

Research Article

**OBESITY AND RELATED FACTORS AMONG STUDENTS GRADE 7-12
IN PHUTTHAMONTHON DISTRICTS, NAKHON PATHOM, THAILAND**

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ABSTRACT

Obesity is a worldwide epidemic. In Thailand, obesity prevalence is increasing dramatically in adult and children.

Method: this was a cross-sectional study. The objective was to determine the prevalence of obesity and its related factors among students grade 7-12. Two hundred and thirty students were selected by multi-stage cluster sampling technique. Student anthropometry was measured and factors related to obesity were assessed by a questionnaire.

Results: the prevalence of obesity among the sample was 8.7%, fat was 6.04% and slightly fat was 5.65%. Paternal occupation had a significant relationship to obesity. This may be the indirect impact of family income. The result revealed that students who ate fruits more than three times per week were 3.69 times at risk of obesity than those who ate fruits less than or equal to 3 times per week (95% CI for OR 1.04-13.13). Physical activities and nutritional knowledge were found to be not significant factors in this study.

Conclusion: the large potential for obesity to develop is alarming. This study has produced result that contradict many previous studies so the results need to be treated with great care and unless further research confirm them.

KEYWORDS

Obesity Eating habit Physical activities

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โรคอ้วนและปัจจัยที่เกี่ยวข้องในกลุ่มนักเรียนระดับมัธยม 1-6 ในอำเภอพุทธมณฑล จังหวัดนครปฐม ประเทศไทย

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บทคัดย่อ

โรคอ้วนเป็นปัญหาสุขภาพอย่างหนึ่งของทั่วโลก ประเทศไทยมีความเปลี่ยนแปลงทางสังคมอย่างรวดเร็ว มีการเพิ่มขึ้นของโรคอ้วนอย่างสูงทั้งในกลุ่มผู้ใหญ่และเด็ก

การศึกษาแบบตัดขวางในครั้งนี้ ดำเนินการในอำเภอพุทธมณฑล จังหวัดนครปฐม ประเทศไทย ในปี 2008 โดยมีวัตถุประสงค์เพื่อศึกษาถึงความชุกของโรคอ้วนและปัจจัยเสี่ยง ที่ก่อให้เกิดโรคอ้วนในกลุ่มนักเรียนระดับมัธยม 1-6 สุ่มเลือกกลุ่มตัวอย่างแบบหลายขั้นตอน ได้กลุ่มตัวอย่าง 230 คน นักวิจัยซึ่งนำหนัก วัดส่วนสูง ของนักเรียน และเก็บรวบรวมข้อมูลปัจจัยเสี่ยงต่อการเกิดโรคอ้วน โดยแบบสอบถาม

ผลการวิจัยพบว่าเด็กนักเรียนมีภาวะโรคอ้วนร้อยละ 8.7 อ้วนร้อยละ 6.04 และค่อนข้างอ้วนร้อยละ 5.65 อาชีพของบิดามารดามีความสัมพันธ์อย่างมีนัยสำคัญต่อโรคอ้วน รายได้ของครัวเรือนมีความสัมพันธ์ทางอ้อมกับโรคอ้วน ปัจจัยด้านเพศ สถานภาพการสมรสของบิดามารดา ระดับการศึกษาของบิดามารดา และลำดับที่ของบุตร มีความสัมพันธ์อย่างไม่มีนัยสำคัญกับภาวะโรคอ้วน พบว่านักเรียนที่รับประทานผลไม้มากกว่า 3 ครั้ง ต่อหนึ่งสัปดาห์ มีความเสี่ยงที่จะเป็นโรคอ้วน 3.69 เท่าของนักเรียนที่รับประทานผลไม้ 3 ครั้ง ต่อสัปดาห์หรือน้อยกว่า การบริโภคอาหารอย่างอื่น เช่น อาหารฟาสต์ฟู้ด อาหารทอดและปนมัน รวมทั้งกิจกรรมเคลื่อนไหวทางกาย และความรู้ทางโภชนาการ ไม่พบว่ามีความสัมพันธ์อย่างมีนัยสำคัญกับโรคอ้วนในการวิจัยนี้ การใช้เวลาดูทีวี การรับความบันเทิงที่ขาดการเคลื่อนไหว ของกลุ่มนักเรียนที่มีและไม่มีภาวะโรคอ้วน ไม่แตกต่างกันอย่างมีนัยสำคัญ

