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Frequency of Overweight and Obesity and its Associated Factors Amongst School Children in Lahore Pakistan

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ABSTRACT

Introduction: Childhood obesity has growing prevalence globally and several grievous health outcomes are associated with it. Present study will help us compute the growing trend of obesity in Pakistan among school children and compare it to the rest of the world.
Aims & Objectives: The objectives of the present study were to determine the frequency of obesity and the factors associated with it amongst children
Place and duration of study: The study was conducted from 2018 to 2019 at different public and private sector schools of Lahore.
Material & Methods: 443 children (6-16 years of age) both male and female were recruited for a cross-sectional study using simple convenient sampling from 10 public and private sector schools of Lahore. Parental consent was taken; moreover, assent was taken from the students. Data was collected on a self-constructed Proforma. Height, weight & BMI were recorded. Subjects were categorized as obese, non-obese and overweight "t" test, one way ANOVA and Chi square tests were applied for comparison of variables in study groups. SPSS version 24 was used for statistical analysis of the data. P-Value < 0.05 was taken as significant.
Results: Our study participants had mean age of 13±0.11 years, of which 33% (males) and 67% (females). Among participants 20% had excess weight (i.e., 9% obese and 11% were overweight). Children from the age group 12-16 years were significantly obese (63%) compared to 6-11 years (37%). There was significant ($p<0.05$) relationship of obesity and overweight with junk food, maternal occupation, lifestyle, socio-economic status, screen time, sleeping hours and family history of obesity (FHO). Obesity has no association with parent's education and educational sector.
Conclusion: 20% among school children were overweight/ obese. Preventive focus should be on children (12-16 years age) who have family history of obesity, screen time >5 hrs and sedentary lifestyle.

Keywords: Obesity, Overweight, School children

INTRODUCTION

Obesity is prevailing in the modern world in all ages, gender, and ethnicities. Obesity is an aberrant or unnecessary fat build-up in the body that risks the health of a person. It is associated with metabolic syndrome, and early deaths[1].
Obesity amongst children is one of the utmost considerable health issues of this century. It was initially thought as a health problem of well-developed countries but now it is increasingly seen in underdeveloped countries. About 340 million children of school going age around the world were overweight and obese in 2016[2]. Under five years of age, overweight children were predicted to be above 41 million, and half among them lived in Asia and one fourth in Africa[3]. Obesity in childhood is a growing health issue in the America and other nations throughout the world. One out of three children in America are facing the problem of unhealthy body weight. Excess intake of calories and less energy expenditure is the utmost common reason of obesity in children who are genetically predisposed for weight gain[4].
The growing trend towards obesity impacts numerous systems in the body affecting quality of life[5]. Especially affected by this change are the younger population for whom easy availability of processed foods and latest technology has pushed them towards a sedentary and unhealthy lifestyle. Children that used to play and run now sit for hours straight, eating pizzas, burgers, and junk food. Our lexicon today is riddled with words like ease and life hacks; our outlook has gone towards 'the faster the better'. This leads to an excess of caloric availability that results in various metabolic disorders. As lifestyle has changed

drastically from the past, the trends for the change in body weight follow in a population. Pakistan is one of the countries in the world with least emphasis on educating the people about their nutritional needs. In recent years, few studies have highlighted the importance and need of a diverse diet and an active lifestyle[6]. Pakistan is at present going from an evolving outbreak of obesity as shown by a study in Lahore emphasizing on the rising trend of obesity in children[7].

Few studies have been done to determine prevalence of overweight and obesity amongst different age groups of school going children in Pakistan. It is a need of the day to determine the extent of burden of excess weight at a younger age. The present study was carried out to determine the prevalence of overweight and obesity and to explore the factors associated with excess weight amongst school going children.

