ASSESSMENT OF CHILDHOOD OBESITY AND OVERWEIGHT IN THAI CHILDREN GRADE 5-9 IN BMA BILINGUAL SCHOOLS, BANGKOK, THAILAND

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ABSTRACT: Childhood overweight and obesity has become an important public health problem in Thailand. A cross-sectional descriptive study was conducted among 250 students to assess the situation of obesity and overweight of Thai children attending grade levels 5-9 in BMA bilingual schools in Bangkok, Thailand. The data was collected by self-administered questionnaire. Data was analyzed by using descriptive statistic and logistic regression to examine the relationship between independent and dependent variables. The independent variables were knowledge, attitude, and practice on diet and physical activity, body image, depression, anxiety, and peer pressure. The results indicated that children were 10.4% overweight and 8.4% obese. There were statistically significant associations between children's diet practice (adjusted OR 2.4, 95% CI 0.946-6.103) and body image (adjusted OR 0.09, 95% CI 0.012-0.650) with childhood overweight and obesity. This indicates that policies should be implemented to improve the health-education program to signify the importance of dietary habits and physical activity. A much directive approach on the food-environment on the school's compound and intervention should be directed not only on school children, but include the whole family are recommended.

Keywords: BMA, Bilingual school, BMI, Obesity, Overweight

INTRODUCTION

Obesity prevalence is increasing worldwide at an alarming rate in both developed and developing countries [1]. There are an estimated about 1.1 billion overweight and obese adults in the world, with an estimated 10% of all children now being overweight [2]. The prevalence of obesity has increased substantially over the last few decades and indications are that this trend will continue [3-5].

Childhood overweight and obesity have reached epidemic proportions and are major public health problems nationally and globally. A survey conducted in Thailand by the National Health and Nutrition Examination Survey reported that obese childhood obesity has more than doubled since the 1960s [6]. Childhood obesity had become an important public health problem in Thailand, especially in big cities such as Bangkok. While there are many factors related to this increasing trend towards childhood obesity, energy imbalance linked with high-caloric intake and physical activity are the most important [7, 8]. A study mentioned the cause of problem to the way of life in urbanization. Children always spend more time watching television, playing video games and computer, and in the same time, they are snacking junk food together [9, 10]. The increased consumption of sugar-sweetened beverages is also associated with higher energy intake, weight gain, and obesity [11].

Many studies have shown that obese children tend to become obese adults [12]. Moreover, adults who were obese children have increased morbidity and mortality rates [13]. For thus reason the prevention of overweight in childhood is one means of preventing adult diseases associated with obesity. With the prevalence of childhood obesity rising in Thailand, there is no information known regarding the prevalence of overweight and obesity in children in a bilingual school under the Bangkok Metropolitan Administration (BMA). Hence, it is critical to assess factors involved in overweight and obesity among Thai children. The objective of this study is to determine the prevalence and risk factors of overweight among Thai children attending grade levels 5-9 in BMA bilingual schools.

MATERIALS AND METHODS

This study was a cross-sectional analytical study conducted in 6 BMA bilingual schools. With no study on childhood obesity in a BMA bilingual school available, this study was beneficial and

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contributed to the understanding of the situation, development of prevention programs and/or promoting activities in the future. The inclusion criterion of study population was children of both sexes attending grade levels 5-9 studying in a BMA bilingual schools. The exclusion criteria was children who were injured (arms and hands) and were unable to use both hands to answer the questionnaire on the date of the data collection and those who were absent on the date of the data collection. Two hundred and fifty students were selected as subjects. The sampling technique used in choosing the subjects was stratified random sampling, while the sampling technique for choosing the school was purposive sampling. The measurement tools consist of self-administered questionnaire, which was composed of three separate parts: 1) General information 2) Knowledge, attitude, and practice towards diet and physical activity 3) Psychological factors that affect a childhood overweight and obesity (body image, depression, anxiety, peer pressure). The pilot study was carried out to test the reliability of questionnaire. All questions were pre-tested with 30 students and reliability of 0.9 was calculated using Cronbach's alpha co-efficient method. Permission was obtained from the Managing Director and the Principal of the six schools, with parents signing a written consent for permission. Data was collected from January until February 2012.

