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Research Article

**PREVALENCE OF OVERWEIGHT AND OBESITY AMONG
PRIMARY SCHOOL CHILDREN IN ABU DHABI**¹Dr. Qamar Fatima, ²Dr. Muhammad Kashif, ³Dr. Leenah Ghazi¹Rawalpindi Medical College²Services Institute of Medical Sciences³Sir Ganga Ram Hospital Lahore**Abstract:**

Background: Childhood obesity has become a very common public health issue with large proportion of children falling in category of overweight or obese. This study was conducted to determine the nutritional status of primary school children, and various factors associated with overweight & obesity at Sheikh Khalifa Bin Zayed Arab Pakistani School, Abu Dhabi.

Methods: This case cross sectional study was conducted from 1st April 2017 to 1st April 2018. Study population comprised of all Primary school Children, 1st – 5th grade (5-12 years). Information was collected regarding age, gender, maternal education level, family size, family income, means of travelling to school, having TV/ computer at home, father having private car & child's participation in sports at school etc. Height and weight of children was measured and US 2000 CDC Growth Charts were used to determine nutritional status of children. Data was analyzed using SPSS. Chi square test was applied at 5% level of significance to determine association of different variables with nutritional status.

Results: The study found that the prevalence of overweight / obesity among these children was 25% (13.4% were overweight & 11.6% were obese). The prevalence was nearly the same for males & females. The study also found that the prevalence of overweight/obesity decreased with the increase in parental education. The data also showed that taking part in sports decreased the prevalence of overweight/obesity. Home cooked fatty food and facilities like TV, computer & car were other factors leading to high BMI.

Corresponding author:**Qamar Fatima,**

Rawalpindi Medical College

QR code



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INTRODUCTION:

Childhood obesity is becoming a major public health issue worldwide. Globally the prevalence of childhood overweight and obesity rose from 4.2% in 1990 to 6.7% in 2010. It is expected that this trend will reach 9.1% in 2020 [1]. An European study presented alarming statistics, it showed that the rate of overweight girls ranged between 18percent and 50percent whereas overweight boys ranged between 18percent and 57percent [2]. In developing countries, like Brazil, Mexico and India the prevalence of obesity among children and adolescents was reported to be 22.1 %, 41.8 % and 22.0% respectively [3]. A study conducted in Eastern Mediterranean Region showed that between 7percent and 45percent of school children were either obese or overweight [4]. In the Emirate of Abu Dhabi 15.1% of the school going children were obese while 16.7% of them were overweight [5].

Several studies have described the health impacts of obesity. Excess fat in adulthood can lead to higher rates of Hypertension, Diabetes Mellitus, hypertriglyceridemia and hypercholesterolemia [6]. Obesity in children and adolescents has been associated to the early onset of cardiovascular diseases [7], psychological dysfunction and type 2 Diabetes Mellitus [8]. In addition obesity impairs the posture, causes musculoskeletal abnormalities and brings about social and economic losses during adult life.⁹Recent studies also reported that children with high BMI (body mass index) are also more likely to be overweight or obese in later life and the risk significantly increases as the children grow older. Children who are obese at 18 years of age are 0.7 times more at risk to be obese when they reach adulthood than the children with normal BMI [10]. Several factors are associated to this condition. Defining them is a challenge as they vary according to social, demographic, genetic, psychological, economic, environmental, and individual factors. Data from developed and developing countries suggested low parental education, family history of obesity sedentary lifestyle, lack of physical activities and sedentary activities like watching television, playing video games etc are the major risk factors for childhood obesity [11]. Studies have shown that, in most Arabic-speaking countries, 34percent of mortality in people under sixty years of age is due to weight gain.¹² It is suggested that early interventions must begin to focus on the children who are at risk of obesity. This period of life is the best time to promote behaviors associated with healthy lifestyle, such as physical activities and food preferences which then extend into adulthood [13].

