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Physical Activity and BMI Level: Youth in Low-Cost Housing Kuala Lumpur

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ABSTRACT

Obesity has been recognised as a major public health concern due to lack of physical activity and a sedentary lifestyle. The aim of this study was to determine the status of physical activity level and body mass index (BMI) among youth living in low-cost housing in Kuala Lumpur. The respondents were youths aged between 15 and 25 (19.80, SD=3.17) years old and consisted of 214 males and 172 females. The BMI value was determined through the ratio of body weight and height, while the level of physical activity was measured using the International Physical Activity Questionnaire (IPAQ). The descriptive analysis showed that the mean BMI of male respondents was (22.65, SD=3.11) kg/m² and (23.73, SD=3.30) kg/m² for the females. A total of 227 (58.80%) of the respondents had low-level physical activity (441.57, SD=81.64) MET-min·wk^{-1}. Correlation analysis showed that there was positive correlation between age and BMI ($r=0.18$, $p<0.001$), meanwhile, there was negative correlation between physical activity and age ($r=-0.27$, $p<0.001$), and between physical activity and BMI ($r=-0.24$, $p<0.001$). The study also found the obese group (obese class I) had lower physical activity than other group at the significant level of $p<0.05$, $F(4, 381)=10.483$, $p<0.001$. The youth living in low-cost housing demonstrated poor physical activity level. Therefore, efforts should be made to promote the importance of a healthy lifestyle and being physically active in order to avoid obesity and other health problems.

Keywords: Body mass index (BMI), physical activity, youth

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INTRODUCTION

Physical activity can be defined as any body movement produced by skeletal muscle contraction that may increase energy

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consumption (Thomas & Kotecki, 2007; Bourchard, Blair, & Haskell, 2007). Physical activity can be classified into several classes such as light, medium and heavy. Light physical activity is any movement that produces energy consumption between 1.6 and 2.9 MET (Metabolic Equivalent of Task) (Pate, O'Neill, & Lobelo, 2008; Owen, Sparling, Healy, Dunstan, & Matthews, 2010). Medium physical activity is activity that requires the use of energy between 3.0 and 5.9 MET and heavy physical activity is activity that requires the use of energy equal to 6 MET and above (Ainsworth et al., 2000). Generally, individuals need to increase participation in physical activity to reduce the effects of a sedentary lifestyle to bring improvement to health (Hamilton, Healy, Dunstan, Zderic, & Owen, 2008; Owen et al., 2010). However, the revolution in industry nowadays has led people to be dependent on technology, and this has caused a reduction in physical activity among them (Heyward, 2011), and previous studies have shown that most of the daily work and leisure activities that are carried out on a daily basis require only very little energy consumption, which is about 1 to 1.5% of resting metabolic rate (Pate et al., 2008).

The lack of physical activity or the sedentary lifestyle adopted by young people will usually continue to be practised up to adulthood (Ortega, Ruiz, Castillo, & Sjostrom, 2008). Additionally, many studies showed that a sedentary lifestyle is associated with lipid problems and being overweight (Colley et al., 2013; Duncan et al., 2012; Thorp et al., 2010). The high amount of fat in the body will cause a person to have difficulty in performing physical activities such as jumping and making quick movements because those movements require great energy consumption. People who are less active were found to be more prone to experiencing lack of muscle strength, endurance and flexibility in perform movements (Fahey, Insel, & Roth, 2011; Baumgartner, Jackson, Mahar, & Rowe, 2007).

According to Embong (2011), it was estimated that 66.9% of people in this country live in the city, and this number increased to 70% in 2008. As a result of rising land prices, low and medium-cost housing is needed in urban areas because the population was made up largely of low- and middle-income workers (Malek & Husin, 2012). Until 2005, there were 676,163 housing units in Kuala Lumpur with 188,610 (28%) being units of low and medium cost (Besar, Fauzi, & Ghazali, 2012) and studies have also shown that facilities for physical activity or exercise were less available in low-income neighbourhoods (Estabrooks, Lee, & Gyurcsik, 2003; Heinrich et al., 2008). The lack of space and infrastructure in these neighborhoods limits individual participation in physical activity. This assumption was made due to the characteristics of the physical environment in neighborhoods and was shown to contribute to the level of individual participation in physical activity (Eriksson, Arvidsson, & Sundquist, 2012; Edwards, Jilcott, Floyd, & Moore, 2011), and was

also associated with obesity (McAlexander, Banda, McAlexander, & Lee, 2009; Casagrande, et al., 2011). The objective of this study was to determine the level of physical activity and BMI of youth living in low-cost housing in Kuala Lumpur.

