Prevalence and risk factors for obesity among high school children: Our experience from UHTC, Khaja Bazar, Gulbarga

Mohd. Abdul Baseer[1*], Mohin Sakre[2], Syed Mustafa Al Hussaini[2], N D Bendigeri[3]

[1]Assistant Professor, [2]PG Student, [3]Professor and HOD, Department of Community Medicine, Khaja Bandanawaz Institute of Medical Sciences, Kalaburagi, Karnataka, INDIA.
Email: abdulbaseer26@gmail.com

Abstract
Background: The pace and pattern of the spread of the global public health problem of obesity is rapidly replacing the problem of Malnutrition. Most children develop their eating habits, lifestyle and activity pattern during childhood. Obesity in Childhood may lead to adult life complication such as DM-II, Hypertension, CHD etc. **Objective:** To know the prevalence of Obesity and its contributing factors among High School Children. **Methods:** A community based Cross Sectional study was conducted amongst 100 High School Children from four Schools in the Khaja Bazaar Area, Kalaburgi by using Systematic and Simple Random Sampling Technique. BMI for age percentiles were used to adjudicate Overweight and Obesity. **Results:** 13% and 06% was found to be the prevalence of Overweight and Obesity respectively. Highest prevalence of Overweight and Obese children was seen in the age group of 14-15 Years and more among Females. A positive association was found with Sedentary lifestyle, Excessive TV gazing, Mobile and other Media Usage and frequent Junk Food Snacking. A negative alliance was found with Outdoor activities. **Conclusion:** It was noticed that although the prevalence of Overweight and Obese individuals wasn't alarming when compared to National pooled data post 2010, it wasn't negligible either. Girls were found to be more prone to be Overweight or Obese as compared to Boys. A positive association with lifestyle, activity and snacking pattern suggested a dire need to change the said obesogenic environmental factors.
Key Words: Obesity, High School Children.

[*]**Address for Correspondence:**
Dr. Mohd. Abdul Baseer, Assistant Professor, Department of Community Medicine, Khaja Bandanawaz Institute of Medical Sciences, Kalaburagi, Karnataka, INDIA.
Email: abdulbaseer26@gmail.com

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 20 July 2018

INTRODUCTION

Obesity and Overweight have been defined by the WHO as abnormal and excessive fat accumulation that presents as a potential risk to the health of an individual[1]. WHO specifically defines obesity for children as greater than 2 Standard Deviations above the WHO growth reference median with the mean being around 15.5 to 22, varying in accordance to age and gender [2]. In layman's terms, obesity can simply be defined as greater than required deposition of adipose tissue or fat caused due to consumption of more calories than normally required and necessary by the body to maintain and sustain daily life activities[3]. An Indian study has defined overweight to be between 85th and 95th percentile of the normal distribution curve and obesity to be greater than or equal to the 95th distribution of the normal distribution curve[8]. The WHO has brought to light that between 1980 and 2014, the prevalence of obesity has alarmingly doubled. In 2014 13% of the world's populations were found to be obese and among these 600million were adults[1]. Around 200 million school aged children have been estimated to be overweight or obese with around 40 to 50% being classified as frankly obese[4]. Also, disconcertingly, it is believed that 1/3rd of Obese pre-school children and

around half of the obese school children grow up to be obese adults[5]. Obesity has been prevalent and flourishing in both developing and developed countries at a pace and having a pattern that can be attributed to a fore most global public health problem. The pace and pattern of the spread of the global public health problem of obesity is rapidly replacing the problem of Malnutrition[6]. National Family Health Survey data (NFHS) 2007 presented a list of the states in India per their order of percentages of people who are overweight or obese. Nationally, it was found that 12.1% and 16% females were either overweight or obese. 14% of Males and 17.3% of females in Karnataka were found to overweight or obese[7]. A variety of causes and complex mechanics are found to be contributory to causing obesity in children. As a given, it is believed that obesity is a consequence of increased caloric and fat intake. However, there is sufficient evidence to conclusively suggest that increased sugar intake, greater portions and steady decline in physical activity contribute immensely to the development of obesity. Causes include the ecological model of increased caloric intake, decreased physical activity and sedentary behaviour. Genetics suggesting that obesity is also heritable. Other causes include lower basal metabolic rates, parental and peer behaviour, food pattern, socio-cultural factors, social factors etc[9]. Apart from leading to obesity in adult life, childhood obesity has several daunting immediate consequences as well. Depression and anxiety, lowered self – esteem, body dissatisfaction, eating disorders, emotional problems, social and emotional well-being, socio-emotional consequences have been found to be associated with childhood obesity[9]. Medical consequences include fatty liver, Type II Diabetes Mellitus, Asthma, hepatic sclerosis, cardio vascular diseases, high cholesterol, cholelithiasis, glucose intolerance, skin conditions, menstrual abnormalities, impaired balance and orthopaedic problems among others[9,10]. Such a complex web of causation and physiology of obesity makes it difficult to control and prevent it. It has been widely agreed that the most potent and effective way to handle this condition having potentially devastating consequences is through a healthy and balanced lifestyle. WHO published a document regarding the prevention of obesity which can be summarized to have the following key points: supportive environment, supportive policies, supportive programmes, behavioural changes at the social, environmental, health and economic front [11]. Owing to the lack of data in various parts of the country, the exact prevalence and the burden of obesity remains a mystery. Most children develop their eating habits, lifestyle and activity pattern during late childhood and early adolescence. The situation in Kalaburagi, Karnataka may not be very different from that of urban metropolitan cities in India as Kalaburagi is a rapidly developing city with number of restaurants and fast food joints. Hence, an attempt herewith has been made to study the prevalence of overweight and obesity among high school children aged between 12 to 15 Years studying in four schools located in the field practice area of Khaja Bandanawaz Institute of Medical Sciences, Kalaburagi.

