PREVALENCE OF OBESITY IN AFFLUENT SCHOOL CHILDREN IN MULTAN

Muhammad Junaid, Jawad Jalil*, Misbah Noor, Kehkashan Arouj***, Khadija Qamar******

Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *Combined Military Hospital/ National University of Medical Sciences (NUMS) Rawalpindi Pakistan, **Armed Forces Institute of Pathology/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, ***International Islamic University Islamabad Pakistan, ****Army Medical College/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To determine the prevalence of obesity in affluent school children in Multan.

Study Design: Cross sectional study.

Place and Duration of Study: Three private schools of Multan were selected. The study was carried out, from May 2015 to Nov 2015.

Methodology: This study was conducted on 165 school children aged 5 years to 10 years from three affluent schools in Multan. In whole Multan region, there are 9 affluent schools. Cluster sampling was done and Multan region was divided into 3 clusters. Each cluster was allocated 3 schools. One school was selected by simple random sampling from each cluster. From each school 55 students were selected by simple random sampling.

Results: Among 165 children included in study, 62 (38%) were between 5-7 years and 103 (62%) were between 8-10 years of age, mean age was 8 ± 1.47 years, 107 (65%) were males and 58 (35%) were females. Mean birth order was 2 ± 1.21, weight was 33.18 ± 8.25kg, height was 1.30 ± 0.08m and Body Mass Index (BMI) was 19.40 ± 3.26 kg/m². Among 165 children 71 (43%) were found to be obese where as 94 (57%) were not obese. Out of 71 obese 37 (52%) were females while 34 (48%) were males.

Conclusion: We concluded that the prevalence of obesity in affluent school children in Multan was high.

Keywords: Body Mass Index, Children, Obesity, Prevalence.

INTRODUCTION

The prevalence of childhood obesity has increased worldwide in recent decades[1]. During early 1970's and late 1990's, the prevalence doubled or trebled in Australia, Brazil, Canada, Chile, Finland, France, Germany, Greece, Japan, the UK, and the US[2]. This rise in the number of obese people worldwide has taken the form of an epidemic, especially in technologically advanced societies. Interestingly, there is a simultaneous growing prevalence of obesity in many communities which still suffer from malnutrition[3]. Socioeconomic status seems to be a key factor in obesity. In advanced countries obesity is more common among poorer communities[4]. However in Pakistan, obesity is seen mostly among children's belonging to elite class, while malnutrition is seen in children of poorer socities[5]. A study carried out on a private school children in Lahore, Pakistan showed that the prevalence of obesity among children was 11.9%[6].

Obesity has various social, psychosocial and monetary outcomes as it adversely impacts self respect, cognition and social growth[7]. As the prevalence of obesity increases, conditions such as type 2 diabetes mellitus, hypertension, hypercholesterolemia and obstructive sleep apnea which were once thought to be the diseases of adults, are on the rise in children[8]. Childhood obesity often extends into adulthood resulting in a lot of adults who will be at risk of cardiovascular diseases, osteoarthritis and certain types of cancer[9]. The obesity epidemic constitutes a substantial decrease in quality of life and life expectancy in terms of morbidity and mortality and accounts for billions of dollars lost in health care spending worldwide[10].

This study aims at estimating the prevalence of obesity in affluent school children in Multan.

This would help in early detection of obesity so that prevention and treatment may be started early in life to avoid the long term consequences of obesity. This study will provide current local magnitude of obesity in children in affluent schools. Result of my study will also help other health care professionals, through publication, to provide awareness regarding obesity and its complications in children.

METHODOLOGY

It was a cross sectional study of six months duration i.e. May 2015 to Nov 2015. Data was collected from three private schools of Multan that were willing to participate in the study. Sample size was 165 and was calculated using WHO sample size calculator with absolute precision of 0.5%, confidence interval of 95% and prevalence of 11.9%[6].

In whole Multan region, there are 9 affluent schools. Cluster sampling was done and Multan region was divided into 3 clusters. Each cluster was allocated 3 schools. One school was selected by simple random sampling from each cluster. From each school 55 students were selected by simple random sampling. Children aged 5 years to 10 years in grade one to five belonging to high standard school from private sector having monthly fee of Rs. 8000 were included in the study. Children with chronic illness e.g. asthma, T.B, any congenital disorder e.g. congenital heart disease, congenital hypothyroidism, physical or mental disability and children of parents who refused to participate were excluded from study.

