UNIVERSITI PUTRA MALAYSIA

THE ASSOCIATION BETWEEN BODY MASS INDEX, DIETARY INTAKE, GRIP STRENGTH AND THE WELL BEING OF MEDICAL STUDENTS IN UPM

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THE ASSOCIATION OF BODY MASS INDEX, PHYSICAL ACTIVITY, DIETARY, AND GRIP STRENGTH ON THE WELL BEING OF MEDICAL STUDENTS IN UNIVERSITY PUTRA MALAYSIA (UPM)

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ABSTRACT

Introduction: According to World Health Organization, students in universities are categorized as adolescents. They are often thought of as a healthy group but not all the students have optimal health and wellbeing. The common definition of health or well being is that stated by the World Health Organization (WHO) over half a century ago; "a complete state of physical, mental and social well-being, and not the mere absence of disease or infirmity[1].Health status and lifestyle patterns are important predictors of future health, productivity and life expectancy of individuals.

Objectives: A cross sectional study was conducted in Faculty of Medicine and Health Sciences (FMHS) in UPM, Serdang, Selangor to determine the effect of diet, BMI, physical activities, grip strength and factors associated with well-being and among medical students in UPM.

Methods: Self administered questionnaire was used to obtain information on social demographic factors, body mass index, physical activity level, dietary intake, grip strength and well being of medical Height and weight was recorded and Body Mass Index (BMI) was calculated using the formula. All the data were analyzed using SPSS version 21.

Result: From our study, we found out that most of medical students have below average hand grip strength, normal BMI, high level of physical activity and insufficient daily calorie intake. There was no significant association between hand grip strength and well being of the medical students (p=0.152).There was also no significant association between BMI and well being of medical students (p=0.594).There was also no significant association between physical activity and well being of medical students (p=0.436).There was significant association between dietary intake and well being of medical students (p=0.000).

Conclusion: Most of medical students have below average hand grip strength, normal BMI, high level of physical activity and insufficient daily calorie intake. There was no significant association between hand grip strength and well being of the medical students (p=0.144).There was also no significant association between BMI and well being of medical students (p=0.154).There was also no significant association between physical activity and well being of medical students (p=0.436).There was significant association between dietary intake and well being of medical students (p=0.000).This research helped us to understand more about the lifestyle of medical students in UPM.

Keywords: Prevalence, BMI (Body Mass Index), Grip strength

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BMI : Body Mass Index

EE : Energy Expenditure

IPAQ : International Physical Activity Questionnaire

WHO : World Health Organization

GHQ : General Health Questionnaire

CHAPTER 1

INTRODUCTION

1.1 Background

According to World Health Organization, students in universities are categorized as adolescents. They are often thought of as a healthy group but not all the students have optimal health and wellbeing. The common definition of health or well being is that stated by the World Health Organization (WHO) over half a century ago; "a complete state of physical, mental and social well-being, and not the mere absence of disease or infirmity[1]. Health status and lifestyle patterns are important predictors of future health, productivity and life expectancy of individuals.

For example, we can assume that the physicians represent a significant human resource a country hence, improving and preserving their health, through lifestyle modification, is a form of preservation of a national resource. Preservation of physician health should start as soon as physicians start their training in medical school[2]. Problems such as examination, packed class activities, lack of leisure time, prolonged hours of study and concern about scores may lead to development of different kinds of psychological problems and thus threaten psychological wellbeing[3]. Another outcome included in this study is handgrip strength as a predictor of physical functioning. The grip strength has long been thought of as a possible predictor of overall body strength. Smith et al (2006) found a direct correlation in grip strength and overall body strength in very old females[4, 5]. Fry also found a correlation between grip strength and performance in American Men Junior Weightlifting. Though in theory, one would believe the two are correlated and more studies may be necessary for other populations[5]. Many of the

research studies correlated grip strength to various other physical variables including nutritional status, rotator cuff weakness, fatigue, and overall physical function[3].

