

Risk factors for overweight and obese middle school children in Dagon Township, Yangon Division

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The school-based, cross-sectional study was conducted during July-October 2008, to identify risk factors associated with overweight and obesity among middle school children in Dagon Township, Yangon Division. Three hundred students (150 males and 150 females) from a randomly selected school participated in this study. About 77% of students were within normal BMI for age, 13.7% were overweight and 9.3% of these students were obese. By the binary logistic regression analysis, family history of obesity, low level of maternal education, eating snacks and others rather than rice and curry at lunch time, playing less than 3 days per week and playing less than 60 minutes per day were found to have statistically significant association with overweight/obesity.

INTRODUCTION

According to the World Health Organization (WHO), childhood obesity is one of the most serious public health challenges of 21st century. The problem is global and it is steadily affecting many low- and middle-income countries, particularly in urban settings. The prevalence has increased at alarming rate, and in 2007 an estimation was made that 22 million children under the age of 5 years were overweight throughout the world. More than 75 percent of overweight and obese children live in low- and middle-income countries. Moreover overweight have epidemic proportions on a world scale. The prevalence of overweight and obesity among adults is increasing in high-income, as well as in low- and intermediate-income countries [1].

Obesity is considered a global epidemic because its prevalence and severity in both adults and children are increasing worldwide at an alarming rate. This increase has been related to highly sedentary lifestyle with less physical activity as well as changing dietary habits, and it occurs not only in developed countries, but also in

developing countries and in countries with economic transition. Myanmar is also undergoing economic development leading to nutrition transition and rapid changes in dietary habits and lifestyle. It may result in creating opportunities for rising levels of childhood obesity. In one Myanmar study it was found that the prevalence of overweight and obesity in 10-19 years old school going adolescents in Yangon was 4.8% (2.1% in boys and 2.7% in girls) [2]. Studies related to obesity are scarcely reported in Myanmar and it has only a few data regarding obesity of its people. Moreover, most of the nutritional surveys were targeted to mothers and children whereas research for adolescents, especially for overweight and obesity was still limited.

The study was conducted with the objectives of identifying the proportion of overweight and obesity in middle school children and risk factors associated with overweight and obesity in those school children.

MATERIALS AND METHODS

A school-based cross-sectional study was conducted from July to October 2008.

To fulfill the objectives, sample size was calculated as follows:

Using the global prevalence of the adolescent obesity (20%), (p) = 0.2

Sample size was determined using formula $n = Z^2 (1-\alpha/2) p q / d^2$

Where,

- n = the desire sample size
- z = the standard normal deviate, usually set at 1.96, which corresponds 95% CI
- p = proportion of expected overweight and obese children = 0.2
- q = 0.8 (1-0.2)
- d = absolute precision set at (0.05)²

Therefore,

$$\begin{aligned} n &= (1.96)^2 \times (0.2) \times (0.8) / (0.05)^2 \\ &= 245.86 \\ &= 246 \end{aligned}$$

Taking into consideration of possible refusal rate of 20%, sample size of 300 (with 150 males and 150 females) was taken.

Multi stage sampling method was applied which involved as follows:

Out of the six downtown areas, Dagon was selected as judgmental sampling. Assuming it as a representative area of modernized urban setting, we can see significant changes in socioeconomic status and life styles of middle school children residing in it. Out of 3 high schools and 3 middle schools in Dagon Township, Basic Education Middle School No (1) was randomly selected.

The next sampling unit was a class. All classes were listed to get a sampling frame. Each class was given a number and fifteen classes were selected randomly. A final list of middle school students from the selected classes were made for next stage sampling. The school children from each chosen classes were listed to get a sampling frame. Each student was given a number and ten numbers of male students and ten numbers of female students were randomly selected using a table of random number to obtain 20 students from each of fifteen class. A consecutive of classes with middle school children was taken in all the classes until the required sample size was met.

Informed written consents were obtained from each selected students. Weight and height of the selected school children were measured by using the bath room weighing scale and stadiometer respectively by either a trained male or female measurer or by the investigator. Calculation of body mass index (Kg in body weight/m² in height) was carried out. Body mass index for age percentile for girls and boys were classified as normal, overweight and obese, according to the growth chart, developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000) [3].

To assess the associating factors, all of the selected children were interviewed and recorded using structured questionnaire. Family history of obesity, education of parents, routine dietary patterns and physical activities at home and school of participants were included in the structured questionnaire. The ages of the student were assessed by examining personal data taken from school enrollment.

RESULTS

Figure 1 shows that majority of the school children (77%) are found to be normal BMI for age ($\geq 3^{\text{rd}}$ -85th percentile). Students with overweight (>85th-95th percentile) are 13.7% and 9.3% of students are obese (>95th percentile).

