FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY AMONG GRADE 4-6 STUDENTS IN NORTHERN THAILAND

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Abstract. Physical inactivity among children can lead to serious health problems, such as overweight and obesity. In this study we aimed to determine factors associated with physical activity among grade 4-6 students from 9 randomly selected primary schools in Pho Prathap Chang District, Pichit Province, northern Thailand in order to guild public health programs to increase physical activity in this population. Study subjects in this cross-sectional study were randomly selected by stratified random sampling and asked to complete a questionnaire about demographics, knowledge and attitudes about physical activity, and activity levels. A total of 312 subjects were included in the study. The mean (± standard deviation; range) age of the study subjects were 10.48 years (± 0.93; 8-12) years; 51.3% males; 14.8% of the subjects were overweight and 9.0% were obese. Seventeen percent of subjects were physically active, defined as adequate, and 83% were physically inactive, defined as inadequate. The percentage with low, medium, and high knowledge about the benefit of physical activity were 1.0%, 43.6% and 55.4%, respectively. The subjects with good and poor attitudes about physical activity were 86.2% and 13.8%, respectively. The factors significantly associated with physical activity levels were a student age of 10 years and higher (OR=6.92; 95% CI: 3.31-14.46), relationship of adult respondent to subject as relatives (OR=2.76; 95%CI:1.40-5.45), the education level of parents/relatives with high school and higher (OR=2.19, 95%CI:1.01-4.75) and a role model who is physically active in the family (OR=17.57: 95%CI:6.01-28.81).

Keywords: obesity, physical activity, school children, grade 4-6 students

INTRODUCTION

Overweight and obesity impair health. Continuous weight gain leads to obesity (Suzanne, 2009). Overweight or obesity are the most often found among children aged 5-6 years; obese children often grow into obese adolescents and adults (CDC, 2015). Obese children may encounter physical problems such as heart disease, stroke, type 2 diabetes mellitus, obstructive sleep apnea, cancer, osteoarthritis,

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and asthma (Freedman *et al*, 2007). Obese children may be looked upon negatively by normal-weight children and ridiculed, increasing their risk for psychological problems, such as depression (American Academy Pediatrics, 2015).

Obesity in children is a worldwide problem, including in Thailand. The World Health Organization (WHO) has estimated 1 in 5 children worldwide are obese. The prevalence of obesity worldwide among children aged 0-5 years increased from an estimated 32 million in 1990 to 42 million by 2013 and is expected to increase to 45 million by the year 2045; obesity among children is mainly found in developing countries (WHO, 2014). In 2015, The Department of Nutrient Health for Thailand reported 1 in 5 preschool and 1 in 10 of school children were obese. A study from Thailand reported the rate of increasing obesity among children in Thailand was the fastest of any country in the world for 2009-2014 (The Nutrition Bureau, Department of Health, 2014).

The prevalence of overweight and obesity among school children attending grades 4-6 in Phichit Province, Thailand during 2015 was 15.2%; the highest percentage in Thailand (Office of Disease Prevention and Control, Nakhon Sawan, 2016). In Pho Prathap Chang District, Phichit Province a prevalence of overweight and obesity among grade 4-6 students in 2015 was 15.6% (Phichit Provincial Health Office, 2016).

Previous studies have reported the factors associated with physical activity among grade 4-6 school students included gender, the year in school, health beliefs, level and type of social support, advertisements, families, teachers and friends (Pyper *et al*, 2016; Saimeung, 2016). However, the factors influencing physical activity in grade 4-6 students in northern Thailand have not been well studied. The aim of our study was to determine the factors associated with physical activity among grade 4-6 students in Pho Prathap Chang District, Phichit Province, northern Thailand, in order to inform an intervention program to promote physical activity to reduce obesity and its consequences among school students.

MATERIALS AND METHODS

Study design and population

We conducted this cross-sectional study in July 2017. Study subjects were students studying in grades 4-6 at public schools. The sample size was calculated using a formula described previously (Parel *et al*, 1973). A minimum of 312 subjects was determined to be needed for this study. We randomly selected 9 of the 20 primary schools in Pho Prathap Chang District, Phichit Province, Thailand to be included in the study. Subjects were randomly chosen from grades 4-6 at the study schools. Inclusion criteria for the study subjects were: 1) aged 9-12 years, 2) being able to read and write Thai and 3) being willing to participate in the study. The exclusion criteria for study subjects were: 1) wanting to withdraw from the study and 2) not coming to schools on the day the data was collected.

Data collection

Each subject was asked to complete a self-administered questionnaire asking about demographics, family characteristics, subject knowledge, attitudes and practices regarding physical activity and nutrition. The content validity and reliability of the questionnaire were verified by the experts and the questionnaire was tested among 30 grade 4-6 school students not included in the study. The Cronbach's

alpha coefficients were 0.88 for knowledge and 0.74 for attitude.