Since most health and lifestyle habits are acquired early, persist throughout life and are difficult to change, the earlier healthy habits begin the more effective it is likely to be. Other factors affect physicians' physical, mental and social well being such as dietary intake, overweight, sedentary life, alcohol, self-medication, stress, and neglect in seeking appropriate preventive and curative clinical care. Thus, improving the health and lifestyle of medical students would be expected to protect them from the health risks of their chosen profession and allow them to gain a healthy life.

1.2 Problem Statement

The health status and well being of student is important and need to be controlled to prevent the risk of complications and other related diseases. Medical students are the future health personnel who act as the promoters and role models for maintaining a healthy lifestyle for the community. Thus, they have to show a good example to the public especially in controlling their BMI. There are studies on medical students which showed that this condition also occurs among them. For example, a study conducted in a Japanese university reported a progressive rise in obesity level among medical students from 1979 to 1991[6]. Hence, as a role model to the public, they should take primary prevention efforts which can reduce the burden of this disease and avoid the conditions become more terrible.

The present study aims to determine the relationship between obesity, dietary intake and physical activity and wellbeing and grip strength among students of UPM. By

participating in the study, the respondent will be able to know their own body mass index hopefully have increasing their awareness toward a better lifestyle. In addition, for those who are suboptimal health status can take steps to manage their dietary intake, physical activity and body weight before any complications develop.

1.1 Objectives

1.2.1 General objective

To determine the effect of diet, BMI, physical activities, grip strength and factors associated with well-being and among medical students in UPM.

1.2.2 Specific objectives

a) To determine the grip strength of medical students in UPM.

b) To determine the BMI (Body Mass Index) among medical students in UPM.

c) To determine the level of physical activity among medical students in UPM.

d) To determine the dietary intake among medical students in UPM.

e) To determine the well being of medical students in UPM.

f) To determine the association between dietary intake, BMI, physical activity, grip strength and well-being among medical students in, UPM.

1.3 Hypothesis

1.3.1 Research hypothesis

a) There is an association between Body Mass Index and well being among medical students in UPM.

b) There is a relationship between dietary intake and well being among medical students in UPM.

c) There is a relationship between physical activity and well being among medical students in UPM.

d) There is a relationship between grip strength and well being among medical students in UPM.

CHAPTER 2

LITERATURE REVIEW

2.1 Health status and well being

Health status and health-related practices such as lifestyle patterns are important predictors of future health productivity and life expectancy of individual.[2] Medical students represent a significant community investment and promoting their health preserve this investment.[2] According to a study on United Arab Emirates medical student, students' needs were assessed by means of a cross-sectional self-administered questionnaire survey. They found that: 14% of students were underweight, 24% of students were overweight or obese; the majority believed their activity levels were insufficient (77%), their stress levels were too high (65%) and their diet unhealthy (50%); 33% were not sufficiently active to meet minimum recommended levels: few students (22%) had seen a doctor in the past year. So, many of the medical students are unaware of important personal health parameters. Thus, medical students need to improve health and by adopting a healthy lifestyle that would be expected to protect them from the health risks of their chosen profession and allow them to gain significant additional years of healthy life. In addition, health is inherently a social phenomenon embodying the quality of our relationships with one another[7]

2.2Factor associated with well being

3.2.1 BMI

According to Alireza Moaafi et all (2011) all of the freshman Iranian students entering university of Isfahan were examined following admission and their BMI were measured. According to WHO guidelines, the normal range was 18.5-25kg/m^2.The results showed that 19.4% of the students were underweight. A BMI level above 25 was more common in the males. The overall percentage of overweight students was 16%.A direct relationship was observed between increased systolic blood pressure and BMI i.e. the higher BMI level, the more the number of cases with high systolic blood pressure[8].

A study conducted among adults in a community in South Africa and also among university students in 1998, reported a lower BMI in the students when compared to that of the public. This might be an indication that university students are more conscious of their body weight than the general public. Therefore, monitoring of weight by age, weight/ height (BMI) is very important when one wishes to advise the general public to practise a normal healthy lifestyle. In the South African study, factors that were found to be significantly associated with a high BMI included gender, age, marital status, obesity among parents, dieting, last physical check up, year of study number of brothers and sisters, regular meals eaten and high school grade. Also, a study done in the USA noted that obesity among female students is associated with smoking and decreased physical activity[9]. Studies performed in developed countries have identified a relationship between body mass index (BMI) and physical activity as well as health status. However; literature searches performed showed that no such study has previously been undertaken

during this period of life which may develop into a sustained lifestyle. A clearer understanding of the interaction between physical activity and BMI was seen among university students in St Lucia. This study is considered to be relevant in young adults as it is widely believed that an improved health status by maintaining BMI status is necessary in order to identify individuals who are at risk of developing obesity associated and or related medical conditions[9].