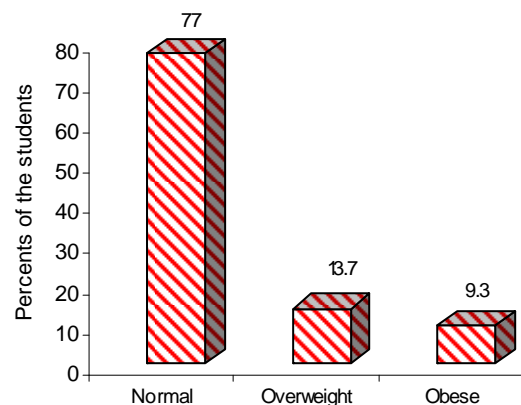


Fig 1. Distribution of BMI-for-age of the study population

Table 1 shows the associated risk factors for overweight and obesity of the study population. Family history of overweight and obesity are commoner in overweight/obese students than that of students with normal weight (26.8% vs 9.6% for overweight and 25.3% vs 4.4% for obesity, $p<0.01$). In the families of overweight/obese students, their parents are significantly obese than other relatives (31.8% vs 16.6%, $p<0.05$). Lower maternal education is found significantly in obese students than in students with normal weight (19.1% vs 7.5%. $p<0.05$).

Table 1. Associated risk factors for overweight and obesity of the study population

	BMI for age			Total No. (%)
	Normal No. (%)	Over weight No. (%)	Obese No. (%)	
Sex				
Male	113 (75.3)	22(14.7)	15 (10.0)	150 (100)
Female	118(78.7)	19(12.7)	14 (9.3)	150 (100)
History of obesity in family				
Yes	34(47.9)	19(26.8)	18 (25.3)	71 (100)*
No	197(86.0)	22(9.6)	10 (4.4)	229 (100)
Obese person in				
Parents	14(34.1)	14(34.1)	13 (31.8)	41(100)**
Relatives	20(66.7)	5(16.7)	5 (16.6)	30 (100)
Education of mother				
Low	31(66.0)	7(14.9)	9 (19.1)	47 (100)**
High	200(79.1)	34(13.4)	19 (7.5)	253 (100)
Lunch pattern				
Snack and others	59 (62.1)	22(23.2)	14 (14.7)	95 (100)*
Rice and curry	172(83.9)	19(9.3)	14(6.8)	205 (100)
Play at home per week				
<=3days	148(71.5)	36(17.4)	23 (11.1)	207 (100)*
>=4days	83(89.2)	5(5.4)	5(5.4)	93(100)
Duration of playing at home				
<60 mins	197(74.6)	40(15.2)	27(10.2)	264(100)**
=>60 mins	34(94.4)	1(2.8)	1(2.8)	36(100)
Duration of studying school lessons per day				
<60 mins	89(86.4)	9(8.7)	5(4.9)	103(100)**
=>60 mins	142(72.1)	32(16.2)	23(11.7)	197(100)

* $p<0.01$ ** $p<0.05$

Regarding the dietary habits, overweight and obese students had snacks and others rather than rice and curry than students with normal weight (23.2% vs 9.3% for overweight and 14.7% vs 6.8% for obesity, $p<0.05$). There are no significant differences between

having of oily meals, fast foods and free sugar of overweight/obese students and those of students with normal weight. Data are not shown.

Regarding the physical activities, the students who play ≤ 3 days per week and <60 minutes in most days of the weeks at home are significantly overweight and obese than those who had less playing times ($p<0.01$ and $p<0.05$, respectively). Overweight/obesity is significantly found in the students who study the school lessons one hour per day than those who studied shorter times. Durations of playing television or computer games and watching television are not significantly different between overweight/obese students and students with normal weight. Data are not shown.

Table 2. Odds ratios of associated risk factors for overweight/obesity of the study population

Risk factor (N = 300)	Odds Ratio (95% CI)	p level
Presence of obese person in family	5.768 (3.010-11.055)	0.000
Low level of maternal education	2.361 (1.052-5.295)	0.012
Eating fast foods and snacks rather than rice at lunch time	3.369 (1.769-6.417)	0.000
Low frequency of playing at home (less than 3 days per week)	5.749 (1.249-26.451)	0.002
Shorter duration of playing at home (less than 60 minutes)	3.233 (1.440-7.261)	0.015

According to binary logistic regression (Table 2), the students who have family history of obesity and eat fast food and snack rather than rice and curry at lunch times have 5.8 times and 3.4 times more likely to have overweight and obesity. There are 2.4, 5.7, and 3.2 times more likely to develop overweight and obesity in students who have lower maternal education, shorter duration of playing at home.

DISCUSSION

Studies on overweight and obesity are important not only for prevention of diseases but also for promotion of good

health. Developing healthy life styles by having sound nutritional knowledge among school-age children will raise the physical growth and mental well-being and it is more likely that these habits will be maintained for whole life.

