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Dietary Pattern amongst Overweight and Obese Children, 9-15years from Government School in Bhubaneswar City

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Abstract:
Background: *Childhood obesity is an emerging problem worldwide. It was once considered a high income country problem, now its on the rise in the low and middle income countries.The increase in childhood overweight and obesity may be major contributors to the adult obesity epidemic.*
Aim: *This study is conducted in a government school in Bhubaneswar city to understand the different variables contributing to overweight and obesity.*
Methodology*: It is a cross sectional study conducted in a government school from 1st March 2014 to 31st July2014. 537 children from age 9-15years were selected for study and their dietary habits and lifestyle were analyzed. The data was collected by questionnaire cum interview technique.*
Result :*Out of 537 students ,16.4% were obese and 18.4% were overweight,of them male accounts for 67.4% and female are 32.6%. Children who eat non veg(87.7%), skipping breakfast(54.5%),increase frequency of soft drinks,watching TV for more than 2hours(98.4%) and decrease physical activity have shown significant relation with weight gain. We did not find any significant relationship between snacking habit and obesity in our study.*
Conclusion: *Overweight and obesity are emerging problem in developed and developing countries. Genetic, faulty dietary habits like skipping meals, consuming fast food and aerated drinks with sedentary lifestyle without any outdoor game activities are some of the important variables for obesity. Special emphasis is to be given by the parents and also school authorities towards dietary habit and lifestyle modification of the growing children in this age group.*

I. Introduction

Childhood obesity is most serious public health challenge of the 21st century. This has become a global epidemic and steadily affecting many low- and middle-income countries, particularly in urban settings[1].Obesity or overweight is defined as a condition of abnormal or excessive fat accumulation that may impairhealth[2]. The World Health Organization has described obesity as one of today's most neglected public health problems.The prevalence has increased at an alarming rate. Globally, in 2013 the number of overweight children under the age of five, is estimated to be over 42 million. Close to 31 million of these are living in developing countries.[2]Childhood-related obesity is an increasing concern with respect to the health and well-being of the child. Body mass index (BMI), a measure of weight with relation to height, is not only used as an outcome measure to determine obesity but also as a useful anthropometric index for cardiovascular risk.[3] For children between 2 and 19 years, BMI is plotted on the CDC growth chart to check for the corresponding age and sex related percentile. Childhood obesity is defined as a BMI at or above 95th percentile for children of same age and sex.[3] Classifications of obesity in children depend upon the body composition of the child, as it varies with respect to age and sex of the child.[4]As per WHO classification Overweight is BMI ≥25 and obesity ≥30.

Few studies have been conducted in India on overweight and obesity and its correlates among children mostly in metropolitan cities.Therefore,in recent years the prevention of obesity in childhood has been considered crucial for the prevention of lifestyle- related diseases in adults.Some previous studies have shown the association between the prevention of obesity in children and their lifestyle habits,such as contents of meals,exercise and how they spend their leisure time(such as watching TV)[5].

As this type of study has been mostly conducted in private schools(where mostly affluent class children study), we hereby undertake to throw a light on the emerging problem of obesity in Government school (where mostly middle and low socio economic class children study) in Bhubaneswar, Odisha.

II. Methodology

This is a cross sectional study conducted in a GovernmentHigh School from 1st March 2014 to 31st August 2014.We had listed names of different Government school according to the wards of Municipal Corporation in

Bhubaneswar city. By lottery method we had selected one government school. Data was collected from 537 school children, of age 9-15years by random sampling,from standard 5^{th} ,6^{th}, 7^{th} ,8^{th},9^{th} and $10^{th}$from attendance register. Prior to the study, consent from school authorities and parents was taken.Children whose parents didn't give consent, children who were absent on the day of study,chronic medical or surgical problems were excluded from the study.A pre designed & pre tested questionnaire was used to elicit information about general,dietary,physical activity and lifestyle pattern contributing to overweight and obesity. Weight of the children was taken by digital weighing machine and height was taken by stadiometer. Subject was made to stand bare foot on flat surface with weight distributed evenly on both feet & heel together, the head positioned so that the line of vision is perpendicular to the body(Frankfurt line).The arms were hung freely by the sides. The head back, buttock and heels in contact with the vertical board on the back. Height measured the nearest 0.1cm. Children were classified as overweight/Obese according to BMI measured.After taking height and weight, BMI was calculated by using formula : Weight in kg/ square of height in meters.BMI= Kg / m^2.