Our focus should be on the fact that obesity is entirely a preventable pandemic provided; the associated risk factors are identified and fought with at early stages of child's growth. Keeping this in view, our study has an objective to determine the nutritional status of primary school children 5-12 years of age and to evaluate the association of obesity with various demographic and environmental variables in those children. In addition, it provides a better understanding of various risk factors involved in childhood obesity, which may support related advocacy and public awareness measures. The conclusions drawn from our study can be used for creating a favorable environment at local level by eliminating those risk factors. At the national level, this could be used to mobilize opinion leaders and decision makers.

MATERIALS AND METHODS:

A cross sectional descriptive study was conducted to assess overweight and/or obesity among primary school children of Abu Dhabi during the months of 1st April 2017 and 1st April 2018. Sheikh Khalifa Bin Zayed Arab Pakistani School was selected from all primary public schools of Abu Dhabi by a simple random sampling technique. The study population was children aged 5-12 years in grades 1st to 5th. Children who were present at the time of visit and willing to participate were included in the study. A total of 268 children were studied. Sample size was calculated using WHO sample size calculator with 95% confidence interval, marginal error of 5%. Operational definitions; Overweight: Body mass index for age and sex greater than or equal to 85th percentile and less than 95th percentile according to CDC 2000, growth monitoring chart. Obesity: Body mass index for age and sex greater than or equal to 95th percentile according to CDC 2000, growth monitoring chart. Ethical clearance was obtained from Abu Dhabi Educational Council, permission was also taken from school principal and head teachers. Written consent was obtained from the participants and their parents after informing them all the purpose, benefit, risk, the confidentiality of the information and the voluntary nature of the participation in the study. Information regarding age, gender, maternal education level, family size, family income, means of travelling to school, having TV/computer at home, father having private car and child's participation in sports at school etc was sought through pretested questionnaire mailed to the parents. Height of the child was measured to the nearest 0.1 cm using a wooden height board fitted with a metallic tape, a head board and a foot board and the weight of the child was measured to the nearest 0.1 kg using a electronic weight scale. All the

data was entered in the structured pretested Performa. Children with illness (e.g.) Fever were excluded from the study. The US 2000 CDC Growth Charts were used to determine nutritional status of children. Children were categorized as Obese, Overweight, Normal weight/Underweight.

Data processing and analysis was done using SPSS version 20. Frequencies and cross tabulations were used to summarize descriptive statistics of the data and tables and graphs were used for data presentation. In order to study degree of association

between dependent and independent variables Chi-square test was applied at 5% level of significance. p-Value of <0.05 was considered statistically significant.

RESULTS:

Out of 500 children screened 267 responded to the questionnaire and were enrolled in the study. Out of 267 subjects 128 (47.94) were boys and 139 (52.05) were girls with a mean age of 8.64 (SD+1.81) years and its range was 7 years.