MATERIAL AND METHODS

A Cross Sectional study was conducted in the field practice area of Department of Community Medicine, Khaja Bandanawaz Institute of Medical Sciences, Kalaburagi to know the prevalence and associated risk factors associated with Overweight and Obesity among High School Children studying in Four Schools located in the field practice area of the Urban Health Training Centre. The study was carried out among 100 children between the age of 12 and 15 Years. The study was conducted between January to May 2015. The source of data was four schools, namely; Khaja High School, Sayyid Akbar Husayni School, Daffodils English Medium School and Government High School, Rouzatain. The sample size was chosen using the formula[12] $4PQ/L^2$; where P (Prevalence) was taken from a study conducted in northern India[13] as 5.59% at the confidence level of 95%. The sample size obtained was 84.44. To make it closer to the nearest whole number, a sample size of 100 High School children was chosen. Among the four schools, every 5th child was chosen to be included in the study using simple random sampling technique from a total of 483 students in the age group of 12 to 15 Years in the above mentioned 4 schools. Parents of the selected children were called and verbal telephonic consent was obtained from them after explaining to them the objectives of the study. A pre-designed, pre-tested questionnaire was used to collect socio-demographic data from the study participants regarding their age, sex, dietary pattern, life style, physical activity level etc. A standard measuring tape was used to measure the height and a weighing machine (adjusted each time to 0 before weighing) was used to calculate the weight of the participants after answering the questionnaire. BMI was calculated using the formula, Weight in Kgs / Height in Metres squared. Standard IAP Age for BMI growth curve was used to categorise the children as overweight and obese[14]. Ethical committee clearance was obtained before the commencement of the study and all the study participants were explained about the purpose of the study in a language and manner of their understanding. MS word, Excel and SPSS was used to analyse and present the data. Statistical tests like percentages and Chi – Square were used in the scope of the study.

RESULTS

Table 1: BMI Distribution of the students according to their sex and age

BMI	Age (In Years)				Sex		Total
	12	13	14	15	Male	Female	
Under Weight	08 (25%)	03 (12%)	06 (23.07%)	01 (5.88%)	12 (21.82%)	06 (13.33%)	18 (18%)
Normal	17 (53.13%)	16 (64%)	13 (50%)	13 (76.5%)	33 (60%)	26 (57.78%)	59 (59%)
Over Weight	05 (15.63%)	04 (16%)	04 (15.38%)	02 (11.8%)	07 (12.73%)	08 (17.78%)	15 (15%)
Obese	02 (6.25%)	02 (08%)	03 (11.54%)	01 (5.88%)	03 (5.45%)	05 (11.11%)	08 (08%)
Total	32 (100%)	25 (100%)	26 (100%)	17 (100%)	55 (100%)	45 (100%)	100 (100%)

Age v/s BMI: The Chi-Square Statistic is 5.4307. The *P*-Value is. 795268. The result is not significant at P<0.5. Sex v/s BMI: The Chi-Square Statistic is 2.4214. The *P*-Value is. 489665. The result is not significant at P<0.5. It was seen that the prevalence of Underweight was 18% while the prevalence of Overweight and Obesity was 15% and 08% respectively. Among the Overweight students, maximum was of the age of 12 (15.63%) followed by age 14 (15.38%). The highest prevalence of Obesity was seen in the age of 14 Years (11.54%) followed by the age of 12 Years (6.25%). Age wise distribution of the BMI of the study participants revealed that a higher percentage of girls (11.11%) were obese as compared to boys (5.45%). Overweight was also seen less in Boys (12.73%) as compared to Girls (17.78%). It was interesting to note that Underweight was seen more in Boys (21.82%) as compared to Girls (13.33%)

Table 2: Association of the BMI of the study subjects with familial history of overweight, Obesity and parents' educational status.