The dependent variable was the child's BMI percentile categorized as normal, overweight, and obese. Measurements of the child's height and weight strictly followed the CDC Atlanta guidelines for measuring children. The independent variables included knowledge on diet and physical activity, attitude on diet and physical activity, practices on diet and physical activity, level of body image, depression, anxiety, and peer pressure.

Data was analyzed using Statistical Package for Social Sciences (SPSS version 17). The statistics used were descriptive statistics for frequencies, percentage distribution, and means ± standard deviation (SD), and logistic regression was used to compute unadjusted odd ratios (OR), 95% confidence interval (CI), and a *p*-value less than 0.20 was selected for inclusion in multivariate logistic regression analysis. For each variable included, a *p*-value of less than 0.05 was used to consider statistically significant. In the logistic models, overweight and obesity (each categorized as a dichotomous variable) served as the dependent outcome variables.

Ethics approval was sought from the Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University.

Table 1 Socio-demographic characteristics of respondents

Characteristics	Frequency	Percentage (%)
Gender		
Male	143	57.2
Female	107	42.8
Total	250	100.0
Age		
11	9	3.6
12	44	17.6
13	109	43.6
14	88	35.2
Total	250	100.0
Mean (SD)	13.1 (0.81)	
Educational level		
Grade 5	50	20.0
Grade 6	50	20.0
Grade 7	50	20.0
Grade 8	50	20.0
Grade 9	50	20.0
Total	250	100.0
Daily allowance		
<50 baht	74	29.6
50-100 baht	120	48.0
101-200 baht	48	19.2
>200 bath	8	3.2
Total	250	100.0
Ethnicity		
Thai	163	65.2
Chinese	14	5.6
Thai-Chinese	40	16.0
Thai-Indian	1	0.4
Thai-Others	25	10.0
Others/Not sure	7	2.8
Total	250	100.0

RESULTS

General characteristics of the population

Two hundred and fifty children were enrolled from six BMA schools in Bangkok, Thailand. The description of general characteristics of the study subjects includes gender, age, educational level, daily allowance, and ethnicity. All respondents were above 10 years and under 14 years old. There were more male respondents (57.2%) than female (42.8%). The mean age was 13.1 and SD was 0.81. The majority of the respondents were 13 years olds (43.6%). Only a few were 11 years old (3.6%). The majority of the respondents were Thai (65.2%). More details of the sociodemographic characteristics are presented in Table 1.

Nutritional status among school children

Using the cutoff point of CDC growth charts, children were classified as underweight, normal,

Table 2 Unadjusted odd ratios (OR) and 95% confidence interval (95% CI) for childhood overweight (≥85th percentile)

	OR	95% CI		*p-value*
Gender				
Male	1.00	Reference		
Female	1.73	0.876	3.429	0.11**
Age				
11-13	1.00	Reference		
14	0.79	0.408	1.512	0.47
Educational level				
Grade 5-6	1.00	Reference		
Grade 7-9	0.84	0.432	1.642	0.61
Daily allowance				
<50 baht	1.00	Reference		
50-100 baht	0.46	0.178	1.199	0.11**
>100 bath	0.74	0.337	1.599	0.43
Ethnicity				
Thai	1.00	Reference		
Others	1.45	0.711	2.946	0.30
Knowledge on diet				
High	1.00	Reference		
Moderate/Low	1.36	0.680	2.968	0.38
Knowledge on physical activity				
High	1.00	Reference		
Moderate/Low	0.70	0.366	1.350	0.29
Attitude on diet				
High	1.00	Reference		
Moderate/Low	1.35	0.533	3.410	0.52
Attitude on physical activity				
High	1.00	Reference		
Moderate/Low	1.31	0.620	2.786	0.47
Practice on diet				
High	1.00	Reference		
Moderate/Low	1.87	0.815	4.280	0.14**
Practice on physical activity				
Practice	1.00	Reference		
Did not practice	0.84	0.434	1.607	0.59
Body image				
Positive	1.00	Reference		
Negative	0.13	0.022	0.705	0.018**
Level of depression				
No	1.00	Reference		
Mild	0.87	0.091	8.229	0.90
Moderate	1.02	0.109	9.653	0.98
Severe	5.60	0.472	66.447	0.17**
Level of anxiety				
No anxiety/Healthy anxiety	1.00	Reference		
Unhealthy anxiety	0.81	0.082	7.941	0.85
Peer pressure				
Can resist	1.00	Reference		
Cannot resist	1.59	0.792	3.178	0.19**

