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# PHYSICAL ACTIVITY LEVEL AMONG UNIVERSITY STUDENTS: A CROSS SECTIONAL SURVEY

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## ABSTRACT

**Background and Objective:** Physical inactivity is the fourth leading risk factor for global mortality. Physical inactivity levels are rising in developing countries and Malaysia is of no exception. Malaysian Adult Nutrition Survey 2003 reported that the prevalence of physical inactivity was 39.7% and the prevalence was higher for women (42.6%) than men (36.7%). In Malaysia, the National Health and Morbidity Survey 2006 reported that 43.7% (5.5 million) of Malaysian adults were physically inactive. These statistics show that physically inactive is an important public health concern in Malaysia. College students have been found to have poor physical activity habits. The objective of this study was to identify the physical activity level among students of Asia Metropolitan University (AMU) in Malaysia.

**Materials and Methods:** The study design was a cross sectional survey. A total of 100 participants comprising of 50 male and 50 female students were selected for the study by means of convenience sampling. International Physical Activity Questionnaire (IPAQ) short form was used to identify the physical activity level.

**Results:** A greater percentage of males (56%) showed high physical activity level than females (24%). In contrast, females showed high percentage of low physical activity level. Students in the age range of 22-25 years depicted more percentage (43.5%) of high physical activity level. When comparison of physical activity levels were done among different races, Indian students showed greater percentage (61.8%) of high physical activity level. Furthermore, students who were underweight and overweight had 50% and 46.7% of high physical activity levels respectively which are greater than the values observed in normal body weight students. **Conclusion:** The physical activity level among students was found satisfactory although the percentage of low level of physical activity was found higher in female students.

**KEY WORDS:** Physical activity level, Metabolic Equivalent, Body Mass Index.

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## INTRODUCTION

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure [1]. The fourth leading risk factor for global mortality is physical inactivity and it is a contributing factor in the development of various non-communicable

diseases such as diabetes mellitus, cancer and heart diseases causing an estimated 3.2 million deaths worldwide [2]. The World Health Organization (WHO) reports that approximately 60% of the global population do not meet the recommended daily minimum of physical activity. According to a WHO study published in

the British Scientific Journal Lancet in July 2012, Malaysia is in the list of the top ten most physically inactive countries in the region with about 61.4% of Malaysians aged 15 and above considered physically inactive [3].

Physical inactivity levels are rising in developing countries and Malaysia is of no exception [4]. Malaysian Adult Nutrition Survey 2003 reported that 39.7% was the prevalence rate of physical inactivity and it was higher for women (42.6%) than men (36.7%). It was found that almost three-quarters of Malaysian adults travelled by transportation such as car (40.8%) and motorcycle (33.6%). Only a small proportion used public transport such as bus, LRT or KTM (9.2%). The study also indicates that Malaysian adult population spent their major time in doing sedentary activities such as 41% of the day in sitting and 33% of the day in sleeping or lying down [5].

In Malaysia, the National Health and Morbidity Survey 2006 (NHMS 2006) reported that 43.7% (5.5 million) of Malaysian adults were physically inactive [6]. In another study, the National Health and Morbidity Survey 2011 showed that the prevalence of physical inactivity was 35.2% [7]. These statistics show that physically inactive is an important public health concern in Malaysia. Individuals who engage in regular physical activity will improve their lifestyle, achieve musculoskeletal fitness and optimal body fat levels, prevent getting silent diseases which comprises of heart diseases, cancer, diabetes mellitus, osteoporosis and other chronic disorders [8]. Epidemiological studies have shown that physical activity can reduce rate of mortality and people who are physically active tend to live longer than those who are sedentary [9].

Physical activity and fitness should remain a top priority of any country. It has been shown that physical activity reduces from high school to college and most of the college students claim a decrease in physical activity following their graduation. A survey study investigating the physical activity index among Malaysian youth showed that at the age of 21, they are more active than the rest of the ages; however at the age of 22 and above, these youth reduce their physical activities [10]. There is evidence that

medical students had low physical activity levels as a result of high workload and less free time [11]. A cross sectional study among students of the medical university of Silesia in Poland reported that medical students do not meet the recommended level of physical activity. The majority of these students were classified as having a moderate level of physical activity [12]. The prevalence of physical inactivity was lower in less developed countries (18.7%) than the most developed countries (27.8%). The crude worldwide prevalence of physical inactivity was 21.4%, being higher among women than men. One out of five adults around the world is physically inactive [13].