BMI	Family History of Overweight (1)		Parents' Educational Status (2)		Total
	Yes	No	Illiterate	Literate	
Under Weight	12 (26.01%)	06 (11.11%)	03 (30%)	15 (16.67%)	18 (18%)
Normal	21 (45.65%)	38 (70.37%)	04 (40%)	55 (61.12%)	59 (59%)
Over Weight	08 (17.39%)	07 (12.96%)	01 (10%)	14 (15.56%)	15 (15%)
Obese	05 (10.86%)	03 (5.56%)	02 (20%)	06 (6.67%)	08 (08%)
Total	46 (100%)	54 (100%)	10 (100%)	90 (100%)	100 (100%)

Family History of Overweight v/s BMI: The Chi-Square Statistic is 6.8689. The *P*- Value is. 076195. The result is not significant at P<0.5. Parents Educational Status v/s BMI: The Chi-Square Statistic is 3.7539. The *P*- Value is. 289291. The result is not significant at P<0.5. Among the 100 students who participated in the study, an alarming 46% had a family history of Obesity or Overweight as reported by the study participants. Among the individuals who had a family history of Overweight and Obesity, it was seen that 17.39% were overweight and 10.86% were Obese, while among the ones who did not have a family history of overweight and obesity, 12.96% were overweight and only 5.56% were Obese. On comparison with the educational status of the parents (Father / Mother in the case of deceased father / Guardian in case of deceased parents) 20% of the individuals whose parents were Illiterate were found to be Obese and 10% of the individuals whose parents were Illiterate were found to be Overweight. 15.56% of the individuals whose parents were Literate were found to be Overweight.

Table 3: Association between Lifestyle, Physical activity and BMI of the study participants

BMI	Lifestyle (Sedentary hours <5 hours a day)		Physical Activity (Pursuing One or More Sport or Physical Activity)		Total
	Sedentary	Active	Active	Not Active	
Under Weight	04 (6.89%)	14 (33.34%)	12 (30%)	06 (10%)	18 (18%)
Normal	40 (68.97%)	19 (45.24%)	21 (52.5%)	38 (63.34%)	59 (59%)
Over Weight	09 (15.52%)	06 (14.28%)	05 (12.5%)	10 (16.67%)	15 (15%)
Obese	05 (8.62%)	03 (7.14%)	02 (05%)	06 (10%)	08 (08%)
Total	58 (100%)	42 (100%)	40 (100%)	60 (100%)	100 (100%)

Age v/s BMI: The Chi-Square Statistic is 11.8741. The *P*-Value is. 007827. The result is statistically significant at P<0.5. Sex v/s BMI: The Chi-Square Statistic is 6.8385. The *P*- Value is. 077227. The result is not significant at P<0.5. It was noticed in the study that among the individuals who had a sedentary lifestyle (Sitting idly for more than 5 hours apart from the time in the school mostly watching TV or Playing Video Games), 15.52% were Overweight and 8.62% were Obese. It was contradicting to note that among the individuals with Normal BMI, 68.97% had sedentary lifestyle whereas 45.24% had an active lifestyle. The prevalence of overweight and obesity was more in the students with a sedentary lifestyle than the individuals with an active lifestyle. This finding was statistically significant. Regarding the physical activity of the study subjects, it was found that among the students who did not pursue any sport or physical activity, 16.67% were overweight and 10% were Obese. Whereas among the ones who did pursue a physical activity as a hobby, only 12.5% and 5% were overweight and obese respectively.