MATERIAL AND METHODS

This cross-sectional study was carried out after seeking approval from Institutional Review Board (IRB) of Shalamar Medical and Dental College (SMDC), Lahore (SMDC/IRB/04-10/126). The sample size was calculated using Open Epi info software for sample size calculation keeping 14% prevalence of obesity (both genders) in 2016 according to WHO[8].Sample size was calculated to be 320, but a total of 443 school going children, including both male and female aged 6-16 years were enrolled in the study to increase the power of study. Simple convenient sampling was done from 10 public and private sector schools of Lahore. Permission was taken from principals of schools and administration was briefed on the objectives and procedure of the survey. Consent forms were sent to homes for parental consent a week prior to sampling and were then collected on the sampling day. Assents were also taken from the children after explaining the study details to them. Students who were underweight, had acute or chronic illness and endocrine disorders, were excluded from the study. Each child was separately questioned and performed as were filled under explicit guidance of the investigator. Data related to socio-demographic variables, lifestyle, physical activity, and dietary habits was collected on a Proforma based on 15 close ended questions.

Income of his/her parents was used to determine the socioeconomic status (Upper, middle, and lower) of each child. The cut off values for income (in Pak rupees) for upper, middle, and lower socioeconomic class was >200,000, 20,000-100,000and <20,000 respectively[9]. Those parents were considered educated who had minimum secondary school certificate[10].Frequency of meal intake was classified into two subcategories: those who were taking <3 full meals and those who were taking ≥3 full meals in a day. The sleep hours were divided into two types: those who had≤10hours sleep and those who had >10 hours of sleep on daily basis. Lifestyle was grouped into two sub-divisions i.e., sedentary (performing light physical activities e.g., typical daily routine tasks) and active (a minimum of 30-45 minutes brisk walk or similar kind of strenuous activity in a day[11]).

The body height was recorded on a wall mounted stadiometer. It was ensured that the child stood erect with the heel and the occiput touching the wall and the shoes taken off. The weight was measured in kilograms using weighing balance with the participant in minimal clothing. The height and weight were then recorded to the nearest one decimal place (0.1), both these measurements were taken twice, and the average was calculated. The information was computed, and Body mass Index (BMI) was calculated.

Children were divided according to centre for disease control (CDC) BMI-for-age growth charts as obese, overweight, and non-obese[12].

Statistical Analysis:

SPSS version 24 was used for data analysis. Frequencies and percentages were calculated for the descriptive data, while quantitative data was expressed as mean ± SEM. 't' test was used to determine the significant difference between the groups and one way ANOVA followed by Turkey test were used. Chi square test was used to check the association of obesity/overweight with the studied variables. p value of < 0.05 was taken as statistically significant.

RESULTS

The response rate of the survey was 85.2%, with a total of 443 responses included in the study, 33% of the total participants belonged to pre-adolescent (6-10yrs) age group and 67% to adolescent (11-16yrs). The mean age of the subjects was 12.84±0.11 years. An equal number of participants were included from the private and public schools of Lahore. 14% of children belonged to lower socioeconomic status, 81% to middle and 5% to the upper class. 37% of the participants had both parents educated (minimum educational qualification being FSc /FA), 25% had one parent educated while 11% had both uneducated parents,

while the rest of the participants did not know. Also 33% of the participants had family history of obesity (Table-1).

In the studied population, 20% children were overweight and obese, of which 11% were overweight and 9% were obese. Subjects with normal BMI were 63% and 17% of subjects were less than the normal body weight (Table-2).

Variables		%	N=443
Age (12.84±0.11 years)	Pre-Adolescent (6-10 years)	33%	146
	Adolescent (11-16 year)	67%	297
Gender	Male	33%	147
	Female	67%	296
Education Sector	Private	49.5%	220
	Public	50.5%	224
Socio-economic status	Low	14%	62
	Middle	80.6%	357
	Upper	5.4%	24
Parental Education	Both Educated	37%	165
	One Educated	25%	112
	Both Uneducated	11%	48
	Don't know	27%	118
Family History of Obesity	Yes	33%	148
	No	67%	295

Table-1: Baseline Characteristics of study population

Category	%	n	BMI (Kg/m^2)
Obese	9%	40	26.98
Overweight	11%	48	23.25
Normal	80%	355	18.42

Table-2: Frequencies of Overweight and Obese School Children

31% of the children between 6-10 years and 69% between 11-16 years of age were overweight /obese. 14% of the overweight/obese respondents were not financially well off, whereas 80% belonged to the middle class and 6% to the upper-class families. 78% children falling in this group had mothers who were housewives. Also 43% of the participants in the overweight/obese category had a family history of obesity.