Although physical inactivity is found in both males and females but the rate of physical inactivity in female is significantly higher than males. Most of the studies state that gender has significant correlates of physical activity where males are more active in performing physical activity than the females [5,10]. Studies on gender differences shows that females and males involve in physical activity with different motivation. Egli et al 2011 [14] found that male college students were motivated by intrinsic factors such as strength, competition and challenges whereas female college students were motivated by extrinsic factors such as weight management and appearance.

Sedentary behavior has become a norm in Malaysian society. Strategies to increase levels of physical activity have been promoted in many countries due to the rising of physical inactivity especially among adults [15]. Researchers tend to focus the factors affecting participation in physical activities in well developed countries as it plays an important role in preventing diseases [16]. Studies found that socio-demographic factors such as race, age, gender, education, marital status, income and perception of health status could affect an individual's decision to take part in physical activity. Identification of socio-demographic factors concerning to physical inactivity can help to plan intervention and prevention programs.

In order to maintain healthy status, all healthy adults aged of 18-65 years need moderate intensity aerobic physical activity for a minimum of thirty minutes for five days a week or vigorous

intensity aerobic activity for a minimum of twenty minutes on three days each week [17]. Majority of the Malaysians are not active and meet the recommendations for physical activity. Therefore, it is important to promote strategies that increase health awareness, knowledge and importance of physical activity. The Philosophy of Malaysian Education emphasizes on physical activity. The Malaysian government hopes to produce students who are active in both academics as well as sports. Furthermore, physical activity improves quality of sleep. People who are physically fit sleep better and feel energetic during the day and reduce insomnia. Study has proved that by being physically active, students' academic performance would improve [18].

Lack of physical activities leads to overweight or obesity. Being obese can lead to serious health conditions including high blood pressure, high cholesterol, coronary heart disease and stroke [19]. Prevention is better than medication; therefore if we focus on physical activities, we can reduce the rates of diseases and enhance a healthy lifestyle. Being inactive will shorten the life expectancy. Regular physical activity plays an important role to improve muscular strength, endurance, build up healthy muscles and bones, reduces stress and anxiety and relieves the symptoms of depression [20]. Increasing physical activity for those who are physically inactive should be the top priority of the public health agenda for individuals of all ages [21].

College students have been found to have poor physical activity habits leading to unhealthy body mass indexes [22]. As the prevalence of low physical activity level among Malaysian adults is high; this is a good opportunity for all college students to review their current lifestyle. Most of the studies were conducted in western countries. Hence, a study was conducted to evaluate the physical activity level of university students in Malaysia. The objective of this study was to identify the percentage of physical activity level among students of Asia Metropolitan University (AMU) in Malaysia.

## MATERIALS AND METHODS

**Study Design, Setting and Population:** The study design was a cross sectional survey. A

total of 100 participants were selected for the study by convenience sampling method on the basis of inclusion and exclusion criteria from AMU. The study was approved by the university research ethical committee.

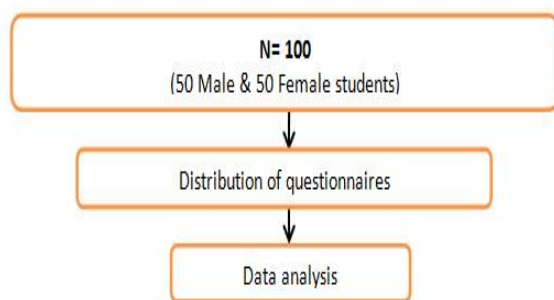
**Inclusion criteria:** We included the individuals between 18-30 years of age, both the male & female students, all races, both physically active / inactive students, able to follow instructions.

