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PREVALENCE OF OBESITY AND ITS INFLUENCING FACTORS AMONG SCHOOL CHILDREN OF BAGALKOT CITY, KARNATAKA

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ABSTRACT: BACKGROUND: Overweight and obesity are the fifth leading risk of global deaths. Once considered a high income country problem, overweight and obesity are now raising in low income and middle income countries especially in urban settings. **OBJECTIVE:** To determine the prevalence of obesity in school children and to identify the factors influencing childhood obesity. **MATERIALS AND METHODS:** The present study has been undertaken at one of the school of Vidyagiri, Bagalkot. The duration of study was during March to August 2014 for a period of two months. A total of 750 students from standard V to X, aged between 10-15 years had been enrolled in the study. It is a Cross-sectional descriptive study Obesity was assessed by BMI for age. Body mass index (BMI) was calculated as body weight in kilograms/height in meter square. The children were categorized into obese and non-obese by using K.N. Agarwal percentiles, children with 95th Percentile of BMI is taken as cut-off point. Children with BMI more than this cut-off point with respect to age and sex is considered as obese. The association of each of the variables with obesity was assessed with the Chi-square test. **RESULTS:** 22.53% of the children had family history of obesity. The total prevalence of obesity was 2.80%. The Prevalence of obesity among male was 2.01% and in female it was 0.79%. The association between obesity in children and family H/O obesity, Diabetes, frequency of outdoor games, number of high energy food intake and education of mother is found to be statistically significant.
KEYWORDS: Prevalence, Obesity, Children, Influencing factors, Urban area.

INTRODUCTION: At present, the potential health issue that is emerging is the increasing incidence of obesity in developing countries and the resulting socio-economic and public health burden that will be faced in our country in near future.[1] Overweight and obesity are the fifth leading risk of global deaths. Once considered a high income country problem, overweight and obesity are now raising in low income and middle income countries especially in urban settings. Close to 35 million overweight children are living in developing countrie.[2]

The proportion of children in the general population who are overweight and obese has doubled over the past two decades in developed and developing countries including India.[3] Obesity and overweight are not only a problem of adults but also of the children and adolescents world-wide. In India little attention has been paid to childhood and adolescent obesity until recently.[4] In India, the emergence of childhood obesity presents a cause for concern because of recent changes in lifestyle and economic development.[5]

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50-80% of obese children will continue as obese adults and falls into risk group of Diabetes, Hypertension, Coronary Heart Diseases and many more obesity related diseases.[6] Effective prevention of adult obesity will require the prevention and management of child hood obesity. WHO has also emphasized on urgent need of understanding the prevalence trend, factors contributing and developing strategies for effective intervention.[7]

The exact prevalence of the condition is unknown in our country because of lack of national data. Although many studies are conducted all over the country, which suggest that childhood obesity is quite alarming in India. Studies of such a nature will be useful tools in planning and developing appreciable intervention methods. In this contest, the present study has been conducted.

AIMS AND OBJECTIVES:
1. To determine the prevalence of obesity in school children and,
2. To identify the factors influencing childhood obesity.

MATERIALS AND METHODS:
Study Setting: The present study has been undertaken at one of the school of Vidyagiri, Bagalkot. It is an English medium CBSE school (Basaveshwara International Public School).

Duration of Study: The study has been conducted between March to August 2014 for a period of six months.

Study Participants: A total of 750 students from standard V to X, aged between 10-15 years had been enrolled in the study.

Exclusion Criteria: Children having chronic illness, severe malnutrition, Endocrinal problems and Physical & Mental defects were excluded from the study.

Type of Study: It is a Cross-sectional descriptive study.

Data Collection: The permission was obtained from the school administration to conduct the study. A prior written consent for the study was taken from each student in a consent form. For data Collection, pre-designed and pre-tested questionnaire was used. The first part of questionnaire consists of the information about socio-demographic factors (Age, sex, occupation, address, parent's education, type of family and income), family history of obesity and Diabetes. The second part of the proforma contained dietary history, physical activity and anthropometric measurements such as height and weight. The Questionnaire was explained to students beforehand.

To find out Socio-economic class, Modified Kuppuswamy classification[8] (For urban area) was used. The dietary history was assessed by asking the students about type of oil used, type and quantity of food consumed, snacks in between meals, how many times, consumption of high energy foods and frequency of intake, and consumption of juices and carbonated drinks.

The high energy foods which are considered in this study are 1. Pizza 2. Sweets 3. Chips 4. Bakery items 5. Non-veg. 6. Junk foods 7. Snacks. Scores are given as under,

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0= Not consuming any of the above item.

1= Consumption of any one item of the above mentioned.

The scores are added up for each individual and put into the table as 0-4 item consumption and 5-7 item consumption.

The physical activity was also assessed by asking about the frequency of exercise (brisk walking, running, jogging and aerobics), outdoor games (Volleyball, football, cricket, kabaddi, badminton and table tennis) and mode of transport. The sedentary lifestyle elicited by asking duration of watching Television, time spent in computers and day time sleep.

