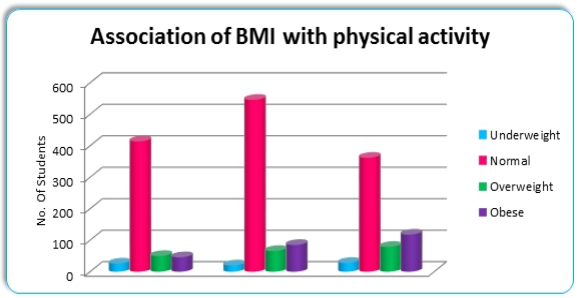
c) Normal (5th to <85th percentile)

Results

Table 1 : Association of BMI with physical activity.

BMI category	Physical activity			p Value
	>2.0	0.5-2.0	<0.5	
Underweight	26	20	28	<0.0001
Normal	414	546	362	
Overweight	50	66	79	
Obese	46	85	118	

Figure 1: Bar Graph representation.

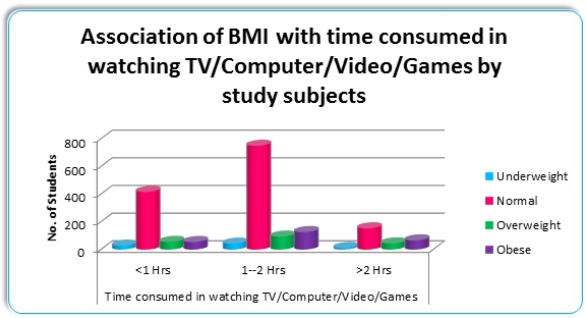


Frequency distribution of subjects with different BMI category was assessed in subjects with various ranges of physical activity, to assess the association between BMI and physical activity. The association was found to be statistically significant with subjects with high (>2,0 hour) physical activity being found to have highest frequency of subjects with lower BMI (underweight) (p<0.0001).

Table 2: Association of BMI with time consumed in watching TV/Computer/Video/Games by study subjects

BMI category	with time consumed in watching TV/Computer/Video/Games (hours)			p Value
	<1	1--2	>2	
Underweight	29	43	12	<0.0001
Normal	417	751	154	
Overweight	56	94	45	
Obese	55	127	67	
≥35.0				

Figure 2: Bar Graph representation.

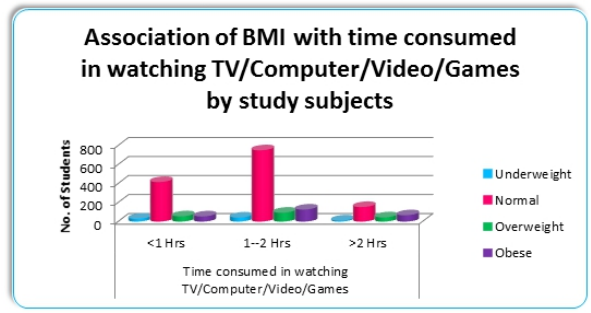


Association between time consumed in watching TV and BMI categories were assessed,which was found to be statistically significant(p<0.0001). Subjects with less time consumed watching TV have found to have lower BMI or less occurance of obesity.

Table 3: Association of liking towards chocolates in study subjects and BMI

BMI category	Liking towards chocolate					p Value
	Never	Occasional	Once a day	Twice a day	>Twice a day	
Underweight	2	42	34	5	1	<0.0001
Normal	33	510	609	162	8	
Overweight	4	50	93	41	8	
Obese	3	49	106	74	17	

Figure 3: Bar Graph Representation.

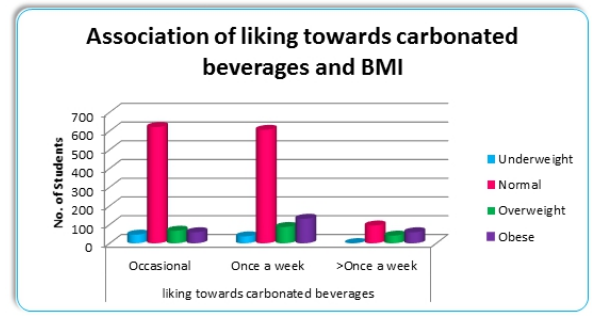


Association between chocolate eating and BMI categories were assessed, which was found to be statistically significant (p<0.0001). Subjects with less liking towards chocolate have found to have lower BMI or less occurrence of obesity.

Table 4: Association of liking towards carbonated beverages and BMI

BMI category	liking towards carbonated beverages			p Value
	Occasional	Once a week	>Once a week	
Underweight	46	37	1	<0.0001
Normal	621	606	95	
Overweight	67	87	41	
Obese	59	131	59	

Figure 4: Bar Graph Representation.