การก่อเกิดโรคอ้วนมีสัญญาณขยายตัวเพิ่มมากขึ้น จำเป็นที่จะต้องให้การติดตามนักเรียนที่เป็นโรคอ้วนและค่อนข้างอ้วนอย่างใกล้ชิด การศึกษาครั้งนี้ให้ข้อค้นพบที่แตกต่างจากการวิจัย ในระยะที่ผ่านมาในทางตรงกันข้าม ดังนั้น จำเป็นต้องพิจารณาอย่างระมัดระวัง และควรดำเนินการวิจัยเพิ่มขึ้นในอนาคตเพื่อหาข้อยืนยัน การส่งเสริมการบริโภคอาหารเพื่อสุขภาพและการมีกิจกรรมทางกายเพื่อหลีกเลี่ยงโรคอ้วน ควรมีการดำเนินการต่อไป

คำสำคัญ

โรคอ้วน บริโภคนิสัย กิจกรรมทางกาย

INTRODUCTION

Excess body weight poses one of the most serious public health challenges of 21st century for all over the world. Nowadays, prevalence

of overweight and obesity is increasing rapidly both in children and adults, with many health consequences. WHO further projected that by

2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese(1). These situation will increase risk of premature death, to serious chronic conditions that reduce the overall quality of life(2).

Thai obesity prevalence is also increasing dramatically both in adult and children. The prevalence of obesity among schoolchildren aged 6–12 years in Thailand raised from 12.2% in 1991 to 15.6% in 1993(3).

A longitudinal study in Thailand in 2005 showed that The prevalence of overweight at Grade 7 of boys and girls were 13.6% and 9.9% and the prevalence of boys and girls at Grade 12 were 14.0% and 10.4%, respectively. The prevalence of obesity in the first year in school in boys and girls were 26.8% and 13.5%, and the prevalence in Grade 12 were 15% and 10.8%, respectively (4). A study in 2004 revealed that prevalence of obesity among primary school children in Nakhon Pathom province, Thailand, was 26%(5).

Since, the obesity prevalence of Thailand in general and of Nakhon Pathom province in particular is alarming, this study was conducted for assessing the prevalence of obesity among students grade 7–12 in Nakhon Pathom province, describing the eating habit, physical activities, and nutritional knowledge of students, the relationship between these factors and obesity were examined.

Theoretical framework

Ecological Systems Theoretical Framework, which adapted to applied in this study, was developed by Urie Bronfenbrenner since 1979. The author assumed that individual development was affected by surrounding contexts. He divided

these contexts into five systems, Microsystem, Mesosystem, Exosystem, Macrosystem, Chronosystem. In 2001, a study of K. K. Davison and L. L. Birch concluded that the development of childhood overweight involves a complex set of factors from multiple contexts that interact with each other to place a child at risk of overweight. This system can be effectively conceptualized using Ecological Systems Theory (17).

Assessment of obesity

Assessment of obesity in this study was conducted by using Thai standard W/H, W/A, H/A as shown in Table 1.

Table 1 Thai nutrition standard

Z scores	Nutritional status		
	W /H	W /A	H /A
< -2 SD	Slim	Light	Short
-2 SD < -1.5 SD	Skinny	Under-weight	Slightly-short
-1.5 SD -1.5 SD	Proportionate	Average-weight	Average-height
> 1.5 SD -2 SD	Slightly-fat	Over-weight	Slightly-tall
> 2 SD - 3 SD	Fat	Heavy	Tall
> 3 SD	Obesity		

W /H : weight for height
W /A : weight for age
H /A : height for age

METHODOLOGY

A cross-sectional study was conducted in January, 2008. 230 students aged 12–18 years old in Kanchanabhisek vidyalaya school, Phuttha monthon district, Nakhon Pathom province, were selected by multi-stage cluster sampling. Students who were using any kind of medicine or drug more than 5 days during the data collection were not included. Students an-