2.2.3 DIETARY INTAKE

The research done among female students living in the dormitory of Haceteppe University in Turkey showed that only one (20%) out of five students had breakfast daily and 3 out of 5 (59.5%) students who had no regular breakfast, mentioned shortness of time as the underlying reason. Frequency of having refreshments between meals, lunch and dinner was higher than the frequency of breakfast. About 69.7% of students skipped at least one of the meals most of the days; the reason behind this in approximately half of those students (46.7%) was shortness of time. Breakfast is usually eaten in the canteen (54.9%), lunch in student dining hall (73.6%), and dinner in the restaurants around the dormitory (43.3%). Two students out of three (67.4%) consumed junk-food during studying. No statistically significant correlation was found between BMI values with of meal regularity and the frequently visited eating places. The frequency of consuming main food groups at least 3-5 times a week and less than once a month was 55.9% and 8.6% for milk and dairy products, 54.5% and 4.3% for meat-egg-grain legumes, 79.4% and 1.7% for cereals, and 64.7% and 1.8% for vegetable fruit. The frequency of fast/junk food consumption at least 1-2 times a week was considerably high (90.4% for chocolate

etc.; 85.0% for pastry; 67.9% for pizza, hamburger, and sandwich. BMI revealed that 10.3% of students who had junk/fast food while studying, 2.0% of students who did not eat fast/junk food, 10.3% of students who drank soda beverage, and 2.0% of students who did not drink, were overweight. 9.5% of students who attended classes regularly were overweight, others were not overweight[10].

A research was done among the second year medical students in Goteberg university in Sweden to find out their dietary intake by using a 3 day food record. The results showed that for energy and macronutrient intake, the mean energy intake for the whole period was 7.8 MJ for women and 10.9 MJ for men and there was no significant trend overtime. The energy intake was 91% and 84% of the calculated energy expenditure for men and women, respectively. The dietary food records of 80% of women and 90% of men were validated using the cut-off limit of energy intake. The mean reported energy intake per kilogram body weight was 129 (8.5) kJ for women, range 120-150 kJ (13 courses included), and 145 kJ, range 119-157 kJ, for men (14 courses included).The mean saturated fat intake was 12 and 13 energy per cent (E%) for women and men, respectively. There was a significant decrease between 1994 and 2006 for both women and men. For vitamin, the reported dietary intake of vitamins A, C and certain vitamin B's were sufficient. Dietary intake of calcium also was an example but there was decrease in iron intake, both men and women. The folate intake was increasing over time both for men and women. There was significant increase in dietary fibre intake in women and men[11]. (Tengvall Marja and Ellegard Lars (2007).

2.2.4 PHYSICAL ACTIVITY

A cross sectional study was conducted among 300 students from the schools of physical therapy, midwifery, nursing, pharmacy, cosmetology, and medicine at the Medical University of Silesia. The majority of students were classified as having a moderate level of physical activity (School of Cosmetology 58%, School of Mid- wifery 66%, School of Nursing 86%, School of Pharmacy 86%, and School of Medicine 52%). The largest number of students with a moderate level of physical activity was observed in the schools of nursing and pharmacy (86%). On the other hand, the largest group of students with a low level of physical activity was observed in the School of Medicine (26%), compared with 14% in the School of Cosmetology, 12% in the School of Midwifery, 6% in the School of Nursing, and 4% in the School of Pharmacy. The level of physical activity among most students from the Medical University of Silesia in Poland was found satisfactory, although there was a group of students who, despite being aware of the benefits of physical activity, did not meet the recommended level of physical activity and did not apply their knowledge in everyday life. Physical therapist students demonstrated the highest level of physical activity compared with other students from the same university. They are well trained and qualified to promote healthy habits and encourage individuals to undertake regular physical activity[12].

