Prevalence of Overweight and Besity Among School Children in Suburb Thailand Defined by the International Obesity Task Force standard

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Background: *Overweight and obesity is an emerging problem among children worldwide. Body mass index (BMI) is widely used to define overweight and obesity as it correlates well with high accuracy to measure body fatness.*
Objective: *Aim of the present study is to determine the prevalence of obesity in Thai school children by using the International Obesity Task Force (IOTF) standard.*
Material and Method: *The school based cross-sectional study was conducted in 1,140 children aged 6-15 years in Ongkharak, Thailand. Anthropometric measurements including weight and height were obtained to determine BMI. The results were analyzed statistically by applying student t-test, and Chi-square test.*
Results: *The prevalence of overweight and obesity among school children in suburb Thailand was 12.8% and 9.4%, respectively. There were no significant differences in prevalence of overweight and obesity between gender splits and between age specific groups.*
Conclusion: *The prevalence of overweight and obesity has been dramatically increasing among Thai children. Further long-term follow-up studies are required to determine the growth pattern of children with higher BMI for age and to survey for obesity-related co-morbid condition in Thai children.*

Keywords: *Child, Obesity, Overweight, International obesity task force, IOTF*

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The prevalence of obesity is dramatically increasing among children worldwide[1] . Childhood obesity is associated with several risk factors for later heart disease and other chronic diseases including type 2 diabetes millitus, asthma, sleep apnea, gallbladder disease, dyslipidemia, hypertension, social and psychological consequences, osteoarthritis and cancers[2-4]. The are several methods and cutoff points to define overweight and obesity, however, body mass index (BMI) is accept to be one of the best method[5]. It correlates well with body fatness and obesity related comorbid conditions both in adults and children. Although BMI is internationally used, the country report of childhood obesity from Thailand was based on weight for height which is less sensitive standard[6]. This study was to investigate the prevalence of overweight and obesity among school children in suburb Thailand using International Obesity Task Force (IOTF) standard.

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Material and Method

The school based cross-sectional study was conducted in children aged 6-15 years in Ongkharak district, Nakornnayok province, Thailand between June and September 2007. Based on the assuming prevalence of overweight and obesity about 13% and acceptable standard error of 0.02, the sample of 1,086 was required. The schools were then selected using simple random sampling till the required sample size was reached. The study included 1,140 children from 2 primary schools which covered around 13% of school children aged 6-15 years in Ongkharak district. Written informed consents were obtained from the head of in-

stitutions and parents before commencing the data collection. Anthropometric measurements and demographic data were obtained by trained staffs. Weight to the nearest 100 gram and height to the nearest millimeter were measured. BMI was calculated as weight/(height)^2 [kg/m^2]. According to IOTF criteria, all children whose BMI were more than 85th percentiles for the age and sex were considered as overweight and more than 95th percentiles for the age and sex were considered obese.

Statistical analysis was performed with SPSS 11.0 software package. The discrete variables were compared with Pearson's Chi-square. Continuous variables were compared by using a student's t-test. The differences were considered as significant if p-value < 0.05.

Results

The average age of study population was 10.02 $\pm$ 2.10 years with half of population being males. The average BMI in boys and girls was 17.85 $\pm$ 4.13 kg/m^2 and 17.90 $\pm$ 4.18 kg/m^2, respectively. The overall prevalence of overweight and obesity was 12.8% and 9.4%, respectively. Of 577 males, 71 (12.3%) were classified as overweight and 56 (9.7%) were obese. Of 563 females, 75 (13.3) were diagnosed as overweight and 51 (9.1%) were obese. There was no significant difference in prevalence of overweight and obesity between gender splits. The prevalence of age- and sex-specific overweight/obesity was detailed in Fig. 1. There was no significant difference in the prevalence of overweight/obesity between adolescents (aged 10.1-18 years) and children (age 6-10 years), in which 138 of 587 (23.5%) adolescents and 115 of 553 (20.8%) children were overweight/obese (p-value 0.29). There were no significant differences in number of person in the child's living place and incidence of single child between overweight/obese and non obese children. The characteristics of the study population were showed in Table 1.

Discussion

The prevalence of overweight and obesity is significantly increasing in developed countries as well as in developing countries. In the United States, the prevalence of obesity among children based on BMI nearly doubled in the past 2 decades[7,8]. Based on IOTF standard, recent data have shown that the prevalence overweight (including obesity) were range from 0.1-17.9% in Africa region, 8.1-36% in Americas region, 8.2-35% in European region and 1.7-36.5% in Asian region[9]. This difference could be due to ethnic difference, difference in standard diagnostic criteria, and the different age range of studies. From the Ministry of Public Health Report 2005, the overall prevalence of childhood obesity in Thailand was 9.7%[6]. However, this report was based on weight for height standard which was not well correlated with person's fatness as same as body mass index. It found that the prevalence of overweight/ obesity varied among regions of Thailand in which 13.3%, 7.7%, 10,4% and 7.5% of children and adolescent (2 days-19 years) in Central, Northeastern, Northern and Southern part of Thailand were overweight/obese, respectively[6]. However, there was no specific data of childhood obesity from Bangkok or surrounding area reported. As the reported prevalence varied around the world and among regions, we sought to determine local data regarding the prevalence of overweight including obesity from children in Ongkarak district, Nakornnayok province, 70 kilometers from Bangkok Metropolitan. In order to making international comparisons and monitoring the global epidemic of obesity, the new international standard proposed by Cole et al (IOTF) was employed[10]. Moreover, compared to weight for height standard, BMI is widely accepted as providing a convenient measure of fatness which is an important risk factor of adult morbidity and mortality[11,12]. Up to present, this is the first ever study in Thailand to report the prevalence of childhood overweight including obesity by using BMI regarded to the IOTF standard.