METHODOLOGY

Subjects

Respondents was selected based on simple random sampling. Of the 400 questionnaires distributed to respondents, only 386 were returned and met the criteria set. All the respondents were youth who lived in residential areas of the People's Housing Programme (PPR) in Kampung Kerinchi, Kuala Lumpur. Of the 386 respondents, 243 (63%) were males and 143 (37%) were females. The respondents were aged between 15 and 25 years (mean=18.82, SD=3.22). Data collection was carried out between the months of January and February 2015. Data collection was conducted by distributing questionnaires randomly to the youths who were found in the vicinity of residential areas.

IPAQ questionnaire

In this study, the International Physical Activity Questionnaire (IPAQ) was used to assess the level of physical activity. The criterion validity for the IPAQ questionnaires was reported to be at r=0.34 (Ekelund et al., 2006). The level of physical activity was measured in MET minutes per week (MET-min·wk^{-1}). The MET-min·wk^{-1} was calculated thus: MET level x number of minutes of activity per day x number of days per week. The level of physical activity of respondents was categorised into low, medium and high. Moderate level physical activity is classified as moderate-intensity physical activity conducted for at least 30 minutes five days per week, while heavy-intensity physical activity is conducted for at least 20 minutes three days per week or a combination of both activities for a total of at least 600 MET-min·wk^{-1}. Further description of the protocol of this questionnaire is available on the website (www.ipaq.ki.se).

Body Mass Index (BMI)

Before the measurement process was carried out, the subjects were asked to remove their shoes, socks, watches and jewellery for the measurement of body mass and height. BMI was determined by calculating the ratio between body mass and height. BMI was calculated using the formula BMI=body mass (kg)/height (m)^2. The BMI level was then classified based on the classification proposed by the World Health Organisation (WHO) for Asians (WHO, 2000). The BMI values were categorised into underweight (less than 18.5 kg/m^2), normal (18.5 to 22.9 kg/m^2), at risk (BMI 23 to 24.9 kg/m^2), obese class I (BMI 25 to 29.9 kg/m^2) and obese class II (BMI 30 kg/m^2 or higher).

Data Analysis

In this study, the t-test was used to compare the BMI and physical activity level between male and female, while the Pearson

correlation index was used to determine the relationship between age, BMI and physical activity level. Apart from this, a one-way ANOVA analysis with post-hoc (Tukey) setting was used to analyse the comparison between the physical activity levels among the respondents, who were categorised into underweight, normal, at risk, obese class I and obese class II. The significant level was set at the level of $p<0.05$.

RESULTS

A total of 386 respondents participated in this study. There were 214 (55.4%) males and 172 (44.6%) females. The average age of the respondents was 19.80 (SD=3.17) ranging between 15 to 25 years. The male respondents had mean BMI (M=22.65, SD=3.11) kg/m² and (M=23.73, SD=3.30) kg/m² for females. The t-test demonstrated there were significant differences of BMI between the male and female respondents, t(384)=0-2.844, p=0.005. A total of 108 (27.97%) males and 61 (15.80%) females had normal BMI. Meanwhile, 10 (2.6%) males and 9 (2.4%) females were classified as underweight. Only 33 (8.5%) males and 36 (9.32%) females were categorised into obese class I and obese class II (Table 1).

Analysis from the International Physical Activity Questionnaire score demonstrated that only 159 respondents (41.19%) had achieved moderate physical activity level (M=678.54, SD=87.57) MET-min·wk^{-1}, while the rest 227 (58.80%) had low level physical activity (M=441.57, SD=81.64) MET-min·wk^{-1} (Table 1). The t-test was conducted to compare the physical activity scores for males and females. There was a significant difference in score for males (M=572.85, SD=152.65) MET-min·wk^{-1} and females (M=497.67, SD=120.52) MET-min·wk^{-1}, t (384)=5.30, p=0.000 (Table 1).