Figure. 1

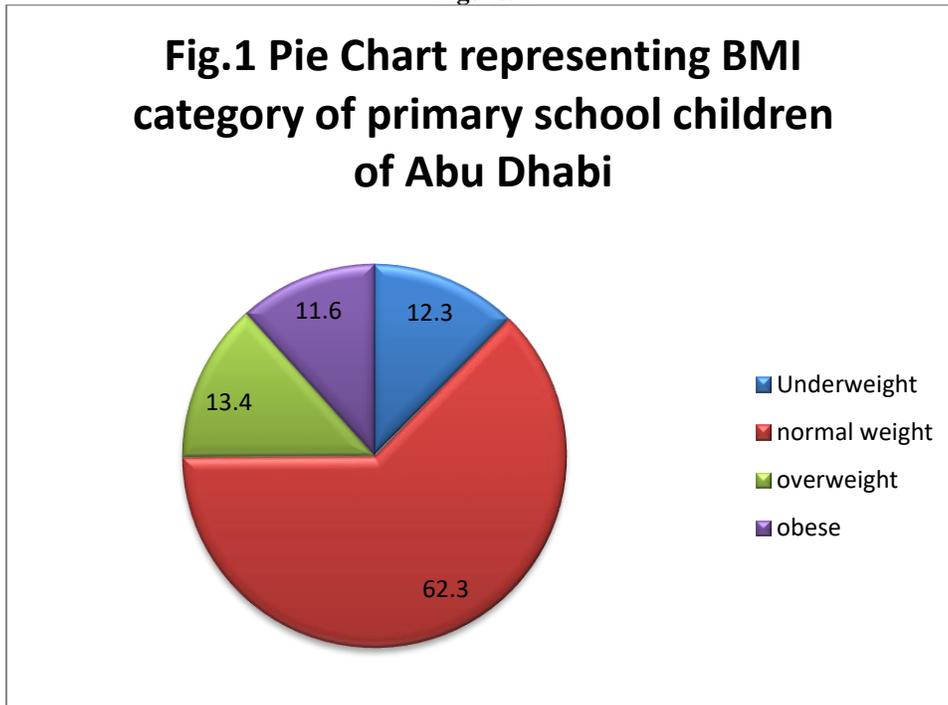


Table.1 Nutritional status

Nutritional status	Frequency	Percentages
Underweight	33	12.3
Normal weight	167	62.5
Overweight	36	13.5
Obese	31	11.6

Table.2 Association of different variables with nutritional status

Baseline characteristics	Total	Malnourished	Adequately nourished	Overweight	Obese	p-value
Age group						0.138
○ 5	1	1	0	0	0	
○ 6	30	4	15	4	7	
○ 7	58	5	47	5	1	
○ 8	44	5	26	7	6	
○ 9	51	7	26	10	8	
○ 10	30	3	22	3	2	
○ 11	31	5	19	4	3	
○ 12	22	3	12	3	4	
Gender						<0.001
○ Male	128	17	75	16	20	
○ Female	139	16	92	20	11	
Family size						0.476
○ Members<5	65	6	46	7	6	
○ Members>5	202	27	121	29	25	
Family Income(dirham)						0.142
○ <5000	96	14	65	9	8	
○ 5000-15000	161	19	95	26	21	
○ >15000	9	0	7	1	1	
Paternal Education						<0.001
○ <high school	36	3	27	2	4	
○ High school	106	16	59	21	10	
○ Bachelor's degree	88	8	59	9	12	
○ Postgraduate degree	37	6	22	4	5	
Maternal Education						<0.001
○ <high school	77	9	52	8	8	
○ High school	83	11	48	17	7	
○ Bachelor's degree	76	10	46	11	9	
○ Postgraduate degree	30	3	20	0	7	
Facilities at home						<0.001
○ TV only	6	0	5	0	1	
○ Computer only	1	0	1	0	0	
○ Car only	1	0	1	0	0	
○ TV and Computer	30	5	17	6	2	
○ TV and Car	15	2	7	3	3	
○ Computer and Car	26	2	16	5	3	
○ TV, Computer and Car	185	24	118	21	22	
○ No TV, Computer or Car	3	0	2	1	0	
Means of travelling to school						<0.001
○ On foot	47	4	29	6	8	
○ School bus	72	16	39	13	4	
○ Car	148	13	99	17	19	
Breakfast						<0.001
○ From home	248	31	154	34	29	
○ From school canteen	8	1	5	1	1	
○ From market/shop	3	1	2	0	0	
○ Don't eat	8	0	6	1	1	

Lunch						
○ From home	252	30	158	34	30	<0.001
○ From school canteen	12	2	7	2	1	
○ From market/shop	3	1	2	0	0	
○ Don't eat	0	0	0	0	0	
Consumption of fast food						
○ Once a month	156	18	98	21	19	<0.001
○ Once a week	96	13	60	12	11	
○ 2-3times a week	6	1	4	0	1	
○ Most days	9	1	5	3	0	
Child's favorite food						
○ Home cooked	162	15	106	24	17	<0.001
○ Fast food	74	13	43	9	9	
○ Fruits and salads	31	5	18	3	5	
Daily hours spent in watching Tv						
○ Less than 1h/day						<0.001
○ 1-2h/day	51	4	35	8	4	
○ More than 2h/day	156	25	111	14	6	
	60	4	21	14	21	
Daily hours spent in physical activities						
○ Less than 1h/day	21	2	5	4	10	<0.001
○ 1-2h/day	193	21	128	24	20	
○ More than 2h/day	53	10	34	8	1	

Out of 267 participants, 13.5% (36 students) were overweight, 11.6% (31 students) were obese and 74.6% represented normal or underweight children. The frequency of overweight and obesity among different age groups and school grades is shown in table 2 and fig 1. The rate of overweight and obesity was highest at the age of 8-9 years (grade 4-5). The frequency of overweight among girls was 7.5% (20 out of 139 girls) compared to 6% among boys (16 out of 128 boys) while the frequency of obesity among boys was 7.5% (20 out of 128 boys) compared to 4.1% (11 out of 139 girls) among girls.