The study was conducted after approval from Institutional ethical review committee (Certificate No. A/342). Parents were explained about the risk and benefits of the study and informed written consent was obtained for examining their children according to the guidelines of Helsinki Declaration. Permission was also obtained regarding use of data for research and publication. Demographic data was collected regarding age and sex. Body weight measured in Kilogram in school uniform using a weight scale; after removing the zero error; and body height measured in

centimeter in erect position without shoes using a stadiometer, were taken. BMI was calculated as weight (in kilogram) divided by height in squared meter (m²). BMI was plotted on WHO BMI charts for boys and girls aged 5-19 years; published in 2007. Obesity was defined as BMI that is greater than +2 standard deviation on the BMI chart. Data was collected through a structured questionnaire. Confidentiality of the patient record was maintained.

All data was entered and analyzed using SPSS version 21. Descriptive analyses were used to analyze and describe data. Frequency and percentage was calculated for categorical (qualitative) variables like gender and obesity. Mean and Standard Deviation (SD) was calculated for numerical (quantitative) variables like age, weight, height, BMI and birth order. Qualitative variables were presented in the form of tables and charts (bar and pie charts). Effect modifiers were controlled through stratification of age, gender and birth order. Chi square test was applied post stratification. Statistical significance was considered at $p<0.05$.

RESULTS

A total of 165 children fulfilling the inclusion /exclusion criteria were enrolled to determine the prevalence of obesity in affluent school children in Multan. Age distribution showed that 62 (38%) were between 5-7 years and 103 (62%) were between 8-10 years of age, mean age was 8 ± 1.47 years. Gender distribution of the children showed that 107 (65%) were males and 58 (35%) were females. Mean birth order was 2 ± 1.21, weight was 33.18 ± 8.25kg, height was 1.30 ± 0.08m and BMI was 19.40 ± 3.26 kg/m² (table-I) among 165

Table-I: Basic characteristics of the patients (n=165).

Characteristic	Mean ± SD
Birth order	2 ± 1.21
Weight (kg)	33.18 ± 8.25
Height (m)	1.30 ± 0.08
BMI (kg/m²)	19.40 ± 3.26

children 71 (43%) were found to be obese where as 94 (57%) were not obese (table-II) Out of 71 obese cases, 49 (69%) were between 5-7 years and

22 (31%) were between 8-10 years of age (*p*-value=0.21, CI=95%). Gender distribution of 71 obese cases showed that 34 (48%) were male and 37 (52%) were females. (*p*-value = 0.01 CI = 95%) *p*-value was significant which showed association of obesity with gender as girls out number boys (table-III). Birth order distribution showed, out of 71 obese cases, 61 were 1-3 and 10 were >3 (*p*-value=1.0 CI=95%) (table-IV).

Table-II: Prevalence of obesity in affluent school children in Multan (n=165).

Gender	Cluster I, (n=55)		Cluster II, (n=55)		Cluster III, (n=55)	
	Obese	Non Obese	Obese	Non Obese	Obese	Non Obese
Male	11 (20%)	28 (51%)	13 (24%)	25 (45%)	10 (19%)	20 (36%)
Female	12 (22%)	4 (7%)	11 (20%)	6 (11%)	14 (25%)	11 (20%)

Table-III: Distribution of obese and non obese children.

Obesity	No. of Patients
Total Obese	71 (43%)
Total Non Obese	94 (57%)

Table-IV: Distribution of birth order (n=71).