The height and weight of students was measured by adopting standard procedures. Height and weight were measured by using studio meter. 0 measurements were set. It was measured without any footwear. The students stood straight with heels, buttocks and back touching the vertical limbs of the instrument. The standing body height was measured to the nearest 0.5cm. It was recorded in centimeters and then converted to meter for calculating Body Mass Index (BMI). The weight is measured with an accuracy of ±100 gm. The scales were re-calibrated after each measurement. Obesity was assessed by BMI for age. Body mass index (BMI)[9] was calculated as body weight in kilograms/height in meter square. BMI = Weight (kg)/Height^2 (m)

The children were categorized into obese and non-obese by using K.N. Agarwal percentiles,[10] children with 95th Percentile of BMI is taken as cut-off point. Children with BMI more than this cut-off point with respect to age and sex is considered as obese. Cut-off point of boys and girls is tabulated as mentioned under.

Age in years	Boys	Girls
10	22.1	23.2
11	23.4	24.5
12	23.8	25.7
13	25.3	27.1
14	26.0	27.4
15	27.3	27.7
95th Percentile of BMI for Boys and Girls		

STATISTICAL ANALYSIS: The association of each of the variables with obesity was assessed with the Chi-square test. Variables showing statistical significant association with the outcome variable (P<0.005) were considered as potential risk factors of overweight and obesity.

RESULTS:

Characteristics	Number (N=750)	%
Age (In years)		
09	011	01.47
10	102	13.60
11	103	13.73

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12	133	17.73
13	131	17.47
14	136	18.13
15	111	14.80
16	021	02.80
17	002	00.27
Total	**750**	**100.00**
Gender		
Male	432	57.60
Female	318	42.40
Total	**750**	**100.00**
Literacy status of head of the family		
Illiterate	003	00.40
Primary	014	01.47
High school	036	04.80
College	147	19.60
Degree	550	73.33
Total	**750**	**100.00**
Socio-economic status		
I	313	41.73
II	415	55.33
III	014	01.87
IV	007	00.93
V	001	00.13
Total	**750**	**100.00**
Table 1: Socio-demographic profile of study subjects		

18.13% of the students were in the age of 14 years. 57.60% of the study subjects were males. Majority (73.33%) of them are of degree holders. 55.33% of the participants belonged to the class II socio-economic status.

Age	Male obesity	Female obesity	Total	%
10	2 (0.27%)	1 (0.13%)	3	14.29
11	5 (0.66%)	1 (0.13%)	6	28.57
12	2 (0.27%)	2 (0.27%)	4	19.05
13	2 (0.27%)	0	2	09.52
14	2 (0.27%)	1 (0.13%)	3	14.29
15	2 (0.27%)	1 (0.13%)	3	14.29
Total	**15 (2.01%)**	**6 (0.79%)**	**21 (2.80)**	**100.00**
Table 2: Distribution of study participants as per obesity according to Body Mass Index				

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The total prevalence of obesity was 2.80%. The Prevalence of obesity among male was 2.01% and in female it was 0.79%.

Family H/O obesity	Obese children	Non obese children	Total	Significance
Yes	13	156	169	X^2=19.19 P=0.000011
No	08	573	581	
Total	**21**	**729**	**750**	
Family H/O Diabetes				
Yes	10	173	183	X^2=6.314 P=0.011
No	11	556	567	
Total	**21**	**729**	**750**	
Table 3: Obesity as per family H/O obesity and Diabetes Mellitus				

The association between obesity in children and family H/O obesity and Diabetes Mellitus is found to be statistically significant.

Frequency of outdoor games	Obese children	Non obese children	Significance
Daily	02	235	X^2=5.18 P=0.022
Weekly	17	421	
Total	**19**	**656**	
Table 4: Obesity as per frequency of outdoor games			

(Note: 2 obese children and 73 non obese children don't play outdoor games.)

The association between frequency of outdoor games and obesity is found to be statistically significant.

No. of high energy food item intake	Obese children	Non obese children	Total	Significance
0-3	05	330	335	X^2=3.80 P=0.05
4-7	16	399	415	
Total	**21**	**729**	**750**	
Table 5: Obesity and number of high energy food item intake				

The association between obesity in children and number of high energy food item intake is found to be statistically significant.

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Literacy status of mother	No. of mothers	No. of Obese children
Illiterate	17	0
Primary	21	0
High school	135	1
College	227	4
Degree	339	16
Total	**729**	**21**
$X^2=8.416$ $P=0.0148$		
Table 6: Obesity as per literacy status of mother		

The association between obesity in children and education of mother is found to be statistically significant.

DISCUSSION: The present study has been conducted to find out, the prevalence of obesity in school children in the age group of 10-15 years and to identify the factors influencing childhood obesity. The overall prevalence of obesity was 2.80%. The prevalence of obesity among male was 2.01% and in female it was lesser than the males (0.79%.)