Table 4: Association between Dietary pattern and BMI

BMI	Diet		Junk Food		Total
	Veg	Non - Veg	Daily or Every Second day	Weekly twice or Less	
Under Weight	03 (15.79%)	15 (18.52%)	04 (7.14%)	14 (31.82%)	18 (18%)
Normal	10 (52.63%)	49 (60.49%)	36 (64.29%)	23 (52.27%)	59 (59%)
Over Weight	04 (21.05%)	11 (13.58%)	11 (19.64%)	04 (9.09%)	15 (15%)
Obese	02 (10.53%)	06 (7.41%)	05 (8.93%)	03 (6.82%)	08 (08%)
Total	19 (100%)	81 (100%)	56 (100%)	44 (100%)	100 (100%)

Age v/s BMI: The Chi-Square Statistic is 0.9849. The *P*-Value is. 804897. The result is not significant at P<0.5. Sex v/s BMI: The Chi-Square Statistic is 10.9036. The *P*-Value is. 012258. The result is statistically significant at P<0.5. It was found in the scope of the study that, contrary to popular belief, the prevalence of Obesity and Overweight was more among vegetarians that Non-Vegetarians. 21.05% of the vegetarians were found to be overweight whereas 13.58% of the Non-vegetarians were found to be overweight. Among the Vegetarians, 10.543% were obese and among the non-vegetarians, only 7.41% were Obese. Apropos of the frequency of Junk Food consumption, 19.64% of the individuals who consumed Junk Food daily or every second day were found to be overweight and 8.93% were found to be obese whereas, among the subjects who consumed less Junk Food (Weekly Twice or Lesser), 9.09% and 6.82% were found to be Overweight and Obese respectively. This result was found to be statistically significant at *P* <0.05.

DISCUSSION

In this study, it was found that the overall prevalence of Overweight and Obesity was 15% and 8% respectively. This figure was considerably higher than the NFHS data, 2007[7]. The highest prevalence of Overweight children was at the age of 12 and that of Obese children was at the age of 14. These findings were not along the lines of the

findings of a similar study conducted in Nitte University, Mangalore[15]. In our study, girls had a higher tendency towards overweight and obesity. These findings were similar to the findings of the study published in Australasian Medical Journal in 2010 where it was coherently found that girls had higher chances of being overweight and obese as compared to the boys[16]. 17.39% and 10.86% of the study subjects with a family history of Overweight were found to be overweight and obese respectively. A study conducted in Brazil confirmed the significance of this finding by conclusively determining via gene mapping that family history of obesity was indeed related to increased chances of obesity in off springs of such parents[17]. This association can also be psychologically linked to the fact the overweight parents fail to recognise their children as overweight or obese. Such a statement can be justified by citing a study that was conducted in Croatia where it was concluded that parents who were overweight or obese failed to recognise and acknowledge the overweight status of their off springs[18]. It was deemed in our study that the 20% of the children whose parents were illiterate were found to overweight and 10% were found to be obese while 15.56% of the children whose parents were literate were found to be overweight. This finding of our study was unlike the finding of a study conducted on the influence of parental demographic characteristics on BMI of their children where it was found that higher the education of the parents, greater the prevalence of overweight among children[19] 15.52% and 8.62% of the children who had a sedentary lifestyle were found to be overweight and obese respectively which was higher than the prevalence of the same mong children who were comparatively active. Such a finding was reflected in another similar study conducted by Vilchis Gil *et al* which showed a positive association between sedentary lifestyle and overweight among children[20]. It was also noticed in our study that the prevalence of obesity and overweight was less among children who were physically active and pursued any sport or a physical activity as a hobby as compared to the children who did not. Such a finding was also coherent in a study conducted by Hills A P in British Journal of Sports Medicine where it was emphasised that Body fat in children was inversely proportional to physical activity[21]. The vegetarians in our study were categorised as such contingency to purely being a vegetarian who did not even consume egg or egg products. Surprisingly, it was found in our study that the prevalence of overweight and obesity was more among pure vegetarians than in Non-vegetarians and Semi-Vegetarians. This finding of our study was contrary to the finding of a study in Thiruvananthapuram, Kerala, where Non-Vegetarians were found to have higher chances of being overweight as compared to Vegetarians[16]. Regarding junk food consumption, it was found that higher the frequency of junk food consumption, greater the chances of developing overweight and obesity. This finding of our study was consistent with the finding of a study conducted in Mangalore city where it was found that increased consumption of fast food was directly related to increased BMI[22].

CONCLUSION

It can be concluded that while the prevalence of Underweight children remains high, the prevalence of overweight and obese children has risen substantially when compared to past studies. In our study, the prevalence of Overweight and Obesity were high enough to consider them a potent public health risk in Gulbarga soon if not now. Girls have a higher tendency towards overweight. Familial history of obesity has a positive association towards obesity and overweight in the off springs of such families. Children of Illiterate parents had a higher prevalence of Overweight. Sedentary lifestyle, reduced physical activity and higher frequency of junk food consumption were seen to be directly associated to development of overweight as well. Primary prevention of obesity can be achieved by getting rid of the obesogenic factors such as diet, physical activity, behavioural changes and lifestyle modifications. It was recommended at the consummation of the study that health education to specific risk groups be taken up as a public health initiative. Promotion of outdoor physical activities and knowledge about the importance of physical activity must be explained to the children and their guardians. IEC activities regarding health diet and lifestyles can be carried out in the schools to promote a healthy lifestyle.