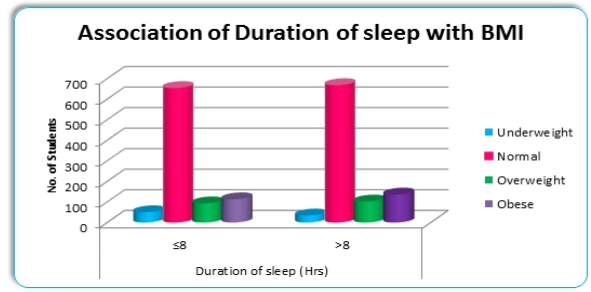


Association between drinking carbonated drinks and BMI categories were assessed, which was found to be statistically significant (p<0.0001). Subjects with less consumption of carbonated drinks have found to had lower BMI or less occurrence of obesity.

Table 5: Association of Duration of sleep with BMI

BMI category	Duration of sleep		p Value
	≤8	>8	
Underweight	50	34	0.15
Normal	654	668	
Overweight	93	102	
Obese	113	136	

Figure 5: Bar Graph Representation.

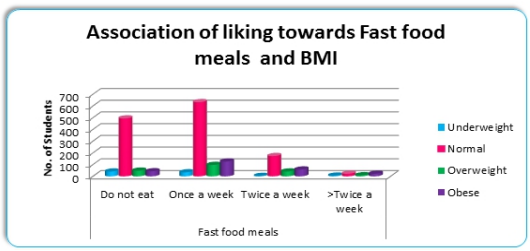


Association between duration of sleep and BMI categories were assessed, which was found to be statistically insignificant (p=015). Subjects with both categories of sleeping hours have similar distribution of BMI range.

Table 6: Association of liking towards Fast food meals and BMI

BMI category	Fast food meals				p Value
	Do not eat	Once a week	Twice a week	>Twice a week	
Underweight	41	34	3	6	<0.0001
Normal	494	633	173	22	
Overweight	48	97	41	9	
Obese	43	126	58	22	

Figure 6: Bar Graph Representation.

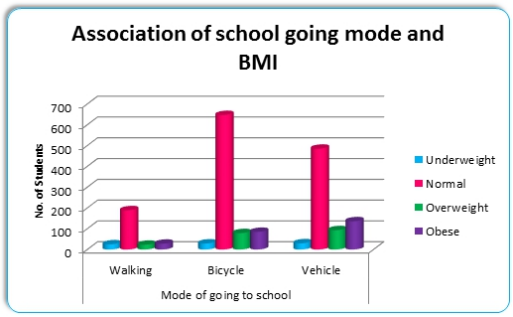


Association between eating fast food frequency and BMI categories were assessed, which was found to be statistically significant (p<0.0001). Subjects with more consumption of fast food have found to had higher BMI or higher occurrence of overweight and obesity.

Table 7: Association of school going Mode and BMI

BMI category	Mode of going to school			p Value
	Walking	Bicycle	Vehicle	
Underweight	25	29	30	<0.0001
Normal	189	647	485	
Overweight	23	79	93	
Obese	28	85	136	

Figure 7: Bar Graph Representation.

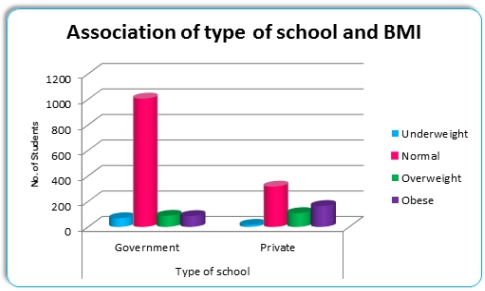


Association between school going mode and BMI categories were assessed, which was found to be statistically significant (p<0.0001). Subjects who used vehicle for going to school have found to have more frequency of higher BMI or more occurrence of obesity,and vise versa.

Table 8: Association of type of school and BMI

BMI category	Type of school		p Value
	Government	Private	
Underweight	68	16	<0.0001
Normal	1006	316	
Overweight	87	108	
Obese	85	164	

Figure 8: Bar Graph Representation.

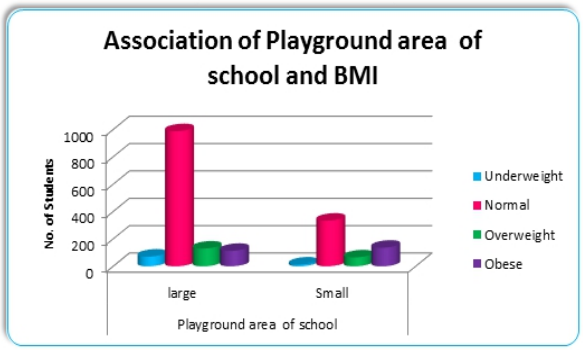


Association between type of school and BMI categories were assessed, which was found to be statistically significant (p<0.0001). Subjects studying in government schools found to have higher frequency of lower BMI or less occurrence of obesity when compared to age and sex matched students of private school.

