Physical Activity and Its Associated Factors among Adolescents in Secondary Schools in Northeast Peninsular Malaysia

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Abstract

Background: The World Health Organization has estimated that 81% of adolescents worldwide are not sufficiently physically active. This study aimed to determine the level of physical activity and its associated factors among adolescents in secondary schools in northeast Peninsular Malaysia.

Methods: A cross-sectional study was conducted that involved Form 1 and Form 2 students from six public secondary schools. The study included a multistage stratified cluster sampling and used the Malay version of the Physical Activity Questionnaire for Children and Body Image Contour Drawing Rating Scale. Data were analyzed by simple and multiple logistic regressions using IBM SPSS Statistics Version 22.

Results: The study involved a total of 603 students who had a response rate of 89.7%. About 53% of the students were physically inactive. Being female [adjusted OR (95% CI): 5.07 (3.57, 7.20)] and allocating time for studying [adjusted OR (95% CI): 0.86 (0.75, 0.98)] were associated with physical inactivity.

Conclusions: The majority of adolescents were physically inactive. To achieve a higher level of physical activity, intervention programs must consider the sex of adolescents and the amount of time they allocate for activities. Objective assessment of physical activity using pedometer or accelerometer is recommended.

Key words: *adolescent; body image; body mass index; exercise, schools.*

Introduction

Physical activity is defined as any bodily movement produced by skeletal muscles that require the expenditure of energy [1]. The World Health Organization (WHO) suggests that children and adolescents aged 5 to 17 years old need moderate to high intensity physical activity at least 60 minutes per day. In 2010, WHO estimated that 81% of adolescents aged 11to 17 years old worldwide were not sufficiently physically active [2] In a National Health and Morbidity Survey, the national prevalence of obesity among Malaysian children under 18 years old had risen, almost doubling, from 6.1% [3] to 11.9% [4].

Physical inactivity in childhood directly relates to obesity and chronic diseases that can occur later in life [5]. It appears to have an impact comparable to smoking or obesity [6]. The WHO has targeted a reduction of 10% of physical inactivity by 2025 [7]. Many factors are associated with physical inactivity, such as age, sex, weight, screen time, sedentary lifestyle (including screen time), economic status, and access to transportation, sports, and recreation facilities [8]. Some of these factors can contribute to difficult and vicious cycle problems.

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The purpose of this study was to determine the prevalence of physical activity and its associated factors among adolescent students in secondary schools in Terengganu, Malaysia. Physical activity is defined as any body movement that requires energy expenditure.

Materials and Method

This cross-sectional study included secondary school students from Form 1 (aged 13 years old) and Form 2 (aged 14 years old). It excluded students with a chronic physical disability who require help for daily activities. A multistage stratified cluster sampling was applied across 130 public secondary schools in Terengganu, Malaysia. The schools were stratified into urban (n = 46) and rural (n = 84) schools; three schools were randomly selected from each group. In each school, three classes were randomly selected from both Form 1 and Form 2. In each class, all students were selected. The sample size was calculated based on a single proportion formula. The prevalence of physical inactivity among adolescents in Malaysia was 57% [9]. After considering the precision of 0.05, cluster effect of 1.5, and non-response rate of 20%, the required sample size was 679 students.

The study involved a case report form to obtain sociodemographic and general information, a Contour Drawing Rating Scale, and a questionnaire about physical activity for older children. An anthropometry measurement for BMI was taken. The Contour Drawing Rating Scale helps to assess body image perception [10]. Body image perception is a person's perceptions, thoughts, and feelings about his or her body [11].

The PAQ-C is a self-administrated, 7-day recall instrument with nine items to assess the general levels of physical activity [12]. Each item was scored on a five-point scale, with scores ranging from 9 to 45. The final scores were categorized into low, moderate and high physical activity [13]. The PAQ-C has the Cronbach's alpha, ranging from 0.72 to 0.85 [14]. The Cronbach's alpha for the Malay version was 0.79 [15]. Physically inactive refers to low physical activity, and physically active refers to moderate and high physical activity [9].

Students were briefed on the study. Assent and parental consent forms were distributed prior to the date of data collection. Self-administered questionnaires were distributed and body height and weight measurements were taken. The data were analyzed using IBM SPSS Statistics Version 22. Simple and multiple logistic regression analyses were performed.

Results

A total of 603 responded giving a response rate of 89.7%. Table 1 shows the sociodemographic and general information of the 603 study participants. The prevalence of physical inactivity among secondary school students in Terengganu was 52.9% (n = 319).

Simple logistic regression showed that family income, study time, school type, sex, and body image perception (desire to reduce weight) have a *P* value of <0.25 (Table 2). Multiple logistic regression analysis shows that sex and study time were significantly associated with physical inactivity (Table 3). Being female had 5.07 odds of physical inactivity compared to male. For every one hour increase in study time, there were 0.86 odds in physical inactivity.