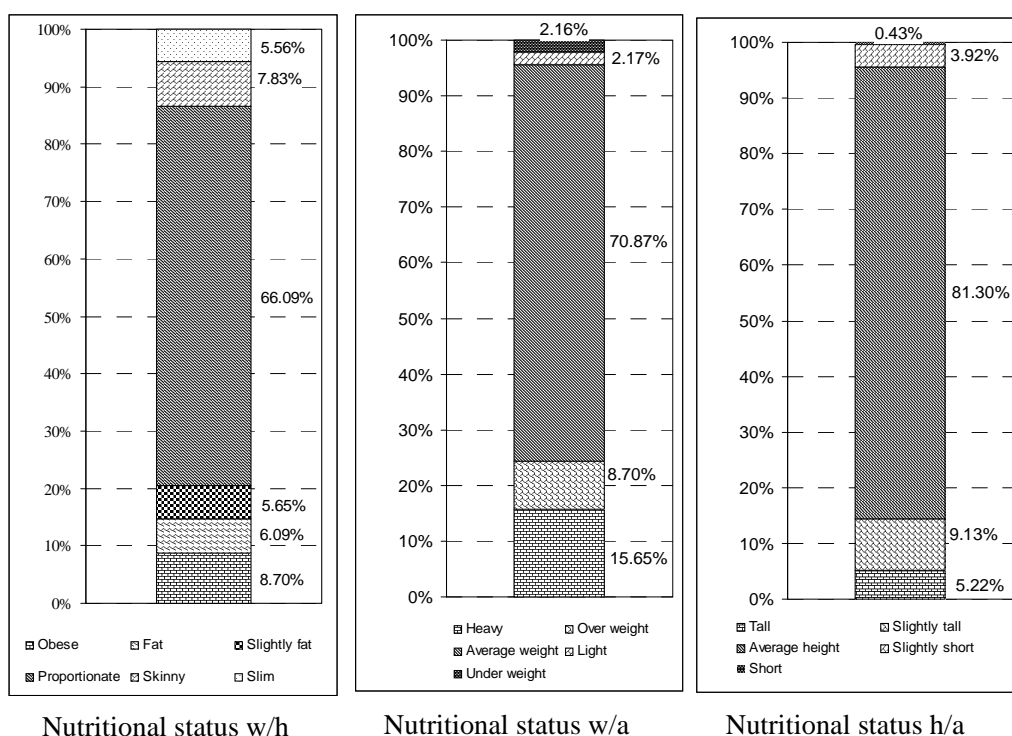
thropometry were measured. Factors related to obesity were assessed by a questionnaire. They were sociodemographic factors (age, gender, birth order, parents marriage status, parents education, parents occupation, daily allowance), eating habit factors (food consumption, habits concerned with daily meal), physical activities factors (vigorous physical activities, moderate physical activities, passive entertainment activities, leisure time), and nutritional knowledge. Analyse data by

descriptive statistic, Chi-square test and Multiple logistic regression was performed to predict the obesity status.

RESULTS

Using Thai standard, the prevalence of obesity among students grade 7-12 in Phuttha Monthon district, Nakhon Pathom province, Obese was 8.7%, fat was 6.04% and slightly fat was 5.65% (Figure1).

Figure 1 Nutritional status of students



There were 101 males (43.91%) and 129 females (56.09%) in this study. Around 62.61% of the students were the first child in their family and their parent have stayed together (86.96%). Around 68.45% of student's father

have good education from diploma and higher, and 33.78% of them run their own business, 34.67% were government officers. Around 63.88%, student's mother had good education, 30.84% run their own business, 20.26% were

government officers, 27.3% were housewife and no job.

Averagely, a student got money from their parents 60 baths per day, (min 20 baths-max. 200 baths.) However, could not found significant association between daily income and obesity. Similarly, gender, birth order and parent's marriage status had no significant relationship with obesity.

The students whose fathers run their own business or were government officers, were higher percentage of obesity than those whose fathers were laborers, employees, no job, or farmers.

This was found statistical significant association with p value =0.040 (table 2). Father's education did not associate with obesity.

There was not significant association between mother's occupation, mother education and obesity status. Around 7.73% of the students whose daily income was more than 50 baths per day were obese, 17.39% of those who had income less than 50 baths per day were obese, its seemed to be a negative association between daily income and obesity status, but significant association was not found.

Around 46.52% of the students used to eat fast food, among them 50.47 % had fast food more than 2 times perweek and 21.74% ate snacks more than 3 days per week. A round 23.91% of the students have soft drink more than 3 days per week .

Around 32.61% of the students used to consume starch (Potatoes, bread, Noodle) more than 3 days per week and that for sugar (chocolate, ice cream, sweet, candy) was 33.91%.

More than 50.00% of the students ate fatty food like fried chicken, fried pork, fried potatoes,

roasted beef, more than 3 times per week, 93.04% of students used cooking oil, butter, cheese, mayonnaise less than 3 times per week. And 61.30% of them ate eggs more than 3 days per week.