Table 9: Association of Playground area of school and BMI

BMI category	Playground area of school		p Value
	large	Small	
Underweight	71	13	<0.0001
Normal	988	334	
Overweight	130	65	
Obese	113	136	

Figure 9: Bar Graph Representation.



Association between drinking carbonated drinks and BMI categories were assessed, which was found to be statistically significant (p<0.0001). Subjects with less consumption of carbonated drinks have found to had lower BMI or less occurrence of obesity.

Table-10

Age (Years)	Male	Percentage	Female	Percentage	Total
5—10	396	21.41	405	21.89	801
11—15	455	24.59	192	10.38	647
16—18	238	12.86	164	8.86	402
Total	1089	58.86	761	41.14	1850

Table 10 Showing male &, female distribution and total number of students included in the study, which are divided into three age bands i.e 5-10,11-15 and 16-18years. Maximum numbers of students were from 1st age band. Males are more in 2nd band and females are more in 1st band.

Table11: Distribution of students according to BMI categories

BMI category	No. of subjects	Percentage
Underweight	84	4.54
Normal	1322	71.46
Overweight	195	10.54
Obese	249	13.46
Total	1850	100

Table 11 shows BMI categories of complete sample size. Out of 1850 students 249(13.46%) were found to be obese and 195(10.54%) were overweight.

Table 12: Comparison of BMI in different gender.

BMI category	Male	Female	p Value
Underweight	38	46	<0.0001
Normal	827	495	
Overweight	121	74	
Obese	103	146	

Figure12: Bar Graph Showing Comparison of BMI in different gender.

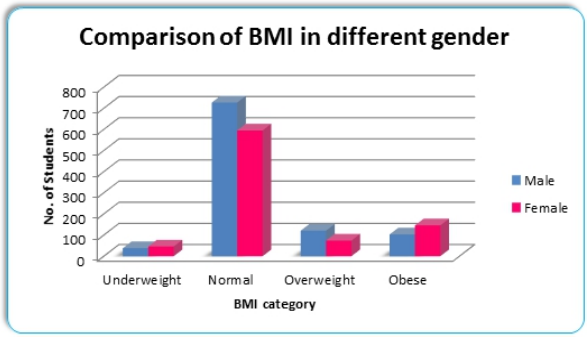
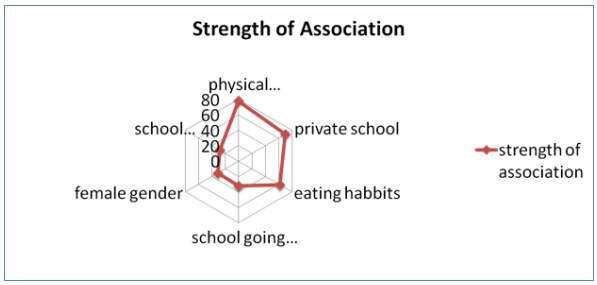


Figure13: showing strength of association of different modifiable factors with obesity.



This is a spider graph representing strength of association. Factor which is farthest from centre has greatest strength of association.

In this study **physical inactivity** is the modifiable factor which has maximum strength of association with prevalence of obesity and overweight.

Frequency of distribution of gender in different category of BMI was assessed. It was found that female gender was significantly associated with obese phenotype ($p<0.0001$).

Discussion

WHO in year 2005, stated that , there are rising concerns of increased sedentary lifestyle in children and adolescence leading to reduced energy expenditure while energy intake remains unaltered resulting in a expansion in prevalence of overweight and obesity [1].

In Jordan, Khader *et al*. [7], (2008) has studied that children from higher monthly income family have significantly higher obesity and overweight a they usually get more pocket money. A related research from Hyderabad depicted the fact that the prevalence of overweight was 7.2% among the 12 to 17 year age group [8]. A study conducted on affluent school children of Delhi(2007) showed the prevalence of obesity to be 7.4% [9]. Mehta M et al in their study among affluent girls in Delhi(2007) reported the prevalence of obesity and overweight to be 5.3 and 15.2%, respectively [10]. A small scale study done by Mandani S et al in school children of Raipur city of Chhattisgarh in 2012, found that out of 1114 students from single school, 20.1% of boys are overweight and 13.4% are obese and 15.6% girls are overweight and 7.6% are obese whereas M. Mehta et al [9] in his study showed significant prevalence of obesity in affluent school girls in Delhi and more than half of them have central obesity. An international study done at Thailand by Mo-Suwan *et al*.[19], (2000) showed that children from higher income societies have greater mean BMI levels. Kruger *et al*[20].in year2005, have conducted a study on modifiable and non modifiable risk factors associated with overweight and obesity and came out with interesting facts that overweight children are the least active children and they are mainly engaged in watching TV the whole day. In 2004 Thompson *et al*[21], in their longitudinal study done among school girls at Massachusetts Institute of Technology reported that the frequency of having fast food meals is positively associated with BMI z-score.