There was significantly higher BMI of obese/overweight school going children belonging to upper class, whose mothers were housewives and with family history of obesity. Although females had higher BMI compared to males, but the difference was proved statistically insignificant ($p>0.05$). Children with sedentary lifestyle and more than five hours screen time had significantly high BMI. Children who skipped breakfast had significantly higher BMI compared to those having breakfast daily. Children with sleep hours less than 10 hours had significantly more body weight compared to those sleeping for more than 10 hours. There was no significant difference in the mean BMI of overweight and obese children; with respect to parents' education and type of schools they are studying (Table-3).

Variables		BMI (Kg/m^2)		
		%	Mean ± SEM	p-value
Age (year)	Pre-Adolescent (6-10years)	31	23.39±0.63	0.007*
	Adolescent (11-16 years)	69	**25.63±0.47***	
Socio-economic Class	Low	14	23.62±0.58	0.01*
	Middle	80	24.88±0.43	
	Upper	6	**29.27±2.45***	
Mothers' Occupation	Working	14	21.78±1.04	0.002*
	Housewives	78	**25.29±0.41***	
	Unknown	8	26.97±1.62	
Family History of obesity	Yes	43	**26.26±0.59***	0.002*
	No	57	23.94±0.48	
Gender	Males	39	24.37±0.68	0.24
	Females	61	25.31±0.47	
Education Sector	Private	56	24.96±0.49	0.97
	Public	44	24.93±0.65	
Parental Education	Both Educated	35	25.95±0.75	0.30
	One Educated	26	24.57±0.89	
	Both Uneducated	14	24.15±0.64	
	Don't know	25	24.35±0.57	
Lifestyle	Active Lifestyle	21	23.65±1.06	0.008*
	Sedentary Lifestyle	79	**26.42±0.57***	
Breakfast	Daily had Breakfast	59	24.34±0.53	0.006*
	Always Skipped Breakfast	41	**29.29**±0.81*	
Screen Time	<5hrs	83	23.72±0.88	0.004*
	≥5hrs	17	**26.49**±1.13*	
Sleeping Hours	<10hrs	45	**25.43±0.48***	0.047*
	≥10hrs	55	23.91±0.59	

* $p<0.05$ was considered statistically significant
ANOVA test was used to compare the socioeconomic status, maternal occupation, and parental education while rest of the parameters was compared by "t" test.

Table-3: BMI of the variables studied among overweight/obese school children.

There was significant association of excess body weight with daily meal frequency, weekly junk food frequency, family history of obesity and screen time per day (Table-4).

Variables		Overweight/ Obese N (%)	Non-obese N (%)	$\chi 2$	p-value
Daily Meal Freq.	≥3 meals/ day	8 (10%)	48 (20%)	6.9	0.03*
	<3 meals/ day	70 (90%)	188 (80%)		
Weekly Junk Freq.	≥5 meals/ week	34 (39%)	103 (37)	5.9	0.03*
	<5 meals/ week	54 (61%)	176 (63%)		
Family History of Obesity	Yes	39 (43%)	90 (32%)	4.2	0.027*
	No	49 (57%)	189 (68%)		
Screen time per day	<5 hours	61 (69%)	192 (69%)	9.4	0.008*
	≥5 hours	12 (14%)	30 (10%)		
* $p<0.05$ was considered statistically significant					

Table-4: Association of variables measured with Overweight/ Obesity

DISCUSSION

Pakistan is facing the emerging problem of overweight and obesity both in adults and children which is a matter of great concern for the country[13].According to World Health Organization (WHO) report, 20.8% of the adult population was overweight and 4.8% was obese in the 2016[14].The present study reported a total of 20% obese/overweight school children between 6 to 16 years of age, using CDC BMI-for-age growth charts to classify overweight and obesity. Among 20% children with excess body weight 9% were obese and 11% were overweight. The present study included children from both public and private schools of Lahore, Pakistan.