Table 1
BMI and physical activity characteristic of subjects between genders

	All		Male		Female	
	N	BMI (kg/m²)	N	BMI (kg/m²)	N	BMI (kg/m²)
	Mean (SD)		Mean (SD)		Mean (SD)	
BMI						
Underweight	19	17.93 (0.48)	10	17.95 (0.44)	9	17.91 (0.54)
Normal	169	20.94 (1.80)	108	20.68 (1.59)	61	21.39 (2.09)
At risk	129	24.15 (0.67)	63	24.03 (0.76)	66	24.18 (0.57)
Obese I	59	27.11 (1.13)	28	26.65 (0.94)	31	27.52 (1.15)
Obese II	10	33.40 (1.13)	5	32.69 (0.89)	5	34.10 (0.95)
All	386	23.13 (3.28)	214	22.65 (3.11)	143	23.73 (3.30
		MET-min·wk^{-1}		MET-min·wk^{-1}		MET-min·wk^{-1}
Physical activity						
Low	227	441.57 (81.64)	124	442.49 (80.24)	111	440.76 (83.05)
Moderate	159	678.54 (87.57)	119	700.80 (79.33)	32	631.41(85.41)
All	386	539.18 (143.81)	243	572.79 (170.65)	143	497.29 (110.52)

Correlation analysis between age, BMI and physical activity is shown in Table 2. The Pearson correlation analysis showed that there was a positive correlation between age and BMI, r=0.18, n=386, p<0.001. Meanwhile, there was negative correlation between physical activity and age, r=-0.27, n=386, p<0.001, and between physical activity and BMI, r=0-.24, n=386, p<0.001.

Inference analysis showed that the obese respondents had lower physical activity (Table 3). There was a significant difference at the p<0.05 level in physical activity score for the five BMI-based groups: F (4, 381)=10.483, p<0.001. Post-comparison using the Tukey HSD test indicated that the mean score for the obese class I group (M=445.35, SD=71.69) was significantly different from the underweight group (M=557.94, SD=149.05), the normal group (M=561.76, SD=137.54) and the at-risk group (M=558.55, SD=159.50).

Table 2
Correlation between ages, BMI and physical activity

Variables	BMI (kg/m²)	Physical activity (MET-min·wk⁻¹)
Ages	.170**	-.272**
BMI		-.237**

**. Correlation is significant at the 0.01 level (2-tailed)

Table 3
BMI and physical activity characteristic of subjects between genders

	All		Male		Female	
	N	MET-min·wk⁻¹	N	MET-min·wk⁻¹	N	MET-min·wk⁻¹
		Mean (SD)		Mean (SD)		Mean (SD)
Underweight	19	557.94 (149.05)	10	542.07 (161.28)	9	575.44 (142.40)
Normal	169	561.76 (137.54)	108	593.61 (141.45)	61	505.37 (110.86)
At risk	129	558.55 (159.50)	63	604.68 (171.42)	66	514.53 (134.31)
Obese class I	59	445.35 (71.69)	28	457.92 (67.84)	31	434.00 (74.25)
Obese class II	10	425.70 (65.95)	5	428.400(41.63)	5	423.00 (89.64)
Total	386	539.03 (143.81)	214	572.79 (152.00)	172	497.29 (120.52)

DISCUSSION

The findings of this study showed that youth aged between 15 and 25 years old and living in the residential area of PPR Kerinchi, Kuala Lumpur had a mean BMI (M=23.13, SD=3.28) kg/m². The findings also showed that the females had a higher BMI than the males, and this finding was in line with previous studies in this country that showed that women were more likely to be obese than men (Tan et al., 2011; Sidik & Rampal, 2009). Of the 386 respondents, only 33 (8.5%) males and 36 (9.32%) females were categorised into obese class I and obese

class II. Although the percentages were small, the problem of obesity in this area needs to be addressed, because the problem of obesity is escalating in developed and developing countries around the world (Lokuruka, 2013). The National Health and Morbidity Survey (NHMS) has reported that the rate of obesity among adults in this country increased by about two-fold over the past 10 years from 5.5% in 1996 to 14.0% in 2006, while the rate of overweight adults (BMI of 18.5 to 24.9 kg/m²) increased from 20.7% to 29.1% (Khambalia & Seen, 2010). In 2011, the prevalence of obesity and overweight had increased to 19.5% and 33.6%, respectively (Wan Mohamud et al., 2011). The problem of obesity in this country has reached a serious level as research has shown three out of five deaths in this country has been associated with obesity (Tan et al., 2011). One study conducted in the country showed that the problem of obesity is more common among individuals who engage in less physical activity (Boo et al., 2010).