*** p-value <0.20 to be entered into the multiple logistic regression model*

overweight, and obese. The results of the study showed that 11.6% were underweight, 69.6% were normal, and the prevalence of overweight was 10.4% and obesity was 8.4% in school children attending grade levels 5-9 in BMA bilingual schools.

Unadjusted Logistic Regression Analyses

In unadjusted logistic regression analyzes of overweight, there were no statistically differences in the age, educational level, ethnicity, knowledge on diet and physical activity, attitude on diet and physical activity, practice on physical activity, and

Table 3 Adjusted odd ratios (OR) and 95% confidence interval (95% CI) for childhood overweight (≥85th percentile)

	OR	95% CI		*p-value*
Gender				
Male	1.00	Reference		
Female	1.53	0.742	3.175	0.34
Daily allowance				
<50 baht	1.00	Reference		
50-100 baht	0.37	0.135	1.004	0.06
>100 bath	0.67	0.289	1.530	0.47
Practice on diet				
High	1.00	Reference		
Moderate/Low	2.4	0.148	0.735	0.04*
Body image				
Positive	1.00	Reference		
Negative	0.20	0.079	0.519	0.001*
Level of depression				
No	1.00	Reference		
Mild	0.61	0.057	6.593	0.68
Moderate	0.73	0.068	7.759	0.79
Severe	4.01	0.294	56.865	0.29
Peer pressure				
Can resist	1.00	Reference		
Cannot resist	1.65	0.794	3.445	0.18

** Significant at p-value <0.05*

anxiety towards childhood overweight and obesity. Data are presented in Table 2. Female was associated with an increased risk of overweight. Children who received daily allowance of 50-100 baht a day are almost half likely to be overweight/obese. Children who had a moderate/low practice levels of eating habits were almost twice more likely to be overweight than children with high attitude towards diet. Children who were severely depressed were almost six times more likely to be overweight than children who were not depressed. Children who could not resist peer pressure were found to be almost one and half time more likely to be overweight than children who reported to be able to resist peer pressure.

Adjusted Logistic Regression Analyses

In multivariate logistic regression analyzes, six variables were significantly association with childhood overweight and obesity. Data are presented in Table 3. Eating habits were significant and children who don't' have good eating habits were almost two and half times likely to be overweight (adjusted OR 2.4, 95% CI 0.946-1.603). Children who have negative body image are almost 80% unlikely to become overweight/obese (adjusted OR 0.20, 95% CI 0.079-0.519). Therefore, the important factors leading to childhood overweight and obesity was eating habits.

DISCUSSION

Childhood overweight and obesity has become an important public health problem in Thailand. The results of the study indicated that the prevalence of overweight and obese children were 10.4% and 8.4% respectively. It is noticeable that these rates are adjacent to studies conducted earlier, which reported that 11.5% Thai children were overweight [14]. National Health and Nutritional Examination Survey (NHANES) indicated that 14.6% children in Bangkok Metropolitan schools were overweight [15]. Moreover, this percentage corresponds well with studies in 2006 that reported 18.9% of Bangkok children were overweight [16].