2.2.5 OTHER ASSOCIATED FACTORS

Stress level and lacking of time

Chronic stress especially to university student is assumed to have a role in the development of obesity by interacting with mechanisms underlying energy intake and expenditure, and stimulating visceral fat accumulation in favor of abdominal obesity[13]. The existing evidence suggests that relationships between childhood traumatic stress and adult weight problems are due in part to the development of symptoms of psychiatric disorders, specifically posttraumatic stress disorder symptoms and depression[14].

The role of posttraumatic stress disorder in the development of weight problems suggests that screening and early treatment of psychiatric disorders could provide benefits in terms of weight problems and physical health in adulthood in addition to improving mental health.

In another study it was found that the two main barriers identified by the participants (medical student) of this study were lack of time and stress. Medical students in their 3rd, 4th and final year have to attend all-night calls at least once per week, or stay up, late studying leading to sleep deficits. Those kinds of stress are likely affect the student's well being and health status [7].

2.3 THE GRIP STRENGTH

Grip strength is useful in clinical practice for the assessment of disease and or progress rehabilitation[15]. Many daily functions and sporting events require high activity levels of the flexor musculature of the forearms and hands. These are the muscles involved in grip strength. Sports activities such as wrestling, tennis, football, basketball, and baseball to daily activities such as carrying laundry, turning a doorknob, and vacuuming, some degree of grip strength is necessary to be successful. For example, without adequate grip and forearm strength, tennis players may run the risk of developing lateral epicondylitis, otherwise known as tennis elbow. The same article said that nutritional status has also been correlated to handgrip strength. Guo et al (1996) and Kenjile et al (2005) found grip strength to be a strong predictor of an individual's nutritional status. These findings draw parallel to the findings of the anthropometric measurement studies and grip strength.

Nutritional status that leads to specific levels of body mass, correlate directly with grip strength. The simple method of non-invasive measurement may provide nutritionists and medical professionals with valuable screening data, prior to further more invasive testing to student. Hand strength is often affected by injury or disease and therefore measurement of grip strength is critical for occupational therapists and other health professionals for assessment of disease progress and progression in rehabilitation (Boissy,Bourbonnais, Carlotti,Gravel & Arsenault, 1999; Innes, 1999).

In general, males are stronger than females in all age groups, and females in their thirties are as strong as males in their seventies. Gender is the most important predictor of grip force, with a difference of 216 N ($B = 216$, $p < 0.001$) in force between females and

males. In the gender-specific regression analyses, age, height, and exercise came out as independent significant predictors of grip force in both females and males. Males are stronger than females in all age groups. Grip force is strongly affected with gender, age, height, and regular exercising. In both genders the difference between hands is largest in the thirties, with females being 10.4% stronger in their right hand than in their left, and males being 7.4% stronger, respectively.[16]).

2.4 School Health Promotion and Healthy Lifestyle.

Healthy eating and regular physical activity play a very important role in preventing chronic diseases, among adults aged >18 years including heart disease, cancer and stroke. The three leading causes of death among adults aged >18 years. In addition, poor diet and physical inactivity among younger person can also lead to an increased risk for certain chronic health condition, including high blood pressure, type 2 diabetes and obesity. There are dietary guidelines published for persons aged >2 years and it is recommended that children, adolescents and adults limit intake of solid fats, cholesterol, sodium, added sugar and refined grains to achieve and maintain a healthy body weight.