There are many factors that lead to obesity in a community, such as lack of physical activity, irregular diet pattern, intake of foods high in fat and carbohydrates, problems caused by urbanisation (Lokuruka, 2013) and the number of facilities for physical activity (Jilcott Pitts et al., 2013). Obesity should be taken seriously because obese individuals often engage in less physical activity (Tudor-Locke et al., 2010), do more sitting all day (Johannsen et al., 2008) and have lower physical competence (Rimmer et al., 2010). In addition, obesity was also associated with health problems and chronic diseases such as diabetes (Saboor Aftab, Kumar, & Barber, 2013), cardiovascular disease (Zalesin et al., 2011) and high blood pressure (Mungreiphy, Kapoor, & Sinha, 2011).

This study also demonstrated that only 39.11% of the respondents were active and achieved a moderate level of physical activity with the average MET-min·wk^{-1} (722.62, SD=93.88) for males and (629.81, SD=74.26) for females, while the rest had a low level of physical activity (429.00, SD=79.24) MET-min·wk^{-1} for males and (438.97, SD=77.40) MET-min·wk^{-1} for females. The findings also showed that males were more physically active than females. The problem of physical inactivity is not only prevalent in this region but in the entire world (Hallal et al., 2012; Tudor-Locke et al., 2010; Healy et al., 2011). According to Healy et al. (2011), adults spend about 8.44 hours indulging in sedentary lifestyle, and approximately 41.5% of adults spend at least 4 hours or more in a day sitting down (Hallal et al., 2012). The survey conducted by Tudor-Locke et al. (2010) found that adults spent approximately 56.8% of the rest of the waking day in sedentary living. Studies conducted in this country also found that people in these countries have low levels of physical activity (Soon et al., 2011; Ibrahim et al., 2013; Ayiesah et al., 2013), and according to Sreeramareddy et al. (2012), the level of physical activity of adults in this country is much lower compared to that in developed countries.

Many factors can be associated with the physical inactivity among youth in this area. Previous studies found that physical activity in residential areas could be affected by traffic safety (Jongeneel-Grimen et al., 2013), economic status (Karusisi, Thomas, Méline, & Chaix, 2013) and available infrastructure facilities such as parks and green spaces (Hanibuchi et al., 2011; Cohen et al., 2007; Amorim, Azevedo, & Hallal, 2010). According to Ishii, Shibata and Oka (2010), environmental factors could directly affect the moderate and high intensity of physical activity. Physical inactivity or a sedentary lifestyle is an issue of concern globally because physical inactivity is often associated with the increased risk of cardiometabolic disease (Warren et al., 2010), has a close relationship with mortality (Wilmot et al., 2012) and increases the risk of cardiovascular disease (Ford & Caspersen, 2012). The study also found that there was a relationship between BMI and the amount of physical activity, and this finding was in line with previous studies conducted in this country that found a significant relationship between the amount of daily energy consumption or physical activity and BMI, waist circumference and percentage of body fat (Soon et al., 2011; Ayiesah et al., 2013).

The study also aimed to determine the different levels of physical activity among groups that had different BMI values. The results of the study found that youth who are obese (BMI: 25 to 29.9 kg/m²) had a lower level of physical activity than the group of youths who were categorised as underweight, normal and risky. These findings include all respondents regardless of gender. There are many studies that have shown the relationship between obesity and level of physical activity. Johannsen et al. (2008) found that there was a significant difference in the amount of physical activity between normal and obese individuals. Recent studies also showed that individuals of all ages with low physical activity and low physical fitness were associated with an increase in the percentage of body fat (Gonzalez-Suarez & Grimmer-Somers, 2011; He et al., 2011; Leskinen et al., 2009).

Strengths and Limitations of study

This study measured the level of physical activity of a specific population with a smaller age gap i.e. between 15 and 25 years old and it used a more specific population of youths who lived in a low-cost housing project, PPR Kerinchi, Kuala Lumpur. Due to the diversity of the low-cost houses in Kuala Lumpur and their various infrastructure and facilities, these findings only represent the youth population living in the PPR only. In addition, this study used the IPAQ questionnaire as an instrument to assess the level of physical activity, so the findings of this study depend entirely on the honesty and accuracy of all the respondents.

CONCLUSION

Generally, youth who live in this residential area had a normal BMI value. However, most of them had low levels of physical activity. This study also showed that youth who were

overweight were less active or less inclined to engage in physical activity. Due to the fact that physical inactivity is often associated with health problems, a strategy to promote healthy lifestyles needs to be administered, and local authorities should take into account the environmental factors that can lead to youth involvement in physical activity when developing new housing areas in the future. This is because many previous studies have demonstrated that the availability of facilities and infrastructure in the living environment could affect the level of individual participation in physical activity.

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