As per WHO (2004) for Asian, classification of BMI: Normal -18.5-22.9, Overweight-23.0-24.9, Obesity >25.

Table 1 shows the variables taken in the questionnaire.

Table 1:Variables taken in the questionnaire

VARIABLES TAKEN IN QUESTIONNAIRE	
Non vegetarian/vegetarian diet	
Skipping Breakfast > 3-4 times/week	
Frequency of taking snacks in between meals	0:once a week 1: 2-3 times a week 2: alternate 3: daily
Watching TV >2hous daily	
Skipping Breakfast > 3-4 times/week	
Frequency of taking snacks in between :	
Frequency of soft drinks intake:	0:once a week 1: 2-3times a week 2: alternate day 3:daily
Physical activity:	0:once a week 1: 2-3times/week 2: alternate day 3: daily

III. Results

A total of 537 students of age 9 to 15 years were taken, out of them 325 were boys and 212 were girls. Overall (88) 16.4% were obese and (99)18.4% were overweight. Amongst the obese/overweight 67.4% were boys and 32.6% were girls. Table 2 shows the relationship between vegetarian / non-vegetarian food habit, skipping breakfast, habit of watching TV for more than two hours with prevalence of obesity in government school. The type of diet and skipping breakfast and watching TV was found to be statistically significant. Table 3 reveals the relationship between frequency of taking snacks and frequency of soft drinks intake with prevalence of obesity in government school. 50 (26.7%) of obese children takes soft drinks daily whereas none of the children who do not consume soft drink were found to be obese. Snacking habit was almost equal for both obese and non obese around 15.7% and 18.7% respectively (statistically insignificant). Table 4 shows the relationship between physical activity with prevalence of obesity in government school. Only 1.1% of children are indulged in physical activity daily as compared to 44% non obese children.

Table2:Relationship between vegetarian / non-vegetarian food habit,skipping breakfast, habit of watching TV for more than two hours with prevalence of obesity in government school.

Type of diet		**Non-obese**	**Obese**	**Total**	**X^2 Value(DF)**
Non Veg	Frequency (%)	176 (50.3%)	164 (87.7%)	340 (63.3%)	73.456** (DF = 1)
Veg	Frequency (%)	174 (49.7%)	23 (12.3%)	197 (36.7%)	
Total	Frequency (%)	350 (100%)	187 (100%)	537 (100%)	
Skipping Breakfast					
No	Frequency (%)	280 (80%)	85 (45.5%)	365 (68%)	235.674** (DF = 1)
Yes	Frequency (%)	70 (20%)	102 (54.5%)	172 (32%)	
Total	Frequency (%)	350 (100%)	187 (100%)	537 (100%)	

Habit of TV watching					
No	Frequency (%)	289 (82.6%)	3 (1.6%)	292 (54.4%)	322.072** (DF = 1)
Yes	Frequency (%)	61 (17.4%)	184 (98.4%)	245 (45.6%)	
Total	Frequency (%)	350 (100%)	187 (100%)	537 (100%)	

**-Significant at 5% level (p<0.05),NS-Not Significant at 5% level (p>0.05)

Table 3: Relationship between frequency of taking snacks and frequency of soft drinks intake with prevalence of obesity ingovernment school.
(0: once a week or fortnight, 1: two to three times a week, 2: alternate day, 3:daily)