Next, physical activity that is defined as "bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level" (US Department of Health and Human Services. Physical activities guidelines for Americans, 2008. Washington, DC: US Department of Health and Human Services; 2008). Examples of physical activity include walking, running, bicycling, swimming, jumping rope, active games, resistance exercises, and household chores. In the 2008 Physical Activity Guidelines for Americans, the U.S. Department of Health and Human Services (HHS) recommends that

children and adolescents engage in ≥60 minutes of physical activity daily. Most of the ≥60 minutes/day should be either moderate or vigorous intensity aerobic physical activity. The guidelines indicate that children and adolescents should include vigorous intensity, muscle-strengthening, and bone-strengthening activities at least 3 days of the week.[17]

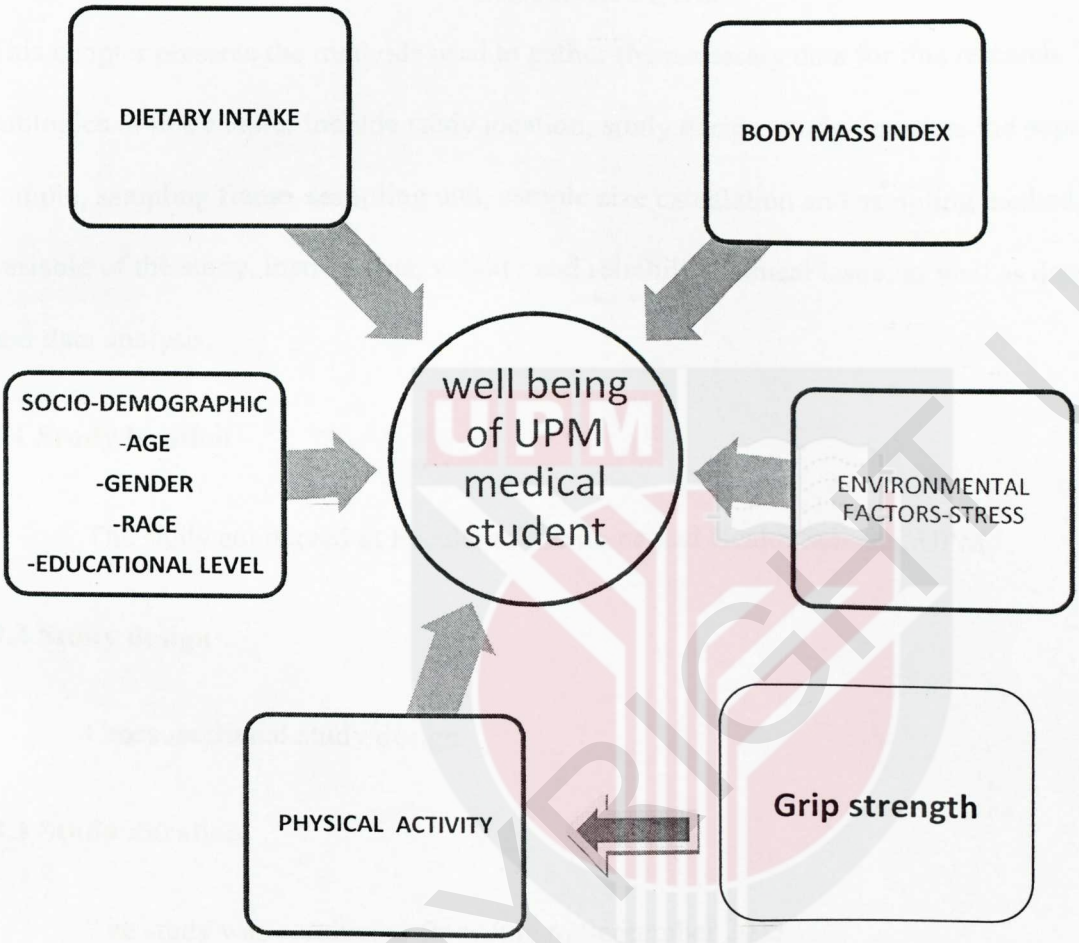

FIGURE 1: CONCEPTUAL FRAMEWORK

CHAPTER 3

METHODOLOGY

This chapter presents the methods used to gather the necessary data for this research. The subtopics in this chapter include study location, study design, study duration, the population and sample, sampling frame, sampling unit, sample size calculation and sampling method, the variable of the study, instruments, validity and reliability, ethical issue, as well as data collection and data analysis.

3.1 Study location

The study conducted at Faculty of Medicine and Health Science, UPM

3.2 Study design

Cross -sectional study design

3.3 Study duration

The study was conducted from July to September 2013.

3.4 Sampling

3.4.1 Study population

The study population was the medical students of UPM.