A study was conducted by Huong Thi Le et al during the year 2011, to study the prevalence of obesity and its associated risk factors among secondary school students in Bac Giang city of Vietnam. 1528 school children in the age group 11 years to 14 years taken for the study. The prevalence of obesity was 2%. The prevalence of obesity in this study and the present study is found to be low. Increased total energy intake was associated with being overweight and obesity.[11]

Soniya V et al conducted a cross-sectional study among school students in the age group 9-14 years in the year 2012. The study was conducted in Latur district of Maharashtra among 1182 school children. Prevalence of obesity was 1.54% which is lower than the present study. Higher socioeconomic status, daily calorie intake above RDA, mix type of food and less physical activity time were the significant factors for obesity. In this present study also obesity was significantly associated with high calorie food intake and less physical activity in the form of outdoor games.[12]

Mahajan et al conducted a study in the Union Territory of Puducherry during 2009, to know the prevalence of childhood obesity. A total of 2542 school going children in the age group 6 years to 12 years was studied. BMI for age was compared with CDC growth charts and BMI for age more than 95th percentile were taken as obesity and more than 85th percentile as overweight. The prevalence of obesity was 2.12% which is little lower than the present study.[13]

Low prevalence of obesity was observed in the present study and above mentioned studies. The low prevalence in the present study can be due to, majority of the children are involved in outdoor activity, taking vegetarian diet and more consumption of vegetables and fruits.

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In this study, the prevalence of obesity was higher among males than females. Similar observations were made by Laxmaiah et al. A study was conducted in Hyderabad city, Andhra Pradesh state during 2003 by Laxmaiah et al. Subjects consisted of 1208 adolescent in the age group 12-17 years. The overall prevalence of obesity was 1.6% among males and 1% in females respectively whereas obesity was significantly lower among those participating regularly in outdoor games > 6 hours and household activities >3 hours.[14]

Bharti et al conducted the study among school going children of Wardha city, central India in the year 2006. About 2555 school going children in the age 10-17 years were selected by probability proportionate to size of population technique, obesity was found to be 1.2% which is lower than the present study findings.[15]

A study was conducted by Cherian et al during 2010 among school going children (6 years to 15 years age group) in Kochi, Kerala. A total of 1634 school students were interviewed for study. The prevalence of obesity was 3% in boys and 5.3% in girls.[16]

A cross-sectional study was conducted by Kotian et al, to know the prevalence and determinants of overweight and obesity in Mangalore city Karnataka, south India. The study was conducted during the year 2008. 900 school children aged 12-15 years were taken as study subjects. International Obesity Task Force (IOTF) references values were used to classify obesity. The overall prevalence of obesity was 4.8%. The prevalence of overweight was more among girls.[17]

In contrast, in the above mentioned two studies, the prevalence of obesity was more as well as more among girls when compared to the present study.

In this study, the association between the obesity of children and family H/O obesity and diabetes was found to be statistically significant.

Obesity tends to run in families, with obese children frequently having obese parents. Risk of obesity is lowest in children with neither parent being obese and greater when both parents are obese. Maternal BMI is strongly and positively related both to childhood BMI and BMI in adult age.[18] A common explanation is the family members share common attitude towards food eating habits and exercise.

A study was conducted by S Kumar et al (2007) to estimate influence of parental obesity on childhood obesity.32.7% of obese children had history of parental obesity. Children with parental history of obesity showed 25.2 times more chances of developing obesity.[19]

The findings of Kumar et al and the present study are similar wherein the association between the obesity of children and family H/O obesity was found to be significant.

A cross sectional study followed by a case control study was conducted by S Kumar, et al in two affluent schools of Davangere city during 2007.In the study 1496 school children in the age group of 10-15 years were examined. The prevalence of obesity was 5.74%. Prevalence of obesity was more in girls (8.82%) than boys (4.42). Family history of obesity, snacking of high energy foods and lack of physical activity were the important influencing factors of obesity.[20]

In this study, the influencing factors for obesity are family H/O obesity and eating of high energy foods which are similar to the above mentioned study (Kumar et al).

A study was conducted by Hussain M et al in Gulbarga city of North Karnataka during 2010. The study was carried out among 1,642 school children aged between 10 to 15 years.

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International Obesity Task Force (IOTF) classification was utilized for the estimation of overweight and obese subjects. The prevalence of obesity was 6.82%.[21]

In the above mentioned study, the prevalence was found to be more than this study.

CONCLUSION: Prevalence rate of obesity in the study population was 2.8%. The factors which were independently associated with obesity were family history of obesity and diabetes, number of items of high energy food intake, outdoor games activity and education of mother. The parents, teachers & students can be educated about the importance of increased physical activity (Playing outdoor games, walking, cycling), the hazards of eating out frequently and the importance of certain food items in the prevention of children obesity.

The concerned authority can implement school based food programs and nutritional health education messages with incorporation of skills for proper selection of food.

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