Several variables were tested to determine their effect on BMI. The variables included age, gender, family size, net monthly family income, maternal and paternal educational level, daily hours spent in physical activities/sports, facilities at home like (TV, computer, car), daily hours spent in watching TV, means of travelling to school, source of breakfast and lunch, child's favorite food, daily consumption of fruits, salads and fast food which are shown in Table 2.

A statistically significant ($p < 0.001$) relationship was established between parental education (both maternal and paternal) and BMI measurements showing that lower parental education (less than bachelor's degree) leads to higher BMI measures

while having educated parents (more than bachelor's degree) leads to lower BMI measures. The data showed that playing any kind of sports (like running, biking or football) regularly as well as more hours spent in these physical activities is strongly associated with fewer incidence of overweight and obesity ($p < 0.001$) as shown in table 2. Moreover the data showed that the frequency of overweight and obesity was higher in children who consumed lunch and breakfast from home ($p < 0.01$) as compared to those who consumed breakfast and lunch from canteen, market or shop. A significant negative association was found between consumption of fast food (McDonald/ Kfc/ pizza) and overweight/obesity ($p < 0.01$). The frequency of overweight and obesity was higher in children who consumed fast food rarely like once a month as compared to those who consumed fast food 2-3 times a week or most days. The data also showed that frequency of overweight and obesity was higher in children whose favorite food was home cooked meals ($p < 0.001$) as compared to those whose favorite food was fruits/salads or fast food. A significant association was also found between BMI measurements and means of travelling to school. The frequency of overweight and obesity was higher in children who travelled to school by bus or car as compared to those who went on foot. The data also revealed that incidence of overweight

and obesity is higher in children who had more facilities like TV, computer and car ($p < 0.001$) at home as compared to those who had no or 1-2 facilities at home. Data also showed that spending more hours in watching TV can lead to higher rate of overweight and obesity ($p < 0.001$). No significant association was found between BMI measurement, age, family size and net monthly family income.

DISCUSSION:

Childhood obesity is a serious public health problem with a rapidly increasing prevalence worldwide. In Abu Dhabi previous studies suggested that the prevalence of childhood overweight and obesity has markedly increased. This was confirmed by the results of present study which found that the overall prevalence of overweight and obesity among primary school children was 25.1% (13.5% overweight and 11.6% obese). On the other hand, prevalence of underweight was much lower than that of overweight/obesity (12.3%). The higher prevalence of overweight /obesity compared to that of underweight, may suggest that Abu Dhabi has already passed the transitional phase of increasing childhood overweight and obesity. Although the prevalence of overweight and obesity among primary school children in Abu Dhabi was relatively high, it is still lower than that reported for several neighboring countries like Kuwait 45.3% (30.7% were overweight and 14.6% were obese) [14], Iran 29% (21.1% were overweight and 7.9% were obese) [15], Kingdom of Saudi Arabia, 45% (18.0% were overweight and 27.0% were obese) [16].

On the other hand the prevalence of overweight and obesity in the present study was similar to or higher than that reported for other neighboring Arab countries like in Irbid, in the north of Jordan, 25.0% (19.4% were overweight and 5.6% were obese)¹⁷, Nablus 19.84% (13.42% were overweight and 6.42% were obese) [18], and Qatar 9.5% (6% were overweight and 3.5% were obese) [19]. The differences seen in the results of the different studies may be attributed partially to the effect of genetic, lifestyle and environmental factors. In addition, part of the differences may be due to the variations in the age groups included, study methods and definitions of obesity and overweight across various studies. In the present study the prevalence of obesity was higher in boys than girls. This result was opposite to that reported in studies conducted in Kuwait, Qatar and Jordan [14,17-19]. In the present study; Children who go to school and back to home with a private/family car were more likely to be overweight/obese as compared to the families who had no family/private car and their children going to

school on foot. This finding was congruent with findings of other studies.^{20,21}

The present study showed a consistent decrease in prevalence of overweight and obesity with the increase in parental education, a result which is consistent with the results of other studies.^{22, 23, 24} However these results contradict the findings of the Nablus study²⁵ and Polish study.²⁶ Both studies showed a significant correlation between children's obesity and parental level of education. While a study involving 1458 school girls in Wroclaw, Poland indicated that overweight and obesity had no significant association with educational level of the parents [27].