Statistics from the Global School-based Student Health Survey (GSHS), which is conducted by Thailand Department of Health, indicated that overweight among children is about 10%. Based on the Thai National Statistical Office, the national prevalence of obesity by gender are 7.0% obese boys and 6.7% obese girls. However, this study reported a lower prevalence in boys (5.6%) and a much lower prevalence in obese girls (2.8%). In the study, gender was significantly associated with overweight. Girls were more likely to be overweight than boy (OR 1.44, 95% CI). Whereas, some studies have reported the odd of being overweight and obese in males and females were similar [17], other studies pointed out that boys from grade 4 to 6 were significantly higher than girls.

One interesting observation was the low level of moderate exercise. The percentage of students who do moderate exercise was lower than expected. Many students exercised but did not do moderate exercise. It is likely that many students did understand the importance of moderate exercise. Various studies have pointed that moderate exercise clearly lowered many health risks associated with obesity [18]. Children's sedentary lifestyle and the increased in inactivity are among the major contributors to the increased prevalence of childhood obesity [19, 20]. Furthermore, there was a high percentage of students who exercised less than 30 minutes. This low frequency of exercise can be likely due to the lack of health education in BMA bilingual schools. In fact, it has been shown in various studies that health education has increased physical activities among students [21, 22]. Another explanation could be due to the urbanization lifestyle.

Another factor could that is likely to be the cause of no association between anxiety and childhood obesity is that the measure on anxiety used in the study was limited to anxiety on school performance only. Anxiety on daily lives experience would have been a better tool to study the association between anxiety and childhood overweight and obesity.

Some studies found major depression or depressive symptoms to be predisposing factors for later weight gain among children and adolescents [23-25]. Though, in this study, depression was not significantly associated with childhood overweight and obesity. However, the high odd ratios of severe depression with a wide range of 95% CI indicated a larger sample is required to thoroughly investigate the association. Though, adolescents were associated with more experience of depression, the case for a relationship between obesity and depression is far from proven [26]. Children with negative body image were 90% unlikely to become overweight. Though, more studies have to be conducted on body image to fully understand the association. However, we assume children who have negative body image are likely to be conscious about their weight and hence eat less. A study reported that body mass index was positively related to body dissatisfaction [27].

All the six BMA schools implemented the School Lunch Program (SLP) subsidized by the government and Bangkok Metropolitan Administration to serve lunch to primary students. However, the prevalence of childhood overweight in Thai children attending grade levels 5-9 is still arguably high. SLP has been beneficial towards primary students. However, observation made during school visits indicated that food-vendors within school compound sell high-caloric food, such as fried chicken and french-fries to students. Soda-machines and/or soft drinks were also freely available to students within the school compounds.

Overall, there were very few associations between independent and depend variables. A reason for few associations could highly be due to children at this age is heavily influenced by hormonal changes than other age groups [28]. Nevertheless, childhood overweight and obesity is a serious public health problem based on its increasing rates and the associated health risks. Obesity is a multifactorial chronic diseases stemming from complex interactions between genes and environment. However, dietary and physical activities are behavioral risk factors that are modifiable. This study indicated that the prevalence of childhood overweight and obesity in BMA bilingual schools is of concern. Our finding highlights the importance of two risk factors for childhood overweight: eating habits and peer pressure.

In view of the recognition that diet can make a substantial contribution to childhood overweight and obesity, research is needed to evaluate family based intervention that target the promotion of fruit and vegetable consumption and the practice of physical activity. However, researches about childhood overweight and obesity in Thailand are still in the early stages.

LIMITATION

The results cannot be generalized to the rest of Bangkok population. The study did not observe other risk factors for overweight and obesity that involves laboratory tests and had to rely heavily on the response of the questionnaire.

RECOMMENDATION

Further studies should be done in a larger scale and include hormonal assessment and an assessment of daily life anxiety instead of school-performance based anxiety only. Health-education program should be revised to further signify the importance of dietary habits and physical activity. Interventions strategies should be directed not only at children, but should include the whole family.

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