In the present study, the prevalence of overweight including obesity of Thai children was 22.0% and 22.4% in males and females, respectively, which were comparable with other Asian and Pacific region countries (Table 2). The prevalence of overweight/obesity in Thai children has dramatically increased among Thai children. Even though the different standards were used, the present study shown that the prevalence of childhood overweight/obesity was more than double since 2005[6]. To measure the true increasing of the obesity prevalence, the agreement between IOTF standard and weight for height standard by using the present data was examined. We found that the agreement between overweight/obesity by IOTF standard and by obesity weight for height standard was excellence (K value = 0.89). Two hundreds and forty-six children (21.6%) were diagnosed as obesity by weight for height standard (W/H > 120%) compared to 253 (22.2%) children were diagnosed as overweight/obesity by IOTF standard. Forty three of 1,140 children (3.8%) were found disagreement in diagnosis (Table 3).

The present data showed that prevalence of

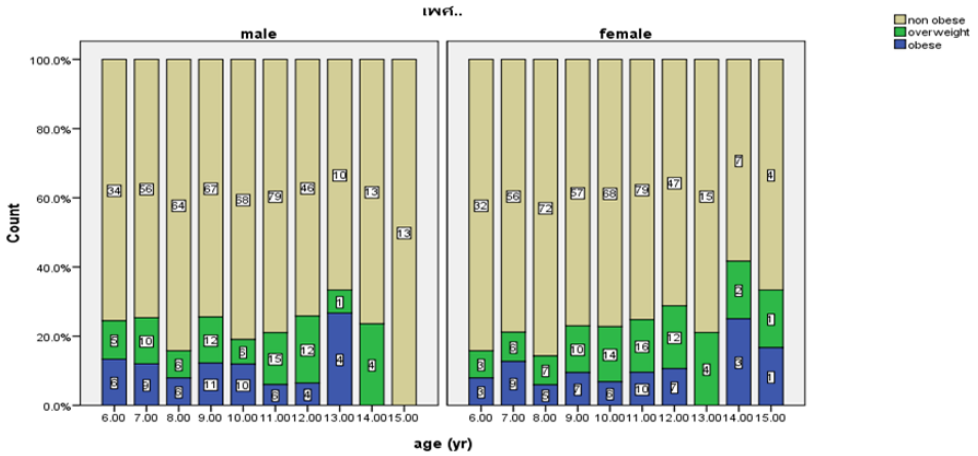

Fig. 1 Age and sex adjusted for overweight and obesity prevalence using International Obesity Task Force standard

Table 1. Characteristics of the study population (n = 1,140)

	All (n = 1,140)	Overweight/obese (n = 253)	Non obese (n = 887)	p-value
Male; n (%)	577 (50.6)	127 (50.2)	450 (50.7)	0.89
Age [years] ; mean (SD)	10.02 (2.11)	10.20 (2.10)	9.98 (2.11)	0.14
Weight [kg] ; mean (SD)	73.41 (28.15)	105.37 (32.08)	64.30 (18.74)	<0.01
Height [cm] ; mean (SD)	134.59 (13.81)	139.64 (13.49)	133.16 (13.57)	<0.01
BMI [kg/m^2] ; mean (SD)	17.87 (4.16)	23.98 (4.01)	16.13 (1.98)	<0.01
No of persons in the child's living place ; mean (SD)	4.97 (1.77)	4.83 (1.64)	5.01 (1.81)	0.15
Single child; n (%)	199 (17.5)	53 (20.9)	146 (16.5)	0.11
Age group [years]; n (%)				0.29
6-6.99	83 (7.3)*	17 (20.5)**	66 (79.5)**	
7-7.99	146 (12.8)	34 (23.3)	112 (76.7)	
8-8.99	160 (14.0)	24 (15.0)	136 (85.0)	
9-9.99	164 (14.4)	40 (24.4)	124 (75.6)	
10-10.99	172 (15.1)	36 (20.9)	136 79.1)	
11-11.99	205 (18.0)	47 (22.9)	158 (77.1)	
12-12.99	128 (11.2)	35 (27.3)	93 (72.7)	
13-13.99	34 (3.0)	9 (26.5)	25 (73.5)	
14-14.99	29 (2.5)	9 (31.0)	20 (69.0)	
15-15.99	19 (17)	2 (10.5)	17 (89.5)	