Table 1. Characteristic of study participants (n= 603)

Variable	Physically inactive (n=319)		Physically active (n=284)	
	Mean (SDa)	**n (%)**	**Mean (SDa)**	**n (%)**
Family income (RM)	1888 (2021)		2320 (3087)	
Screen time (hour/day)	2.68 (2.43)		2.81 (2.45)	
Study time (hour/day)	1.85 (1.31)		2.11 (1.30)	
Type of school				
Urban		151 (47.3)		148 (52.1)
Rural		168 (52.7)		136 (47.9)
Sex				
Male		88 (27.6)		186 (65.5)
Female		231 (72.4)		98 (34.5)
Body mass index				
Normal		215 (67.4)		188 (66.2)
Underweight		30 (9.4)		30 (10.6)
Overweight		46 (14.4)		37 (13.0)
Obese		28 (8.8)		29 (10.2)
Body weight perception				
Normal		218 (68.3)		198 (69.7)
Underweight		37 (11.6)		30 (10.6)
Overweight		55 (17.2)		47 (16.5)
Obese		9 (2.8)		9 (3.2)
Body image perception				
Satisfaction		28 (8.8)		42 (14.8)
Desire to reduce weight		194 (60.8)		134 (47.2)
Desire to increase weight		97 (30.4)		108 (38.0)

RM = Malaysian Ringgit

[a]Standard deviation

Table 2. Associated factors of physical inactivity by simple logistic regression

Variables	Regression coefficient	Crude Odds Ratio (95% CI)	Wald statistic	P value
Family income (RM)	0.00	1.00 (1.00, 1.00)	4.03	0.045
Screen time (hour/day)	-0.02	0.98 (0.92, 1.04)	0.47	0.492
Study time (hour/day)	-0.14	0.87 (0.77, 0.98)	7.23	0.007
Type of school				
Urban		1		
Rural	0.19	1.21 (0.88, 1.67)	1.37	0.242
Sex				
Male		1		
Female	1.61	4.98 (3.52, 7.05)	82.46	<0.001
Body mass index				
Normal		1		
Underweight	-0.13	0.87 (0.51, 1.50)	0.24	0.628
Overweight	0.08	1.09 (0.68, 1.75)	0.12	0.730
Obese	-0.17	0.84 (0.49, 1.47)	0.36	0.550
Body weight perception				
Normal		1		
Underweight	0.11	1.12 (0.67, 1.88)	0.18	0.668
Overweight	0.06	1.06 (0.69, 1.64)	0.08	0.783
Obese	-0.10	0.91 (0.35, 2.33)	0.04	0.842
Body image perception				
Satisfy		1		
Want to reduce weight	0.78	2.17 (1.28, 3.68)	8.34	0.004
Want to increase weight	0.30	1.35 (0.78, 2.34)	1.12	0.289

Table 3. Associated factors of physical inactivity by multiple logistic regression

Variables	Regression coefficient	Adjusted Odds Ratio (95% CI)	Wald statistic	*P* value
Study time (hour/day)	-0.16	0.86 (0.75, 0.98)	5.00	0.025
Sex				
Male		1		
Female	1.62	5.07 (3.57, 7.20)	82.44	<0.001

Discussion

Our findings showed that the proportion of physical inactivity among younger adolescents aged 13 and 14 years old in Terengganu was 52.9%. This finding was comparable with a study that discovered 57.3% of Malaysian adolescents aged 10 to 17 years old were physically inactive [9]. However, a Global School-based Student Health Survey that was done in Malaysia found that 47.4% of students aged 13 to 17 years spent three or more hours sitting on a typical day [16]. It is difficult to compare these two studies because they used different research tools.

In this study, female students were five times more likely to be physically inactive compared to male students. The proportion of being physically active in the five or more days during the previous week was significantly higher among males (29.5%) compared to females (16.8%) in school children aged 13 to 17 years old in Terengganu [16]. Because most female students experience secondary sexual characteristic changes during this age, they might not feel comfortable being physically active. This is consistent with a study that found physical activity declined after menarche [17].

A study in Borneo found that male students have a mean of 600 steps more than female students, which might reflect that female students are more physically inactive [18]. The Multidisciplinary Lifestyle of Our Kids project in Australia found that girls were 19% less active and had 1,940 fewer steps per day than boys [19]. Lower physical activity among girls was associated with weaker influences at school and in the family and lower participation in extracurricular sports [19]. A review of 29 articles revealed that, on average, females participate in physical activity at lower rates than males, and they found that self-efficacy, social support, and motivation are empirically substantiated factors that impact their physical activities [20].

With the advance in technology and internet coverage, adolescents are prone to spend more time on screen-related activities. Compared to previous years, adolescents only had television, where today, adolescents might own smartphones or tablets, giving them more access to social media [21]. Some adolescents might also have a video game console at home. Increasing the total usage of time for screen-related activities might affect the time for physical activity as demonstrated by a Brazilian study, which showed that the proportion of physical inactivity among adolescents increased because of higher screen time [22]. In Malaysia, children aged 7 to 12 years spent an average of 3.1 hours per day on screen-based activities, including television watching, video gaming, and computer use [23].

This study is not without limitations. First, the PAQ-C did not prompt participants to indicate a specific time allocation for physical activity nor specific caloric expenditure and intensity for each activity. Second, a recall bias can be introduced on the estimated duration for screen time and study time. Third, a selection bias can be introduced because students from the same cluster might share similar characteristics.

In conclusion, this study showed a high proportion of physical inactivity among adolescents in secondary schools in Terengganu, Malaysia. Two factors increased the risk for physical inactivity: being female and spending less time on studying. For future studies, we recommend objective assessment of physical activity, such as, using a pedometer or accelerometer, and including both early and late stages of adolescents.

Ethical Clearance: Taken from Research Ethics Committee (Human) Universiti Sains Malaysia (USM/JEPeM/15100309) and the Ministry of Education in Malaysia.

BMI: body mass index; PAQ-C: Physical Activity Questionnaire for Older Children; WHO: World Health Organization.

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