In 2010 a study with 293 participants of Grade 6th & 7th from only two private schools of Lahore, using the WHO BMI-for-age charts to classify overweight and obesity reported that 11.9% of school children were obese and 21.8% were overweight[15]. A study conducted in metropolitan city Karachi[16] has reported 6% obese and 8% overweight among 6th-8th grade school going children using Asian BMI criterion. However, this study had a smaller sample size (n=284) and a narrower age group with no significant relationship with age, whereas the present study showed an increase in the trend of weight gain with age from pre-adolescent to adolescent age group. Present study reported 11% overweight and 9% obese from both public and private schools (school fee ≤ 2000 PKR/month), however in 2011 a study involving primary school children (5-12 years old) of Lahore Pakistan from different private and public schools with high to low fee structure reported 17% and 7.5% of overweight and obese respectively[17], this difference in prevalence rate might be due to inclusion of children from high fee schools also and of a different age group in sample population. Data from Pakistan has reported different prevalence rates of obesity and overweight, this difference is due to different age groups, children from different socioeconomic background, studying in high fee schools and the criteria used to classify obesity and overweight.

Present study exhibited that 14% of overweight/obese belonged to lower socioeconomic class, while 80% of them belonged to middle class and only 6% were those who belonged to upper socioeconomic class. Comparatively an Indian study reported 20% overweight and 6% obese rate among their affluent school going children[18].

Studies from USA and Brazil found higher rate of overweight in children of private sector schools compared to public schools[19,20]. In contrast to these reports present study reported no significant difference in Body Mass Index (BMI) of school children from public and private sectors, as we have not selected children from very high fee schools.

Present study reported 61% females as overweight/obese compared to 39% males, which is in accordance with previous reports with more over with and obesity amongst females of all age groups in Pakistan. These findings may be due to same age group and socioeconomic status of these two studies. Contrary to this, data from India reported more increase in body weight in boys compared to girls[21], in addition this data from USA (in Asian-Americans), Canada, Finland, Brazil and urban India also reported more BMI in boys compared to girls[22,25] that might be due to increased junk food intake.

Present results suggested significant association of excess body weight with meal frequency per day and junk food frequency per week. Likewise, association of obesity with increased meal frequency per day (>3 full meals) has been reported[26].

Current findings also suggested significant association of raised body weight with screen time per day. Similarly other studies also asserted the same association of screen time with increased

BMI, as more time spending with screens promoted sedentary living and increased calorie intake[27-29]. Furthermore, another study reported association between T.V viewing hours, vigorous exercise and BMI[30], compared to this, present study showed that greater physical activity was associated with a decreased risk of being overweight or obesity.

According to present study a significant association of excess body weight with family history of obesity was also noticed. In line with our results in year 2014 a study reported family history of obesity as a vital predictor in relation to child obesity[31]. Moreover, a study from Italy also suggested the strong relation between childhood obesity and family history of obesity, type 2 diabetes mellitus, arterial hypertension, and coronary heart diseases[32].

In the present study a significant high BMI was observed of school children, who belonged to upper socioeconomic class, children of housewives, with family history of obesity, with sedentary living, those who skipped their breakfast and those whose screen time was >5 hrs daily. In accord with our findings another study also supported the inverse relation of increased BMI with physical activity in children, similarly adolescents and pre-adolescents who were used to take their breakfast were less likely overweight/obese.

Rapidly growing rates of Overweight/obesity amongst school going children has now been regarded as a potential public health concern in Pakistan, hence it is the need of the hour to take steps as primary preventive measures in this regard.

Limitations:

The main limitations of our study were limited number of schools included in this study and lack of underweight age group. Similar studies should be done in future on larger sample size and underweight age group.

CONCLUSION

20% of the school children were overweight /obese. Family history of obesity, upper socioeconomic statuses, screen time, lack of physical activity, skipping of breakfast are important factors associated with overweight/obesity among school children.

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