*% of study population; **% of specific age group

overweight/ obesity was increasing at an alarming rate in both young children and adolescent. Longitudinal studies indicate that the overweight child is at significant risk of remaining overweight into adulthood[13, 14]. Moreover, the risk of obesity persisting into adult is higher among obese adolescents than among younger children[14]. As childhood obesity is associated with significant health and financial burdens, the early recognition and interventions for childhood overweight are essential throughout childhood to prevent obesity prevalence. BMI is widely accepted to define overweight and obesity. It is well correlate to body fatness and obesity-co morbid conditions, feasible to measure and had the international standard for making international comparisons. We advocate that BMI should be routine assessment in children for early detection and

Table 2. Prevalence of childhood overweight including obesity defined by IOTF* standard

Country	Year	Age (year)	Male (%)	Female (%)
China	1999-2000	11-15	14.9	8.0
Japan	1999-2000	6-14	16.2	14.3
Singapore	1993	10-15	20.4	14.6
Taiwan	2001	6-18	26.8	16.5
Australia	2007	9-13	25.0	30.0
New Zealand	2000	11-12	30	
Present study	2007	6-15	22.0	22.4

*IOTF = International Obesity Task Force

Table 3. Estimate of prevalence of overweight/obesity using IOTF and weight for height standards

			IOTF* standard		
			non obese	overweight/obese	Total
W/H** standard	Non-obese (W/H ≤ 120%)	n	869	25	894
		% within W/H	97.2%	2.8%	100.0%
		% within IOTF	98.0%	9.9%	78.4%
	Obesity (W/H > 120%)	n	18	228	246
		% within W/H	7.3%	92.7%	100.0%
		% within IOTF	2.0%	90.1%	21.6%
Total		n	887	253	1140
		% within W/H	77.8%	22.2%	100.0%
		% within IOTF	100.0%	100.0%	100.0%

*IOTF = International Obesity Task Force; **W/H = Weight for high

prevention of childhood overweight and obesity.

The present study did not found the effects of age, sex, single child or number of person in the child's living place on the prevalence of obesity as the previous report[15]. This might be explained by the small sample size in each specific group as the obesity was a trend toward higher prevalence in single child and inversely associated with small number of people in the child's living place.

In conclusion, the prevalence of overweight and obesity among school children in Ongkharak district, suburb of Thailand, has been dramatically increasing among Thai children to 12.8% and 9.4%, respectively. Further long-term follow-up studies are required to determine the growth pattern of children with higher BMI for age and to survey for obesity-related co-morbid condition in Thai children.

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อุบัติการณ์ของภาวะน้ำหนักตัวเกินและโรคอ้วนในเด็กนักเรียนไทยบริเวณชานเมืองโดยประเมินตามเกณฑ์นานาชาติ

สงวนศักดิ์ ฤกษ์ศุภผล, ลัคนา ฤกษ์ศุภผล

***บทนำ**: ภาวะน้ำหนักตัวเกินและโรคอ้วนในเด็กเป็นปัญหาที่พบมากขึ้นทั่วโลก การประเมินภาวะนี้ โดยใช้ดัชนี มวลกาย เป็นวิธีที่นิยมโดยทั่วไป เนื่องจากมีความสัมพันธ์และมีความเที่ยงตรงสูง ในการประเมินสัดส่วนไขมันของร่างกาย*

***วัตถุประสงค์**: เพื่อหาอุบัติการณ์ของภาวะน้ำหนักตัวเกินและโรคอ้วนในเด็กนักเรียนไทยโดยใช้ดัชนีมวลกายตามเกณฑ์การประเมินนานาชาติ*

***วัสดุและวิธีการ**: การศึกษาเชิงตัดขวางที่โรงเรียนในอำเภอองครักษ์ จังหวัดนครนายก ในนักเรียนอายุ 6 ถึง15 ปี จำนวน 1,140 คน ทำการวัดน้ำหนักและส่วนสูงเพื่อคำนวนดัชนีมวลกาย การวิเคราห์สถิติโดย student t-test และ Chi-square test*

***ผลการศึกษา**: อุบัติการณ์ของภาวะน้ำหนักตัวเกิน และโรคอ้วนในเด็กนักเรียนไทย เท่ากับร้อยละ 12.8 และ ร้อยละ 9.4 ตามลำดับ และไม่พบความแตกต่างอย่างมีนัยสำคัญของอุบัติการณ์ของภาวะน้ำหนักตัวเกิน/โรคอ้วนระหว่างเพศและกลุ่มอายุต่างๆ*

***สรุป**: อุบัติการณ์ของภาวะน้ำหนักตัวเกิน และโรคอ้วนในเด็กไทยเพิ่มขึ้นมากจากรายงานในอดีต ควรทำการศึกษาชนิดติดตามผลระยะยาว เพื่อประเมินการเจริญเติบโตรวมทั้งดัชนีมวลกาย และผลแทรกซ้อนที่สัมพันธ์กับโรคอ้วนในเด็กไทย*