**Exclusion criteria:** We excluded the individuals who are physically challenged, and who had contraindications for physical activity

**Outcome Measure:** The International Physical Activity Questionnaire (IPAQ) short form was used to assess the physical activity level [23]. This instrument is validated in several researches and has been adapted in 12 countries [24]. Reliability and validity of the IPAQ short version has acceptable test-retest reliability and validity for sitting and vigorous activity [25]. Questionnaire can be used for a wide range of respondents (aged from 15 to 69). The IPAQ short form asks about three specific types of activity undertaken in four domains. The specific types of activity that were assessed are walking, moderate and vigorous intensity activities. The level of physical activity referred in the questionnaire is presented as Metabolic Equivalent (MET). 1 MET = a resting energy expenditure assuming oxygen consumption of 3.5 ml-min/kg weight. Walking = 3.3 METS, moderate physical activity = 4.0 METS and vigorous physical activity = 8.0 METS. Students were assigned to three different categories of physical activity levels (low, moderate, high) and assessed using the formula: MET level × minutes of activity/day × days per week. The MET level was multiplied by minutes of physical activity and by events per week. There are three levels of physical activity proposed to classify populations: low, moderate and high levels of physical activity. Respondents categorized as high level of physical activity had to meet either one of the following criteria such as (a) vigorous intensity activity on at least three days achieving minimum total physical activity of at least 1500 MET-minutes/week or (b) seven or more days of any combination of walking, moderate or vigorous intensity activities, achieving a minimum total physical activity of at least 3000

MET-minutes/week. Respondents categorized as moderate level of physical activity had to meet either one of the following criteria such as (a) three or more days of vigorous intensity activity of at least 20 minutes per day or (b) five or more days of moderate intensity activity or walking of at least 30 minutes per day or (c) five or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET-minutes/week. Respondents who did not meet the criteria for high or moderate physical activity level were considered low.

**Fig 1:** Showing the flow chart for the Procedure.



**Statistical Analysis:** Data analysis is the method by which the validity of a research study is evaluated. Data were analyzed by descriptive statistical method using Microsoft excel 2010 and SPSS 20 version.

## RESULTS

**Table 1:** Characteristics of the participants.

VARIABLES		n (%)
Gender	Male	50 (50%)
	Female	50 (50%)
Age	18 - 21	24 (24%)
	22 - 25	69 (69%)
	26 - 30	7 (7%)
Ethnicity	Malay	27 (27%)
	Indian	34 (34%)
	Chinese	22 (22%)
	Others	17 (17%)
Body Mass Index (BMI)	Underweight	8 (8%)
	Normal	71 (71%)
	Overweight	15 (15%)
	Obese	5 (5%)
	Severely obese	1 (1%)
Physical activity level	Low	22 (22%)
	Moderate	38 (38%)
	High	40 (40%)

n: frequency, % : percentage.

The participants' demographic characteristics are explained in Table 1 and 2. Number of days of vigorous physical activities, moderate physical activities and walking in last 7 days between male and female participants are shown in Table 3 with mean and standard deviation through  $Q_1$ ,  $Q_3$  and  $Q_5$ . Duration of vigorous physical activities, moderate physical activities and walking in last 7 days between male and female participants are also shown in Table 3 with mean and standard deviation through  $Q_2$ ,  $Q_4$ ,  $Q_6$  and  $Q_7$ . Physical activity level on the basis of age, gender, ethnicity and BMI is shown in Table 4.

**Table 2:** Demographic characteristics of the participants.

VARIABLES	MEAN	MEDIAN	MINIMUM	MAXIMUM	SD
<b>MALES</b>					
Age (Yrs)	22.98	23	18	30	2.66
Body Mass (kg)	66.88	66.5	45	90	10.81
Body Height (m)	1.73	1.72	1.62	1.91	0.06
BMI	22.21	22.15	15.6	30.5	3.02
<b>FEMALES</b>					
Age (Yrs)	22.72	23	18	28	2.61
Body Mass (kg)	58.16	54.5	40	105	13.29
Body Height (m)	1.58	1.58	1.5	1.74	0.06
BMI	23.02	22.35	17.63	38.1	4.48

## STUDENTS' ANSWERS TO THE QUESTIONS FROM THE QUESTIONNAIRE

**Table 3:** Number of days and duration of vigorous physical activities, moderate physical activities and walking in last 7 days between male and female participants.