Table 2 Association between sociodemographic factors and obesity status

Socio-demographic factors	Obesity (%)	Non Obesity (%)	χ^2	p value
Gender				
Male	10.89	89.10	1.093	0.296
Female	6.98	93.02		
Birth order				
First	7.64	98.36	0.542	0.462
≥ Second	10.47	89.53		
Parent's marriage status				
Living together	10.00	90.00	***	0.084
Other*	0.0	100.0		
Father's occupation				
Business	9.21	90.79	6.418	0.040
Government officer	14.10	85.90		
Other**	2.63	97.37		
Father's education				
≤ High school Diploma	8.50	91.50	0.125	0.939
≥ Bachelor	10.00	90.00		
≥ Bachelor	8.50	91.50		
Mother's occupation				
Business	8.60	91.40	2.086	0.555
Government officer	10.87	89.13		
Housewife	11.29	88.71		
Other	4.08	95.92		
Mother's education				
≤ High school diploma	9.76	90.24	1.507	0.471
≥ Bachelor	4.08	95.92		
≥ Bachelor	9.38	90.62		
Daily allowance				
≥ 50 baths/day	7.73	92.23	***	0.234
< 50 baths/day	17.39	82.61		

* Other: Divorced; living separately; father died; mother died

** Other: laborer, employee, no job, farmer

*** Fisher exact test

More than 70% of the students ate vegetables more than 3 times per week, among them 53.37% ate everyday. Similarly 63.48% had fruits more than 3 days per week, among them 42.46% ate everyday. Nearly 70% of the students reported using milk more than 3 times per week, among them 70.63% drank it everyday, cacao was the second choice, more than forty percent drank cacao 4-7 times per week. Just 11.74% drank fruit juice everyday.

Fruit and milk intake were significant associated with obesity with $p = 0.048$ and $p=0.003$ alternately. After adjusted the students who had fruits more than 3 days per week were 3.69 times more likely to be obese compared to those who had fruits less than or equal to 3 days per week (95% CI: 1.04 - 13.13; $p = 0.044$). Other factors were no longer association with obesity status. (Table 3). Characteristic of daily meal such as fast food consumption, times of fast food per week, number of meals per day, time of last meal every day were not found to be significant association with obesity status.

Physical activities

Around 35.22% of the students played sport like football, running, badminton, swimming more than 3 times per week and 71.80% played sport more than 20 minutes each times.

Around 42.17% of the students joined in moderate physical activities such as walking, cycling, housework, gardening, more than 5 times per week and 38.05% spent more than 30 minutes each time.

Nearly all of students joined in passive entertainment such as: go on internet, chatting, computer game, 45% did it everyday. Students usually spent average 2.5 hours per day for passive entertainment and average 3 hours for watching TV. During these activities, more than 50% had food such as snack

Only 18.69% of the students spent their leisure time for active activities such as sport and moderate physical activities, 81.31% used their leisure time for inactive activities.

There was no significant association between physical activities and obesity. Time spent for passive entertainment activities and for watching TV were not significant difference between obese group and non obese group.

Nutritional knowledge

About nutritional knowledge of the student 19.13% of the students had good knowledge, 60.87% fair, 20% poor. The students had very low knowledge on cause and consequence of obesity. There was no significant relationship between knowledge and obesity status.

Table 3 M
S

Predicto
Gender
Male
Female
Snack
> 3 days
≤ 3 days
Fruit
> 3 days
≤ 3 days
Full creat
> 3 days
≤ 3 days

DISCUSSION

Prevalence of obesity

The obesity prevalence found in this study was 8.7% similar with the study of Germaine L et al. They found that prevalence of obesity among children 7 to 9 years old in government school in Northeast of Thailand was 8.3% (18). In 2000, a study in Saraburi Province, Thailand, showed that prevalence of childhood obesity was 22.7% in urban and 7.4% in rural areas (6).

Phuttha Monthon is the rural-urban area, income per capita is lower than other urban area in Nakhon Pathom Province, so the prevalence of obesity may be lower. On the other hand, this district shares the border with Bangkok, the socioeconomic status here may be better than the other rural area hence the prevalence of obesity is greater than the other rural area.

In the study of Yunimar Usman, 2004 (5), prevalence of obesity in primary school students in Nakhon Pathom province was 26%, it was much more higher than this study, but the criteria for classifying obesity was different between two studies. In Yunimar Usman's study, Z score (weight for height) greater than 2 SD was obesity but in this study Z score from 2 SD to 3 SD was fat, greater than 3 SD was obesity, this may lead to the different result.

By using WHO standard (BMI for age) to assess nutritional status, the prevalence of obesity was 7.39% less than that by Thai standard. WHO recommendation may base on nutrition surveys of European and American, that adolescent were taller and heavier than adolescent in Southeast Asian countries, therefore the cut off point for classifying nutritional status

was higher than Thai Standard. This may lead to lower prevalence of obesity.