With respect to family income, in the present study there was no significant association between nutritional status and per capita income. These results are in agreement with the results of Nablus study²⁵ however Al-Riyadh study, showed a negative correlation between monthly family income and the mean caloric intake of the subjects [16]. On the other hand a Jordanian study found that the total monthly family income was significantly associated with increased prevalence of overweight and obesity [17]. Technological advances in the form of hand-held electronic devices, computer games, and television programs have probably contributed to adopt a lifestyle that involves less physical activity and more sedentary activity [28]. A study conducted among children in Iran reported an association between watching television and being overweight [29]. The study demonstrated that watching television decreased the amount of time spent on playing outdoor games which might result in gaining extra weight. Another study in the US reported that watching television or videos for >2 hours a day increased the risk of being overweight in children [30]. In line with these findings our study showed that overweight/obese children spent more time (>4 hours) on sedentary activities (like watching television, playing games on computer) compared to healthy children. Television viewing requires little energy beyond the resting metabolic rate, and also replaces time spent in more vigorous activity. This could be the reason for the positive association with overweight and obesity. This pattern suggests that overweight and obesity prevalence rates are linked to the availability and affordability of sedentary entertainments such as television and computer gaming as confirmed by other studies [31,32].

Our data also suggests that children who spent greater time in physical activities such as playing general outdoor games were less at risk for being overweight or obese. The reduced physical activity of

children could be linked with the rapid urbanization of Abu Dhabi where around 9,450,157 people are currently residing. The city is expanding in all directions in response to the need for housing, leading to a reduction of open recreation spaces and therefore, probably contributing to a change in physical activity pattern of both children and adults. However, reduced space issue remained doubtful as the healthy children of this study were engaged in physical activities while residing in the same location. Further exploratory research among young children to understand physical activity practices including type of activities practiced would be useful to design effective public health programs that aim to promote physical activity in this setting. Our study also demonstrated that children whose families prefer them to eat fatty and fried foods were more likely to be overweight and obese than children whose favorite food was fruits or salads. This finding is similar with the findings of studies conducted in Canada³³ and Romania³⁴ where the consumption of junk foods were found to be associated with overweight and/or obesity. This may be due to families preference may increase children uptake of fats and fried foods which are high energy dense foods resulting in excess accumulation of fat in the bodies to end up with overweight and/or obese child. Similarly in our study greater proportion of children who consumed breakfast and lunch from home were found to be overweight/obese than children who consumed meals from canteen, market or shops. Another important finding was that the children who consumed fast food more often were less likely to become obese as compared to children who consumed fast food rarely. This result could be due to the fact that greater proportion of children in our study was from Asian families who use to make fatty/ fried food at home promoting the deposition of extra fat on body.

The strength of our study includes the use of a culture and population specific questionnaire for data collection and the measurements of anthropometric characteristics instead of self-reporting. However we did not use any previously validated physical activity questionnaire to measure physical activity of study participants. We conducted this study in one school in Abu Dhabi. So, the risk factors that we identified may not be representative of every state in U.A.E. Finally, other factors which can affect excess body weight like genetic factor, health condition and drug use of participants were not addressed in this study.

CONCLUSION:

In conclusion, based on the results of the present study, we can conclude that the prevalence of overweight and obesity was relatively high among

school children in Abu Dhabi. Therefore, there is an urgent need to spread awareness about obesity, its consequences, and ways and means of prevention especially among school children. In addition, nutrition and physical education programs in schools are recommended to promote healthy life styles and healthy dietary habits among school children and their families. In addition, further studies are needed to find out the causes of obesity in Abu Dhabi.

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