Questions	Male	Female	
Number of days	$Q_1$	$3.13 \pm 1.75^a$	$2.41 \pm 1.54$
	$Q_3$	$2.76 \pm 1.60$	$2.47 \pm 1.41$
	$Q_5$	$5.06 \pm 1.94$	$5.69 \pm 1.54$
Duration	$Q_2$	$111.6 \pm 75.6$	$67 \pm 50.7$
	$Q_4$	$73.6 \pm 65.9$	$45.32 \pm 35.09$
	$Q_6$	$66.02 \pm 68.5$	$83 \pm 90.74$
	$Q_7$	$371.4 \pm 175.3$	$312.4 \pm 184.5$

<sup>a</sup>Mean  $\pm$  Standard Deviation (SD).

The participants comprised of 50% (n=50) female students and 50% (n=50) male students. There were 7 (14%) male participants in the low physical activity group, 15 (30%) in the moderate physical activity category and 28 (56%) showed high physical activity. Meanwhile, there were 15 (30%) females who demonstrated low physical

activity, 23 (46%) and 12 (24%) females who showed moderate and high physical activity levels respectively. Students were classified in 3 ranges of age as 18-21 years, 22-25 years and 26-30 years. Among participants in the 18-21 age range, an equal proportion of 8 students (33.3%) fall into the low, moderate and high physical activity level. In the 22-25 age range, 14 (20.3%) come under low, 25 (36.2%) under moderate and 30 (43.5%) in the high physical activity level. In the last age range, 0 (0%) of them showed low physical activity, whereas, 5 (71.4%) and 2 (28.6%) demonstrated moderate and high physical activity level.

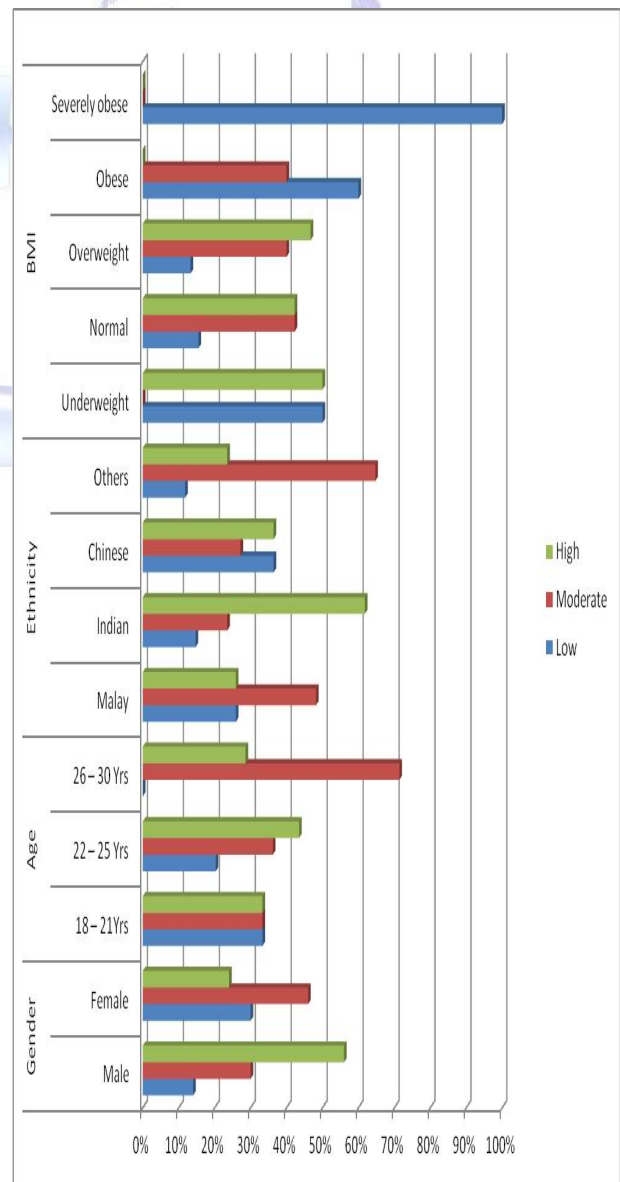
Different races of students participated in this study. In the low physical activity level, there were 7 (25.9%) Malay, 5 (14.7%) Indians, 8 (36.4%) Chinese and 2 (11.8%) other race students. On the other hand, 13 (48.2%) Malay, 8 (23.5%) Indians, 6 (27.2%) Chinese and 11 (64.7%) of other race students showed moderate physical activity. Furthermore, in the high physical activity level, there were 7 (25.9%) Malay, 21 (61.8%) Indians, 8 (36.4%) Chinese and 4 (23.5%) other race students.