Physical activity

Physical activity in our study followed the definition of a previous study (Cheychom, 2015): body movement that can include recreation and sports activities, such as jumping rope, playing football, weight lifting and daily activities, such as walking, climbing, and ascending and descending stairs. Physical activity was recorded as frequency in number of times per week and duration in minutes spent in physical activity.

The level of physical activity was categorized as adequate (≥7 hours per week) and inadequate (<7 hours per week).

Anthropometry

The weight of each subject to the nearest 100 grams was measured and recorded. The height of each subject was measured without shoes to the nearest centimeter. The body mass index (BMI) was calculated as the height in centimeters divided by the weight in kilograms squared. Each subject was then categorized by their BMI as underweight (defined as a BMI <18.50 kg/m^2), normal weight (defined as a BMI ≥18.50-22.99kg/m^2), overweight (defined as a BMI ≥23.00-24.99 kg/m^2), and obesity (defined as a BMI ≥25.00 kg/m^2).

Knowledge and attitude about physical activity

Knowledge about physical activity was assessed with 10 true-or-false questions; giving 1 point for each correct answer and 0 point for each incorrect answer. Physical activity knowledge was categorized as poor (0-3 points), average (4-7 points), and good (8-10 points). Attitudes were assessed with rating scale questions; each answer using a 3-level Likert scale, where 1 meant disagree, 2 meant neutral, and 3 meant agree. The attitude level was averaged and the possible results were a negative attitude with a score 1-2 points and a positive score with an average of ≥2-3 points.

Statistical analysis

Categorical data were described using frequencies and percentages. Continuous data were described using mean and standard deviations.

Chi-square and logistic regression analyses were used to determine associations between selected factors and physical activity. Adjusted odds ratios (OR) with 95% confidence intervals (CI) were calculated for each factor using binary logistic regression analysis. A p-value <0.05 was considered significant.

Ethical considerations

Informed consent was obtained from the parents or guardians of each subject prior inclusion in the study. This study was approved by the Human Research and Ethics Committees of Naresuan University, Thailand (Ref No. 0215/2017).

RESULTS

Socio-demographic characteristics

A total of 312 subjects were included in the study, 51.3% were males. The mean [±standard deviation (SD)] age for subjects was 10.5 (±0.9)(range: 8-10) years. Thirty-four point three percent, 37.2% and 28.5% of subject studied in grades 4, 5, and 6, respectively (Table 1). Fourteen point eight percent of subjects were overweight and 9.0% were obese. Seventeen percent of subjects were physically active.

Family factors

Fifty-nine point two percent of those who answered the parental portion of the questionnaire were the subject mothers; 76.9% of them were married; 77.9% had up to high school education level; 41.7% were

Table 1
Socio-demographic characteristics of study subjects (n=312).

Characteristics	n (%)
Gender	
Male	160 (51.3)
Age in years	
<10	168 (53.8)
≥10	144 (46.2)
Mean ± SD	10.48 ± 0.93
Grade	
Fourth	107 (34.3)
Fifth	116 (37.2)
Sixth	89 (28.5)
Nutritional status	
Underweight	15 (4.7)
Normal	223 (71.5)
Overweight	46 (14.8)
Obesity	28 (9.0)
Birth order	
First or second	271 (86.9)
Third or later	41 (13.1)
Pocket money per day (USD)	
≤ 1.70	300 (96.2)
> 1.70	12 (3.8)
Mean ± SD	0.81 ± 0.53
Chronic disease (allergy and asthma)	
Yes	44 (14.1)
No	268 (85.9)
Total number of siblings	
1-2	191 (61.2)
≥3	121 (38.8)
Physical activity	
Adequate	53 (17.0)
Inadequate	258 (83.0)

Table 2
Characteristics of parents/guardians of the study subjects who completed parental part of questionnaire (n=312).

Characteristics	n (%)
Relationship to subject	
Father	40 (13.4)
Mother	165 (52.9)
Grandparent	92 (29.5)
Cousin	13 (4.2)
Marital status	
Single	15 (4.8)
Married	240 (76.9)
Widowed/divorced	57 (18.3)
Education level	
≤ high school	243 (77.9)
> high school	69 (22.1)
Occupation	
Agriculturalist	130 (41.7)
Business owner/merchant	41 (13.1)
Government officer	5 (1.6)
Employee/factory worker	99 (31.7)
Other	37 (11.9)
BMI (kg/m^2)	
Underweight (<18.50)	28 (9.0)
Normal (≥18.50 - 22.99)	119 (38.1)
Overweight (≥23.00 - 24.99)	133 (42.6)
Obese (≥25.00)	32 (10.3)
Average monthly income in USD	
≤ 333.30	273 (87.5)
333.31-666.6	35 (11.2)
≥ 666.7	4 (1.3)
Mean ± SD	228.80±166.30
Role model for physical activity	
Yes	63 (20.2)
No	249 (79.8)

agriculturalists. Their average monthly income of the parental respondent was ≤USD333.30 (seen in 87.5%) and the mean monthly income was USD228.80. Forty-two point six percent of parental respondents were overweight; 79.8% were not a role model for physical activity (Table 2).