Birth Order	Obesity		*p*-value
	Yes	No	
1-3	61 (37%)	81 (49%)	1.0
>3	10 (6%)	13 (8%)	

DISCUSSION

Obesity is becoming an increasingly prevalent problem in both the advanced and developing nations, and it is one of the 21st millennium most alarming community health concerns. Worldwide, 22 million children under 5 years of age were reported to be overweight, with more than 75 percent of overweight and obese children who live in low to medium revenue nations[11]. The standards for obesity determination in youth and adolescents in underdeveloped nations were based on American and European BMI standards. CDC growth curves were created from an obviously overweight populace. Pediatricians around the world prefer to use the WHO growth charts. In 2007 de Onis and group created WHO age and sex specific body mass index charts as a global standard. However the WHO cut off would probably lead to greater levels of = overweight and obesity[11]. According to the policy makers, obesity is a critical public health threat for the 21st century[12]. Higher BMI has been linked with reduced levels of vitamin D in children[13]. The proposed mechanism is increased storage of vitamin D in fat tissue[14]. There is at least twofold more likely hood of iron-deficiency in obese children than normal weighing children[15]. Complications of childhood obesity include premature thelarche, early menarche in girls[16], pubertal advancement in boys[17], fractures, musculoskeletal discomfort and impaired mobility[18], tibia vara (Blount's disease or adolescent bowing of the legs)[19] and slipped capital femoral epiphyses[20]. Overweight and obesity among children results from complex interaction between genes, lifestyle behaviors, dietary habits, and socioeconomic factors[21].

The findings of our study are higher than a research statistics (11.9%) for the occurrence of obesity in private school children in Lahore, Pakistan[6]. Aziz *et al* estimated overweight and obesity incidence among children and adolescents of affluent schools of Karachi. Out of 398, 24 (6%) were beyond the 95th centile (obese) while 77 (19.35%) were between 85-95th centiles on NCHS graphs. About 85% of participants were questioned about their everyday life and they confessed living a predominantly static life style, owing to education, video screening, web browsing and indoor sports such as video games (not involving exercise)[21].

Sharma and colleagues investigated the rate of obesity in children of private schools in Delhi. They noted that the children's heights and weights had been nearly comparable to that of National Center for Health Statistics standards and well above the figures quoted by the Indian National Nutrition Monitoring Bureau, which mainly reflect poor children belonging to lower socio-economic class in India. Of the pupils incorporated in this research, overweight were found to be 22 percent and the percentage of obesity

was 6. Only 6% of these kids had low weight at birth[19]. These trends were not comparable to our study as 43% of children in our study were obese and it might be due to the difference in socioeconomic group of children included in our study. Pakistan Demographic and Health Survey 2013 reported 11% obesity prevalence among men and 19% among women living in rural areas, while 23% of men and 40% of all women were obese in urban settings. Pakistan lacks literature on the prevalence of obesity in school aged children[23].

Mohsin *et al* recorded the prevalence of obesity among affluent school children and adolescents and found that the prevalence of obesity was 17.9%, higher among males (19.9%), compared to females (15.3%)[24]. This is contradictory to our study where more females (52%) were found to be obese as compared to males (48%). Childhood obesity may be due to globalization and epidemiological transformation in poorer populations than in wealthier populations and it may also be due to the problem of stunting in developing nations. Dietary defects and the persistent issue of micronutrient deficiency should therefore be considered in developing country children as reasons for elevated BMI[25].

The findings of our study are helpful in early detection of obesity for its prevention and treatment started early in life to avoid the long term consequences of obesity. This study has provided current local magnitude of obesity in children in affluent schools. Results of this study are also helpful for other health care professionals, through publication, to provide awareness regarding obesity and its complications in children.