When the characteristics of the participants were analyzed based on their Body Mass Index, 0 (0%) students were seen to fall under the underweight category in the moderate physical activity level, whereas, 4 (50%) underweight students were seen in both low and high levels of physical activity level. A majority of students were in the normal BMI category, of which 11 (15.5%) were seen in the low physical activity level and 30 (42.25%) in both moderate and high physical activity level. Some of the students were also in the overweight BMI category. Among them, only 2 (13.3%) had low physical activity levels, 6 (40%) had moderate physical activity levels and 7 (46.7%) had a high level of physical activity. A few students were seen in the obese BMI category. Of them, 3 (60%) had low physical activity level, 2 (40%) had moderate physical activity level, whereas there were no obese 0 (0) student who demonstrated high physical activity level. Only 1 (100%) student was severely obese and had a low physical activity level. There were no 0 (0%) severely obese students who showed moderate or high physical activity level.

**Table 4:** Physical activity level of the participants on the basis of variables.

VARIABLES		PHYSICAL ACTIVITY LEVEL		
		Low	Moderate	High
		n (%)	n (%)	n (%)
Gender	Male	7 (14)	15 (30)	28 (56)
	Female	15 (30)	23 (46)	12 (24)
Age	18 - 21	8 (33.3)	8 (33.3)	8 (33.3)
	22 - 25	14 (20.3)	25 (36.2)	30 (43.5)
	26 - 30	0 (0)	5 (71.4)	2 (28.6)
Ethnicity	Malay	7 (25.9)	13 (48.2)	7 (25.9)
	Indian	5 (14.7)	8 (23.5)	21 (61.8)
	Chinese	8 (36.4)	6 (27.2)	8 (36.4)
	Others	2 (11.8)	11 (64.7)	4 (23.5)
Body Mass Index (BMI)	Underweight	4 (50)	0 (0)	4 (50)
	Normal	11 (15.5)	30 (42.25)	30 (42.25)
	Overweight	2 (13.3)	6 (40)	7 (46.7)
	Obese	3(60)	2(40)	0 (0)

**Graph 1:** Physical activity level of the participants on the basis of variables.



## DISCUSSION

This study was conducted to identify the physical activity level among students of Asia Metropolitan University. 100 university students were recruited for this study comprising of 50 male and 50 female students with age ranges from 18 to 30 years. Gender is one of the most important predictors of physical activity. A number of studies show that physical activity levels among adolescence varied by genders whereby males demonstrated a higher percentage of physical activity than females. It has also been shown that female adolescence were less physically active than male adolescence [10,26-28]. The crude worldwide prevalence of physical inactivity was 21.4% being higher among women (23.7%) than men (18.9%) [13]. Similarly, this study also showed that male students are more physically active than female students. The percentage of low level physical activity of both male and female participants was 14% and 30% respectively. It has been noted that the level of physical activity decreases from high school to college. The findings of this study are in agreement with other studies that the level of physical activity declined as age increased [4,10]. This study found that there is a difference in physical activity level between the ages. Students at the age range of 22-25 demonstrated the highest level of physical inactivity compared with students in an age range of 18-21 and 26-30.

Few studies have reported that physical activity patterns varied by race [29,30]. In this study, Indian students were more physically active (61.8%) when compared to Chinese (36.4%), Malay (25.9%) and other races (23.5%). Study done by Dan SP [26] reported that no association was found between physical activity levels and race. The findings of this study showed that the highest low level of physical activity was observed in Chinese (36.4%), followed by Malay (25.9%), Indians (14.7%) and other races (11.8%). These results were consistent with the findings from NHMS III (MOH, 2008) which showed that the highest prevalence of physical inactivity was observed among Chinese students [6].