Gender

This study found that the prevalence of obesity of male (10.89%) was higher than female (6.98%) this tendency was consistent with the study of Elisabete Ramos et al 2006 (7) and Yunimar Usman, 2004(5). The explanation may concern with the social perception and culture, Obese boys were more acceptable than obese girls.

Father occupation

Father's occupation had a significant association with obesity status. This may be explained that these jobs (business, government officer) have higher income than the others. Using Chi-square test to determine the relationship between father's occupation and student's daily allowance, the result revealed the significant association. This showed indirectly that family income had impact to obesity status. That result was consistent with other study carried out in Thailand and other South East Asian countries (8,9).

Fruit consumption

This study found positive significant association between fruit consumption and obesity. After adjusted the result showed that students who have eaten fruit more than 3 times per week were at risk of being obese 3.69 times greater than those ate less than or equal 3 times per week. (adjusted OR: 3.69, 95% CI 1.04-13.13; p=0.044). It was inconsistent with the other studies. One study has observed that increasing fruit and/or vegetable intake was associated with a reduced risk of major weight gain or becoming obese (10), but another one found no such relationship (11).

Fruit consumption in this study was not approached in detail hence consumption of various kind of fruit was not clarified, this may lead to difference results from the other studies.

Milk consumption

There was a significant association of milk consumption and obesity (p value =0.003). it seemed to be that the more milk intake the higher prevalence of obesity. This was in contrary with the cohort study of Schulz M et al in 2004 among 17369 adults in Germany, both men and women who lost weight over a two-year period reported a higher intake of milk and milk products than those who maintained their weight (12). The difference may explained by the role of confounder "sugar" one factor have strong relationship with obesity (13), this study did not distinguish milk with sugar or not.

Fast food consumption

Ebbeling, D.B. et al 2002 suggested that Fast-food consumption has strong positive associations with weight gain and insulin resistance, suggesting that fast food increases the risk of obesity and type 2 diabetes (14). In this study no significant association between obesity and fast food was found. There may be two reasons. At first, in Thailand fast food was quite expensive particularly with adolescent, hence they could not approach it easily, the second in Phuttha Monthon district, there were not many fast food restaurant compared with urban area like Bangkok metropolitan therefore fast food consumption among adolescent here was not so high.

Physical activities

Association between physical activities and obesity were found in many studies (15) but that kind of association was not found in this study.

It's may because in this study physical activities was assessed by insufficient questionnaires and accelerometry was not used, However the relationship between physical activities and obesity was not simple, there were complicated interaction among three factors: physical activity, food consumption and obesity.

Watching TV

There no significant difference of watching TV time between obese and non obese group was found, similar with the result of Yunimar Usman's study in 2004(5). Other study had indicated that television viewing alone, as an index of inactivities, was strongly associated with obesity (16). This means the relationship between obesity and watching TV was sophisticated, it may concerned to eating food during watching TV or motivated to eat by food advertisement on TV programs.

Nutritional knowledge

For questions on causes and consequences of obesity, many students have incorrect answer or don't know (nearly 50%), it suggested the demand of further health education for these issues. Consistent with study of Gordon Larsen in 2001 (16), There was no significant association between nutritional knowledge of students and their obesity status.

CONCLUSION

The prevalence of obesity among students grade 7-12 in study was 8.7%, father's occupation was significant associated with obesity status.

Fruit and milk intake were significant associated with obesity with p value=0.048 and p=0.003 alternately. After adjusted the result revealed that students who ate fruit more than

3 times per week were at risk of being obese 3.56 times greater than those ate less than or equal 3 times per week. (adjusted OR: 3.69; 95% CI: 1.04–13.13; $p= 0.044$)

No significant association between physical activities and obesity was found. Time spent for passive entertainment activities and watching TV was not significant different between obesity and non obesity group. Knowledge on obesity and related factors did not have significant relationship with obesity.

RECOMMENDATION

For health promotion

Potential group of obesity (include fat and slightly fat) was 20.44%, it is an alarming figure. Therefore, health programs for obesity prevention should be promoted continuously. Prevalence and incidence of adolescent obesity should be monitored closely.

School based programs for early obesity prevention should focus not only on eating habit, physical activities, but also to knowledge on obesity and related factors.

For future research

A larger sample size should be selected to reflect the prevalence of obesity and its

relationship with related factors.

Self administered questionnaire should be adjusted for different target population. Anthropometry measurement should be done by researcher, self reported data may have bias.

It is recommended that these factors such as pattern of daily meal, fast food, fatty food, vigorous activities, moderate activities, passive entertainment activities, watching TV time should be studied more in detail.

This study has produced result that contradict many previous studies so the results need to be treated with great care and unless further research confirm them.

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