Soft Drink Intake		**Non-Obese**	**Obese**	**Total**	**X^2 Value(DF)**
0	Frequency (%)	40 (11.43%)	8(4.3%)	48(8.9%)	502.540** (DF = 3)
1	Frequency (%)	108 (30.86%)	65(34.8%)	173(32.21%)	
2	Frequency (%)	202 (57.71%)	64 (34.2%)	266 (49.59%)	
3	Frequency (%)	0	50 (26.7%)	50 (9.3%)	
Total	Frequency (%)	350 (100%)	187 (100%)	537 (100%)	
Intake of snacks					
0	Frequency (%)	30 (8.6%)	20 (10.7%)	50 (9.3%)	1.741 (DF = 3)
1	Frequency (%)	126 (36%)	61 (32.6%)	187 (34.8%)	
2	Frequency (%)	139 (39.7%)	71 (38%)	210 (39.1%)	
3	Frequency (%)	55 (15.7%)	35 (18.7%)	90 (16.8%)	
Total	Frequency (%)	350 (100%)	187 (100%)	537 (100%)	

**- Significant at 5% level (P<0.05), NS – Not Significant at 5% level (P>0.05)

Table 4:Relationship between physical activity with prevalence of obesity in government school.(0: once a week or fortnight, 1: two to three times a week, 2: alternate day, 3: daily)

Physical activities		**Non-Obese**	**Obese**	**Total**	**X^2 Value(DF)**
0	Frequency (%)	6 (1.7%)	18 (9.6%)	24 (4.5%)	124.248** (DF = 3)
1	Frequency (%)	73 (20.9%)	87 (46.5%)	160 (29.8%)	
2	Frequency (%)	117 (33.4%)	80 (42.8%)	197 (36.7%)	
3	Frequency (%)	154 (44%)	2 (1.1%)	156 (29.1%)	
Total	Frequency (%)	350 (100%)	187 (100%)	537 (100%)	

**- Significant at 5% level (P<0.05), NS – Not Significant at 5% level (P>0.05)

IV. Discussion

Worldwide obesity has nearly doubled since 1980. In 2008, more than 1.4 billion adults, 20 and older were overweight. 65% of world's population live in countries where overweight and obesity kills more people than underweight. 42 million children under the age of 5 were overweight or obese in 2013[6] .Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population. Prevalence is higher in urban than in the rural areas. Studies have shown that the prevalence of overweight among adolescents varies between 10 and 30%[7].

The present cross sectional study was conducted in Government High School , Bhubaneswar, taking 537 students. The prevalence of overweight/obesity in our study was found to be 16.4% obese and 18.4% overweight.In correlation with another study in Orissa by Patnaik S (2010) 28.6% children from age 5-15years (n=468) studying in private school were found to be overweight/obese. Among them 14.1% children were overweight while 14.5% were obese[8].In our study we have also found boys(67.4%) to be more obese than girls(32.6%). This can be explained because of urbanization due to which there are more numbers of Fast Food outlets and more pocket money given to boys.This is correlated with study mentioned earlier done by Patnaik S, in Orissa, with maximum number of obese were boys(33.65%) in a private school[8] . Childhood obesity is due to the imbalance between caloric intake of the child and the calories utilized (for growth, development, metabolism, and physical activities). The normal amount of calories a child consumes through food or beverages everyday, if not used for energy activities, leads to obesity[9].Obesity can be multifactorial in children. Factors