Our study showed that the physical activity level is correlated with BMI status. The distribution

of respondents with high physical activity level was found in underweight and overweight BMI groups. This finding is consistent with a study carried out by Pon LW [31] which has shown that overweight Malaysian adolescents were found to be physically active than normal weight adolescents. High percentage of low physical activity level was found in obese and severely obese BMI groups compared with other BMI groups. However, a study carried out by Dan SP [26] found no association between physical activity level and weight status. The discrepancy may be due to different population comparisons, for example children versus adolescents.

The limitations of this study were less sample size, possibility of recall biases or over reporting of physical activity that lead to overestimation of the physical activity levels and analysis were not done on the basis of different disciplines. Level of physical activity among the female respondents was lower than male respondents; it is therefore recommended to develop physical activity programs especially for the females. It is also recommended that further studies should be carried out to identify the physical activity barriers. Objective measures of physical activity might be included to minimize the self-reported estimate error.

## CONCLUSION

The physical activity level among university students was found satisfactory although the percentage of low level of physical activity was found higher in female students. Moreover, obese and severely obese students showed a low level of physical activity in a higher percentage.

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**Conflicts of interest: None**

## REFERENCES

- [1]. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise and physical fitness: definitions and distinctions for health-related research. Public Health Rep. 1985;100:126-131.
- [2]. World Health Organization. Reducing risks, promoting healthy life. The world health report. Available at: <http://www.who.int/whr/2002/chapter4/en/index4.html>. Accessed September 2, 2010.