Knowledge and attitudes of subjects about physical activity

Fifty-five point four percent of subjects had a good knowledge level (mean: 7.6 points) about the benefits of physical

activity, and 86.2% of subjects had a positive attitude about physical activity (mean score: 2.67) (Table 3).

Factors associated with physical activity

The factors assessed for possible association with physical activity were gender, age, birth order, presence of chronic disease (allergy and asthma), relationship of the parent/guardian with the student, marital status of parents, education level of parents, occupation of parents, having a role model for physical activity in the family, subject knowledge level about benefit of physical activity, and attitude of subjects about physical activity. Multiple logistic regression analysis showed factors associated with physical activity were: age ≥10 years (OR = 6.92; 95%CI: 3.31-14.46), being cared for by a relative rather than a parent (OR=2.76; 95%CI: 1.40-5.45), having a parent/guardian with ≥high school education level (OR=2.19; 95%CI: 1.01-4.75, and having the role model for physical activity in the family (OR=17.57; 95%CI: 6.01-28.81)(Table 4).

DISCUSSION

In our study, a relatively large percentage of subjects were overweight/obese and a relatively low percentage of subjects were physically active. Factors significantly associated with physical activity were: older subject age (≥10 years), non-parental questionnaire respondent, a higher parental education level and having a physically active role model in the family.

The older age subject association with physical activity could be due to a better understanding of the benefits of physical activity with increasing age and the socialization involved with sports valued by older subjects. Tongtiam (2016) also reported more physical activity among older aged subjects.

The finding of the association between a non-parental guardian completing the questionnaire and increased physical activity could be the subject lived with a non-parent and had to do more housework than students who lived with their parents. A study from Thailand (Kulaphichit and Puthikul, 2017) reported ≥40% of school students did not live with their parents; they lived with their relatives while their parents went to the city to work.

Our study subjects whose parents had a higher education level were more likely to be physically active. This could be because the parents had better educa-

Table 3
Knowledge and attitudes of study subjects about physical activity (*n*=312).

Factors	Mean (SD)	Scores	Level	*n* (%)
Knowledge	7.64 (1.51)	(Total possible score=10)		
		0 - 3	Poor	3 (1.0)
		4 - 7	Average	136 (43.6)
		8 - 10	Good	173 (55.4)
Attitude	2.67 (0.27)	(Mean score)		
		1.00-2.00	Negative	43 (13.8)
		2.01-3.00	Positive	269 (86.2)

Table 4
Factors significantly associated with physical activity among study subjects (n= 312).

Factors	Adjusted OR	95%CI
Gender of students		
Male	Reference	
Female	0.90	0.47-1.72
Age of subject in years		
< 10	Reference	
≥ 10	6.92	3.31-14.46*
Birth order of study subject		
First or second	Reference	
Third of later	0.65	0.24-1.76
Presence of chronic disease in subject		
Yes	Reference	
No	0.91	0.39-2.10
Relationship of adult respondent to subject		
Father or mother	Reference	
Relative	2.76	1.40-5.45*
Marital status of parents/guardians		
Married	Reference	
Others	6.63	0.29-11.38
Education level of parents/guardians		
≤ high school level	Reference	
> high school level	2.19	1.01-4.75*
Occupation of parents/relatives		
Agriculturalist	Reference	
Business owners/merchant	1.39	0.51-3.79
Others	1.14	0.57-2.29
Having a role model for physical activity in family		
No	Reference	
Yes	17.57	6.01-28.81*
Knowledge of subject about benefits of physical activity		
Low and moderate	Reference	
High	0.60	0.31-1.15
Attitude of subject about physical activity		
Negative	Reference	
Positive	4.95	0.57-13.36

* p-value <0.05.

tion regarding the benefits of exercise. Previous studies found higher parental education was associated with better health practices (Orem, 1955; Janturos, 2010). Another study also found that higher education level not only resulted in a better understanding of health but also resulted a greater knowledge of

how to access health services (Mora and Trapero-Bertran, 2018). Parents with a better knowledge about health can pass this along to their children.

In our study, having a physically active role model in the family was associated with physical activity in study subjects. This shows adult behaviors influence the behaviors of the children in the house (Ruebel *et al*, 2011).

In this study the prevalence of overweight and obesity were relatively high and the prevalence of having a good level of having a being physically active was relatively low. The factors associated with physical activity among study subjects were older subject age, having a non-parental questionnaire responded, having a parent with a high education level, and having a physically active role model in the family. Education about the importance of physical activity should begin in younger age subjects, should include education of parents and encouragement for the parents to be good physically active role models for their children. Children of parents with lower education levels should especially be targeted for intervention programs. Further studies are needed to determine if the above interventions will result in significant, long term increases in physical activity among study subjects.

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