CONCLUSION

The prevalence of obesity in affluent school children in Multan was high. There was significant association of obesity with gender as more females were found to be obese as compared to males. Childhood obesity is a co-ncerning health issue which must be adequately addressed.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Ogden CL, Flegal KM. Centers for disease control and prevention 2000 growth charts for the united states: Improvements to the 1977 national center for health statistics version. Pediatrics 2002; 109(1): 45-60.
2. Wang Y, Lobstein T. Worldwide trends in childhood overweight and obesity. Int J Pediatr Obes 2006; 1(1): 11–25.
3. Taheri, Kazemi. Prevalence of overweight and obesity in 7 to 18 year-old children in birjand/ Iran. Iranian J Pediatrics 2009; 19(2): 135–40.
4. McCormack GR. Associations between familial affluence and obesity risk behaviors among children. Paediatr Child Health 2011; 16(1): 19–24.
5. Warraich HJ. Prevalence of obesity in school-going children of Karachi. PLoS ONE 2009; 4: e4816.
6. Adeel. Prevalence of obesity among the school going children of lahore and associated factors. J Ayub Med Coll 2010; 22(4): 27-32.
7. Tremblay MS, Inman JW, Willms JD. Relationships between physical activity, self esteem, and academic achievements in ten- and eleven-year-old children. Pediatr Exer Sci 2000; 12(3): 312-23.
8. Must A, Strauss RS. Risks and consequences of childhood and adolescent obesity. Int J Obes Relat Metab Disord 1999; 23(2): S2-11.
9. Dietz WH. Overweight in childhood and adolescence. N Engl J Med 2004; 350(9): 855-57.
10. Katzmarzyk PT, Janssen I. The economic costs associated with physical inactivity and obesity in Canada: An update. Can J Appl Physiol 2004; 29(1): 90-115.
11. Mohan V, Ranjani H, Mehreen T, Pradeepa R, Anjana R, Garg R, et al. Epidemiology of childhood overweight & obesity in India: A systematic review. Indian J Med Res 2016; 143(2): 160-68.
12. Alemzadeh R, Kichler J, Babar G, Calhoun M. Hypovitaminosis D in obese children and Adolescents: Relationship with adiposity, insulin sensitivity, ethnicity, and season. Metabolism 2008; 57(2): 183-91.
13. Yanoff LB, Parikh SJ, Spitalnik A. The prevalence of hypovitaminosis D and secondary Hyperparathyroidism in obese Black Americans. Clin Endocrinol (Oxf) 2006; 64(5): 523-29.
14. Nead KG, Halterman JS, Kaczorowski JM, Auinger P, Weitzman M. Overweight children and Adolescents: a risk group for iron deficiency. Pediatrics 2004; 114(1): 104-08.
15. Rosenfield RL, Lipton RB, Drum ML. Thelarche, pubarche, and menarche attainment in children With normal and elevated body mass index. Pediatrics 2009; 123(1): 84-88.
16. Bau AM, Ernert A, Schenk. Is there a further acceleration in the age at onset of menarche? A cross-sectional study in 1840 school children focusing on age and bodyweight at the onset of Menarche. Eur J Endocrinol 2009; 160(1): 107–13.
17. Taylor ED, Theim KR, Mirch MC. Orthopedic complications of overweight in children and Adolescents. Pediatrics 2006; 117(6): 2167–74.
18. Gordon JE, Hughes MS, Shepherd K. Obstructive sleep apnoea syndrome in morbidly obese Children with tibia vara. J Bone Joint Surg Br 2006; 88(1): 1003.
19. Sharma A, Sharma K, Mathur KP. Growth pattern and prevalence of obesity in affluent schoolchildren of Delhi. Public Health Nutr 2007; 10(5): 485-91.
20. Murray AW, Wilson NI. Changing incidence of slipped capital femoral epiphysis: a relationship With obesity? J Bone Joint Surg Br 2008; 90(1): 92-94.

21. Franco M, Sanz B, Otero L, Domínguez-Vila A, Caballero B. Prevention of childhood obesity in Spain: a focus on policies outside the health sector SESPAS report 2010. Gac Sanit 2010; 24(1): 49-55.
22. Aziz S, Noorulain W, Zaidi UE, Hossain K, Siddiqui IA. Prevalence of overweight and obesity among children and adolescents of affluent schools in Karachi. J Pak Med Assoc 2009; 59(1): 35-38.
23. Tanzil S, Jamali T. Obesity, an emerging epidemic in Pakistan -

A review of evidence. J Ayub Med Coll Abbottabad 2016; 28(3): 597-99.
24. Mohsin F, Tayyeb S, Baki A, Sarker S, Zabeen B, Begum T, et al. Prevalence of obesity among affluent school children in Dhaka. Mymensingh Med J 2010; 19(4): 549-54.
25. Kelishadi R, Haghdoost A, Sadeghirad B, Khajehkazemi R. Trend in the prevalence of obesity and overweight among Iranian children and adolescents: A systematic review and meta-analysis. Nutr 2014; 30(4): 393-400.

....