REFERENCES

1. Fact Sheet: Obesity and Overweight. Media Centre [Internet]. World Health Organization. Last Updated: 2016 June. Accessed on 2016, October, 12th. Available at: http://www.who.int/mediacentre/factsheets/fs311/en/
2. Weight for Height: Child growth standards [Internet]. World Health Organization. Accessed on 2016, October, 12th. Available at: http://www.who.int/childgrowth/standards/weight_for_height/en/
3. Anne Collins. Obesity: Definition and Explanation. Guide to the severe overweight Condition of ExcessBody Fat, Known As 'Obesity'. 2010. Available from: http://www.annecollins.com/obesity.html
4. WHO/ IASO/ IOTF. Obesity the global epidemic. The Asia Pacific Perspective. Available from:http://www.iaso.org/ iotf/ obesity/ obesity the global epidemic
5. M. Mehta, S.K. Bhasin, K. Agrawal, S. Dwivedi. A study on Obesity Amongst Affluent Adolescent Girlsin New Delhi. Indian Journal of Pediatrics. 2007. 74 (7): 619-622.

6. K Park. Text Book of Preventive and Social Medicine. 21st edition. Banarsidas Bhanot Publishers. Published: 2011 February. Pg. No.: 366 – 370.
7. National Family Health Survey. 2005 – 2006. Mumbai: International Institute for Population Sciences. 2007.
8. Nawab T, Khan Z et al. Influence of behavioural determinants on the prevalence of overweight and obesity among school going adolescents of Aligarh. Indian Journal of Public Health. 2014 April – June. 58(2): 121 – 124.
9. KrushnapriyaSahoo et al. Childhood obesity: Causes and Consequences. Journal of Family Medicine and Primary Care. 2015 April – June. 4(2).
10. Niehoff V. Childhood Obesity. A call to action: Bariatric nursing and surgical patient care. 2009. 4: 17 – 23.
11. Population based approaches to Childhood Obesity prevention. World Health organization. 2012. Published by WHO Document production Services, Geneva, Switzerland.
12. B K Mahajan Methods in Biostatistics, Jaypee Publishers, 7th Edition 2010 (84).
13. Marwaha R K et al. A Study of growth parameters and prevalence of overweight and obesity in school children from Delhi. Indian Pediatrics. 2006 November. 43 (11): 943 – 952.
14. Indian Academy of Pediatrics Growth Charts Committee, Khadilkar V, Yadav S, Agrawal KK, Tamboli S, Banerjee M, et al. Revised IAP growth charts for height, weight and body mass index for 5- to 18-year-old Indian children. Indian Pediatrics. 2015. 52:47-55.
15. Keerthan Kumar M et al. Prevalence of Obesity among High School Children in Dakshina Kannada and Udupi Districts. Nitte University Journal of Health Science. 2011 December. 1(4): 16 – 20.
16. Ramesh K. Prevalence of Overweight and Obesity among High School students of Thiruvananthapuram city corporation, Kerala, India. AMJ. 2010. 3(10): 650 – 661.
17. Reuter C P et al. Association between Overweight and Obesity in School Children with rs9939609 polymorphism (FTO) and family history of for obesity. Journal de pediatria. 2016. September – October. 92 (5): 493 – 498.
18. Petricevic N et al. family History and Parental recognition of Overweight in Croatian Children. 2012 August. 171. (8): 1209 – 1214.
19. Nayera E Hassan et al. Influence of Parental and Some Demographic characteristics on Overweight / Obesity status among a sample of Egyptian Children. Open Access Macedonian Journal of Medical Sciences. 2016 September. 4(3): 342 – 347.
20. Vilchis Gil J et al. Food Habits, Physical Activities and sedentary lifestyles of eutrophic and obese school children: a case control study. BMC public Health. 2015 February. 11: (15):124.
21. Hills A P, Andersen l B and Byrne N M. Physical activity and Obesity in Children. British Journal of Sports Medicine. 2011 September. 45(11): 886 – 870.
22. Nitin Joseph, Maria N et al. fast Food Consumption pattern and its association with overweight among high school Boys in Mangalore city of Southern India. Journal of Clinical and Diagnostic Research. 2015 May.