causing childhood obesity are genetic, behavioral, and environmental. We have taken different variables leading to obesity in this study. Few studies have suggested type of diet as an important factor influencing weight gain. Children consuming vegetarian food tend to be lighter and leaner than non-vegetarian children and data was proved statistically in our study .In correlation to our result there is a study done by Ramachandran Y in Kerala reported slightly higher prevalence of obesity among non-vegetarian than vegetarian,however it was statistically not significant[10]. Skipping meals, especially breakfast, can actually lead to weight gain. Breakfast skippers tend to eat more in the next meal, or nibble on high calorie snacks. Skipping calories gives you an uneven distribution of calories throughout the day. Interestingly, studies show that kids who skip breakfast are tardy and absent from school more often than children who eat breakfast on a regular basis. Skipping meals is known to cause low blood sugar[11].In our study 54.5% of obese students from government school skip breakfast almost 2-3times per week.This data is also statistically significant. This can be explained from the fact that children are having morning school, so most of the students tend to skip breakfast or they end up having breakfast with high calories or unhealthy food. Sometimes children eat more or consume more energy via food and beverages which are not utilized appropriately[9]. Children may eat large portions of food, foods high in sugar, and energy-rich foods. Hence, energy intake is higher than energy expenditure. So this may lead to weight gain in children[9].In our study there was no statistical significance found between obesity and frequency of taking snacks. The reason can be due to increase time duration of physical activity or snacks which doesn't have high calorie or sugar are more consumed by students.This can be related to a studydone by Matthews, the frequency of consumption of grains, nuts, vegetables and low nutrient dense foods were inversely related to the risk of being overweight[12]. There are many schools who provide lunch daily.Students have access to sugary drinks and less healthy foods at school throughout the day from vending machines, school canteens, at fundraising events, school parties, and sporting events.Advertisements of sweetened beverages on T.V. and other media is also having an effect on children. Because of easy availability children are experimenting by eating new foods which are high energy foods.We have found 26.7 % of obese students who are consuming beverages on daily basis have gained more weight as compared to none in non-obese children. High fructose corn syrup added to this sweetened beverages important factor for weight gain. Correlation to our result another study done by Ludwig D and Peterson K E suggested that sugar sweetened drinks consumption could be an important factor in increase of BMI, but soda drinks were not statistically proven to increase BMI[13]. TV viewing has become a routine for children and socially accepted.The prevalence of overweight in children was significantly related to amount of time (hours/day) that the children spent watching TV or videos.Among 187 obese students in government school, 97.4% are watching TV >2hours as compared to 17.4% non obese children,and the data was statistically proven.In a study it was found that children 8-18 years of age spend an average of 7.5 hours a day using entertainment media, including TV, computers, video games, cell phones, and movies. Of those 7.5 hours, about 4.5 hours is dedicated to viewing TV[14] .Eighty-three percent of children from 6 months to less than 6 years of age view TV or videos about 1 hour and 57 minutes a day[15] .TV viewing is a contributing factor to childhood obesity because it may take away from the time children spend in physical activities, leading to increased energy intake through snacking and eating meals in front of the TV and influence children to make unhealthy food choices through exposure to food advertisements[15,16] . Lack of physical activity also plays an important role in obesity.It is seen that children and teens nowadays lack the required amount of physical activity; hence the calories are not used properly and can lead to obesity.[9] In a study conducted in Iran, lack of safe and easy – access place for physical activity and unsupportive family were the main barriers to physical activity among adolescents.[17]In our study 44% of non- obese students are playing daily as compared to 1.1% of obese children, the result is also statistically proven. It is recommended to carry out at least 30 minutes of physical activity of moderate-intensity for at least 5 days in a week or vigorous intensity for 20minutes per day for three or more days per week. (U.S. Department of Health and Human Services,1996). Children and teenagers need at least 60 minutes of physical activity every day. This amount of physical activity may reduce the risk of some chronic diseases[11]

Childhood obesity also leads to health risks in adulthood. Health problems related to obesity are not only physical but psychological and social as well.Children who are obese have a negative body-image, which leads to lower self-esteem. Children feel depressed and nervous about their obesity issue and this has a negative effect on their behavior. This may also reflect negatively on their academic and social progress. They feel socially discriminated and stigmatized by their peers and adults.[17,18].

V. Conclusion

Obesity has become alarming situation globally and it is rapidly increasing in our city. On the background of increasing prevalence in school children, implementation of interventions (short and long term) measures focusing mainly on increasing the physical activity of children, drawing them away from high energy foods. Knowledge regarding healthy lifestyle and healthy food habit should be cultivated in school children through teachers and parents. Periodic health checkups in school children should be made compulsory for early

detection of childhood obesity. It is not only seen in affluent society but can also be seen in low and middle income groups.

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