Kasmini K et al[22] in 1997, revealed the statement that Obesity, Overweight and Sedentary behavior coexists with each other and have become a major public health problem in five large cities of India. The prevalence of obesity and sedentary behavior was significantly greater in Trivandrum, Calcutta and Bombay compared to Moradabad and Nagpur. Sedentary behavior was significantly associated with obesity as compared to non-obese subjects in both sexes, which may be due to greater economic development and ease of access to fast food in metro cities [11].

Dietz *et al.* in 1985, indicated the figure 0f 2%,in the manner, that for every hour of television viewed the prevalence of obesity is increased by 2% [12]. Simillar fact has been tested and proven by WHO in 2006, stating increase in 2% obesity with each hour of television viewed among adolescent 12-17year old. Another large study has shown that Obesity incidence increases in children who watched TV sitting for more than 4 hours per day [13].

In 2013, Nora El-Said Badawi et alstudied the food habbits of children and found a relatively high prevalence of overweight and obesity among children aged 6–12 years in Port Said city who are fond of eating candy and chocolates and have less consumption of fresh fruits and vegetables. They also found a relatively high prevalence of overweight and obesity among children aged 6–12 years in Port Said city who had more liking towards carbonated beverages and sugary juice consumption [14].

In 2013, Wendt et al showed that (Too) short sleep duration is one of many risk factors for overweight and obesity. It showed sufficient sleep should be there for proper health of children, sleep should neither be too less nor too more [15]. In 2001, Ludwig *et al.* who found that for each consumed additional serving of sugar sweetened drinks BMI and obesity increased after adjustment for anthropometric, demographic, dietary and life style variable. On other hand, eating quick meals did not significantly correlate with BMI [16]. In 2000, JJ Reilly et al due to small school playgrounds and unsafe roads, children are discouraged from walking or cycling to school. Motorized vehicles are popular and they are perceived to be quicker and safer means of transport [17].

Incorporating WC as a routine measure in standard pediatric care is faced with several challenges to validity and reliability. An expert committee of the American Medical Association and the Centers for Disease Control and Prevention Task Force on Assessment, Prevention, and Treatment of Childhood Obesity was unable to recommend the routine clinical use of waist circumference for children because of incomplete information and the lack of specific guidance for its clinical application. BMI can provide a general description of adiposity characteristics in a healthy pediatric population, but it is less accurate in predicting fatness in an individual child [18].

Although BMI and abdominal adiposity measures may be highly correlated, it is desirable to obtain a BMI, where possible, and consider the utility of joint use of the two indicators.

Conclusion

Healthy society is a wealthy society and children are the important components of the society Prevalence of obesity is rising in school going children in Raipur city and prevalence is more so in Girls. Some of the reforms are immediately required to combat or in fact control this situation. The government, health planner, administrator and individual parent are the equal partners in delivering this message and fulfilling the agenda for the society based on our study and experience, we recommend few points for better health of the children as well as their parents.

(1) School based program:- Teachers should be motivated to explain the health related problems through non-conventional ways like short play, video clips, games etc.

Every student should take part in outdoor games and sports, irrespective of gender.

Eating regular, healthy meals and snacks is key to a healthy lifestyle.

Planning ahead and make fruit or raw mixed nuts available for snacking.

30 minutes session for sports and other physical activity must be mandatory.

Each student should monitor his/her anthropometric parameters in their health dairy, at least once in a month. Growth curve should be incorporated in their dairy.

In parent teacher meeting there should be a healthy discussion about healthy food habits and time spent on physical activity.

2. Parents should be advised about obesity problems not only for their children but also for themselves.
3. The government should take proactive initiative to promote good health awareness program across the civil society.
4. Special incentives/provisions should be made by the government or the private companies to encourage its employee/ people to use cycle or walk down to their work place.
5. Restriction should be made for advertising fast food or packet food poor in nutritive values in public places.

There is diversity of religion, customs, food habits, ethnicity and geographical factors in this vast country, so we recommend a large study covering all the parts and strata, which could act as ready reference like CDC, Atlanta. This data pool is very much necessary, as it well provide guidelines to pediatricians and policy makers regarding childhood nutrition.

Limitations

- It is self reported questionnaire. Study would be more accountable if parents were also interviewed.
- Body mass index fails to distinguish between fat and fat free mass. (muscle and bone).
- Larger sample size would predict the values more precisely. i.e with less % errors.

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