- [3]. Geneva. World Health Organization (WHO). Global recommendations on physical activity for health: 2010.
- [4]. Guthold R, Ono T, Strong KL, Chatterji S, Morabia A. Worldwide variability in physical inactivity a 51-country survey. *Am. J. Prev. Med.* 2008;34:486-494.
- [5]. Poh BK, Safiah MY, Tahir A, Siti Haslinda MD, Siti Norazlin N, Norimah AK, Wan Manan WM, Mirnalini K, Zalilah MS, Azmi MY, Fatimah S. Physical activity pattern and energy expenditure of Malaysian adults: findings from the Malaysian Adult Nutrition Survey (MANS). *Mal J Nutr.* 2012;16(1):13-37.
- [6]. Khor GL, Noor Safiza MN, Rahmah R, Jamaluddin AR, Kee CC, Geeta A, Jamaiyah H, Suzana S, Wong NF, Ahmad Ali Z, Ruzita AT, Ahmad Faudi Y. Third National Health and Morbidity Survey (NHMS III) 2006: Nutritional status of adults aged 18 years and above. In: Siong TE, editor. 23<sup>rd</sup> scientific conference of the nutrition society of Malaysia; 2008 Mar 27-28. Kuala Lumpur, Malaysia: Nutrition Society of Malaysia; 2008.
- [7]. Abdul Kadir AB, Ang KT, Azizul A, Firdaus M, Jasvinder K, Lim CH. (2011) Mental health problems in adults. In: Kaur G, Kaur J, Nalachakravarthy O, Norzawati Y, Fadzilah K, Helen Tee GH. National Health and Morbidity Survey 2011 (NHMS 2011). Vol. II: Non-communicable diseases. Kuala Lumpur, Malaysia: Institute for Public Health (IPH).
- [8]. Bouchard C, Rankinen T. Individual differences in response to regular physical activity. *Med Sci Sports Exerc.* 2001 Jun;33(6):446-451.
- [9]. Kaplan GA, Strawbridge WJ, Cohen RD, Hungerford LR. Natural history of leisure time physical activity and its correlates: associations with mortality from all causes and cardiovascular disease over 28 years. *Am J Epidemiol.* 1996 Oct;144(8):793-797.
- [10]. Salamuddin N, Harun MT. Physical activity index among Malaysian youth. *Asian Social Science.* 2013 Aug;9(12):99-104.
- [11]. Angyan L, Teczely T, Mezey B, Lelovics Z. Selected physical characteristics of medical students. *Medical Education Online.* 2003;1-6.
- [12]. Dabrowska-Galas M, Plinta R, Dabrowska J, Skrzypulec-Plinta V. Physical activity in students of the Medical University of Silesia in Poland. *Journal of the American Physical Therapy Association.* 2012 Oct;93(3):384-392.
- [13]. Dumith SC, Hallal PC, Reis RS, Kohl III HW. Worldwide prevalence of physical inactivity and its association with human development index in 76 countries. *Preventive Medicine.* 2011 Mar;53:24-28.
- [14]. Egli T, Bland HW, Melton BF, Czech DR. Influence of Age, Sex, and race on college Students' exercise motivation of physical activity. *J Am Coll Health.* 2011;59(5):399-406.
- [15]. Dietary guidelines for Americans. USA: Department of Health and Human Services; 2010.
- [16]. Wicker P, Breuer C, Pawlowski T. Promoting sport for all to age-specific target groups: The impact of sport infrastructure. *European Sport Management Quarterly.* 2009 Jun;9(2):103-118.
- [17]. Haskell WL, Lee IM, Pate RR, Powell KE, Blair SN, Franklin BA; Macera CA, Heath GW, Thompson PD, Bauman A. Physical Activity and Public Health: Updated Recommendation for Adults From the American College of Sports Medicine and the American Heart Association. *Med Sci Sports Exerc.* 2007 Aug;39(8):1423-1434.
- [18]. Kamal AA, Yusari N. Malaysian students' involvement in physical activity and the impact on academic achievement. *Standard Journal of Education and Essay.* 2014 Apr;2(1):32-38.
- [19]. Kohl HW. Physical activity and cardiovascular disease: Evidence for a dose response. *Med Sci Sports Exerc.* 2001 Jun;33(6):472-483.
- [20]. McGuigan FJ. *Encyclopedia of stress*: London; Benjamin Cummings: 1999.
- [21]. Tudor-Locke CE, Myers AM, Rodger NW. Development of a theory-based daily activity intervention for individuals with Type 2 diabetes. *Diabetes Edu.* 2001 Jan;27(1):85-93.
- [22]. Brevard PB, Ricketts CD. Residence of college students affects dietary intake, physical activity and serum lipid levels. *Journal of the American Dietetic Association.* 1996;96(1): 35-38.
- [23]. International Physical Activity Questionnaire, scoring protocol. Available at: <http://www.ipaq.ki.se/scoring.htm>. Accessed December 28, 2011.
- [24]. Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, Pratt U, Ekelund U, Yngve A, Sallis JF, Oja P. International Physical Activity Questionnaire: 12 country reliability and validity. *Medicine and Science in Sports and Exercise.* 2003; 35(8):1381-1395.
- [25]. Kurtze N, Rangul V, Hustvedt BE. Reliability and validity of the international physical activity questionnaire in the Nord Trondelag health study population of men. *BMC Medical Research Methodology.* 2008 Oct;8(63).
- [26]. Dan SP, Mohd Nasir MT, Zalilah MS. Determination of factors associated with physical activity levels among adolescents attending school in Kuantan, Malaysia. *Mal J Nutr.* 2011; 17(2):175-187.
- [27]. Ying CY, Kuay LK, Huey TC, Hock LK, Abd Hamid HK, Omar MA, Ahmad NA, Cheong KC. Prevalence and factors associated with physical inactivity among Malaysian adults. *Southeast Asian J Trop Med Public Health.* 2014 Mar;45(2):467-480.
- [28]. Mohammed G, Md Said S, Ariffin AA, Kamaruzaman J. Physical inactivity and its associated factors among university students. *IOSR Journal of Dental and Medical Sciences.* 2014 Oct;13:119-130.
- [29]. Schmitz KH, Lytle LA, Phillips GA, Murray DM, Birnbaum AS, Kubik MY. Psychosocial correlates of physical activity and sedentary leisure habits in young adolescents: the teens eating for energy and nutrition at school study. *Prev Med.* 2002;34:266-278.



- [30]. Gordon-Larsen P, McMurray RG, Popkin BM. Determinants of adolescent physical activity and inactivity patterns. *Am Acad Pediatrics*. 2000 Jun;105(6):1327-1328.
- [31]. Pon LW, Kandiah M & Mohd Nasir MT. Body image perception, dietary practices and physical activity of overweight and normal weight Malaysian female adolescents. *Mal J Nutr*. 2004;10(2):131-147.

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