Out of 300 students, 77% of students were normal BMI-for-age, 13.7% of students were overweight (more than 85th percentiles for age) and 9.3% were obese (more than 95th percentiles for age). The findings are similar to the findings of studies performed elsewhere [4, 5]. A study in Canada among school children revealed that 16.65% were overweight and 11.8% were obese [4] and a study in Myanmar found that prevalence of overweight and obesity was 14.7% and 10.3% respectively among school children [3]. Our result is comparable to that of Thailand where the prevalence of obesity was 12.2% in 1991 to 15.6% in 1993 [3].

In this study, there is no association between sex and overweight/obesity of the children. This finding is similar with that of studies in Canada and Italy [6, 7]. However, a study in Brazil showed that the prevalence of overweight and obesity in girls was higher than that in boys (22.9% vs 21.1% respectively) [8].

Association had been found between family history of obesity and overweight/obesity of children in our study and is similar with that of a study in Kuwait [9]. Our finding of association of low level of maternal education with overweight/obesity of the children is similar to that of studies done in Brazil [8] and in Mexico [10].

In our study statistically significant association is found between lunch pattern and overweight/obesity. In a study in Thailand it was found that higher frequency of meals, higher frequency of consume snack and higher frequency of fried food consumption had statistically significant association with obesity status [11] for prevention of overweight/ obesity.

Physical activity is one of the influencing factors for development of obesity. American

Medical Association recommended at least 30 minutes for adults and 60 minutes for children of moderate physical activity in most days of week and to reduce the amount of time spent in sedentary activities to less than 2 hours a day status [12].

Regarding the physical activity, a significant association was found between habit of playing and duration of playing with overweight/obesity in children. This finding is similar to the finding of a study in Canada status [13]. However, the study in Kuwait showed no association with physical activity of 6-13 years children with overweight/ obesity status [9].

We conclude that the findings in our study regarding presence of family history of obesity, low level of maternal education, eating snacks and others rather than rice at lunch time, playing less than 3 days per week and playing less than 60 minutes at home as risk factors for overweight and obesity among school children are to be considered as areas for interventions to be undertaken to prevent obesity among school children.

It is important that, the actions undertaken should be intensified at all levels. Improvement in education levels of parents may promote the nutritional knowledge of their children. Children and adolescents also need information, skills, access to health services, safe and supportive environment to get normal growth. Their nutritional knowledge, perception and eating pattern may stand on one point for possession of healthy life. Childcare providers, especially parents and teachers should review and apply methods to create healthy life styles of children. Therefore, parents, teachers and health authorities should interact to communicate and collaborate to reduce prevalence of obesity and its health problems.

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REFERENCES

1. WHO: Global Prevalence and Secular Trends in Obesity. Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Expert Committee, Geneva: WHO 2000: 894: 7-23.
2. Me Me Thar. A study on prevalence in risk factors for adolescent obesity in Yangon Division. A dissertation submitted for degree of Master of Medical Science (Paediatrics), Defence Services Medical Academy 2004.
3. Body mass index for age percentile for girls and boys were classified as normal, overweight and obese, according to the growth chart, developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).[Cited 2008 Sep 25]. Available from: URL: <http://www.cdc.gov/growthcharts>.
4. He M & Beynon C. Prevalence of overweight and obesity in school children. *Canadian Journal of Dietetic Practice and Research* 2006; 63 (3): 125-129.
5. Min Kyaw Htet. Factors associating overweight and obesity in Primary Five School Children at International language and Business Center, Yangon. Thesis for the Degree of Master of Medical Science in Public Health. University of Medicine II 2007.
6. Haque F, de la Rocha AG, Horbul BA, Desroches P & Orrell C. Prevalence of childhood obesity in northeastern Ontario. *Canadian Journal of Dietetic Practice and Research* 2006; 67 (3): 143-147.
7. La Torre VG, Langiano E, Berardi D & Ricciard G. Overweight and obesity among secondary school children in Central Italy. *European Journal of Epidemiology* 1999; 15 (7): 649-654.
8. Giuliano PI & Carneiro EC. Factors associated with obesity in school children, *Journal de Paediatrics* 2004; 80 (1): 17-22.
9. Shaltout AA, Nkansa-Dwamena D, Mourad M, Al-Sheikh N & Galal O. Factors associated with obesity in Kuwaiti children. *European Journal of Epidemiology* 1991; 15 (1): 41-49.
10. Hernandez B, Rivera JA, Sepulveda-Amor J, Shamah-Levy T, Vuelas-Nasu L, Monterrubio EA, Ramirez-Silva CI & Farcia-Feregrino R. Factors associated with overweight and obesity in Mexican school-age children, *Salud Publica de Mexico* 2003; 45 (4): S551-S557.
11. Yunimar Usman. Factors related to obesity in primary school children: a case study of Nakhon Pathom Province, Thailand, Thesis paper 2004.
12. American Medical Association. AMA delegates tackles obesity. *The Press Enterprise* 16 June 2004.
13. Veugelers PJ & Fitzgerald AL. Prevalence of and risk factors for childhood overweight and obesity. *Canada's Leading Medical Journal, CMAJ* 2005; 173 (6): 503-515.