3.4.2 Sampling population

3.4.2.1 Inclusion criteria

Those students studying medicine in UPM.

3.4.2.2 Exclusion criteria

Those whose are absent on the day of data collection.

Sample size calculation :

Group Comparison (Two Groups)
Ho: $P_1 - P_2 = 0$
Ha: $P_1 - P_2 \neq 0$

Formula

$$n = \frac{\{z_{1-\alpha/2}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$$

where,
$\bar{P} = (P_1+P_2)/2$
P_1 = estimated proportion (larger)
P_2 = estimated proportion (smaller)

Effect size
$ESp = \phi_1 - \phi_2$

where,
ESp = effect size for proportions
ϕ_1, ϕ_2 = arcsine transformation for proportions (groups 1,2)

Note:

$Z_{1-\alpha/2}$ = *standard errors* associated with *confidence intervals*:

1.00	68%
1.645	90%
1.96	95%
2.58	99%

$Z_{1-\beta}$ = *standard errors* associated with *power*:

.524	70%
.842	80%
1.282	90%
1.645	95%
2.326	99%

Sources: Lemeshow, Hosmer, Klar, and Lwanga, 1990; Lipsey, 1990.

a) Sample size calculation based on physical activity

= physically active people who have good general health

= 0.285

= non physically active people who have good general health

= 0.165

n = 178.69

Sample size required is 179.

Source : Oguntibeju OO, Orisatoki RO, Truter EJ.(October 1, 2010).The relationship between body mass index and physical activities among medical students in Saint Lucia, *Pakistan Journal of Medical Sciences*[18]

b) Sample size calculation based on BMI

= non obese who have good general health

= 0.64

= obese who have good general health

= 0.36

n = 48.88

Sources : Alireza Moafi,Soheila Rahgozar,Majid Ghias, Elham Vahdat ahar, Amirbahador Borumand,Amirhosein Sabbaghi, Amirabass Sameti, Mostafa Hashemi (October 2011).BMI, Blood Pressure and Red Blood Cell Indices, *International Journal of Preventive Medicine,* Vol 2, No 4[19].

c) Sample size calculation based on dietary intake

= people with good dietary intake who have good general health

= 0.78

= people with bad dietary intake who good general health

= 0.22

n = 11.26

Sources : Ida Laudanska-Krzeminska, dietary behavior of students from Poznan Universities, Department of Health Education,

University School of Physical Education, Poland, Papers on Anthropology XXI, 2012, pp. 163-175 [20].

d) Sample size calculation based on grip strength

= people with good grip strength who have good general health

= 0.42

= people with bad grip strength who good general health

= 0.58

n = 152.16

sources: Tove Nilsen,2012, Grip force and pinch grip in an adult population: Reference values and factors associated with grip force, Scandinavian Journal of Occupational Therapy, 19: 288–296[16]

Highest sample size should be taken to obtain a better research outcome. So, the sample size calculation based on physical activity was taken in this research.

Non-respond rate = 179 x 20%

Thus, n = 179 + 36

= **215**

3.4.3 Sampling Method

Simple random sampling.

3.4.4 Sampling frame

List of respondents involving Year 1, 2, 4 and 5.

3.4.5 Sampling unit

Students studying medicine in UPM.

3.5 Instrument and data collection

3.5.1 Instruments or questionnaire

A structured pre-tested questionnaire was used in this study. It is divided into 3 parts. First part consists of socio- demographic questionnaire. The second part consists of lifestyle questionnaire which include International Physical Activity Questionnaire (IPAQ) that measures the physical activity of student, personal eating

habits (24-hour diet recall), and General Health Questionnaire (GHQ) that measures the health status and well being of students.

3.5.1.1 General Health Questionnaire

GHQ is a measure of current mental health. It focuses on two major areas – the inability to carry out normal functions and the appearance of new and distressing experiences.

Originally developed as a 60-item instrument, a range of shortened versions of the questionnaire including the GHQ-30, GHQ-28, GHQ-20 and GHQ-12 are now available. The questionnaire asks whether the respondent has experienced a particular symptom or behavior recently. Each item is rated on a four-point scale.

The 12 item version has been shown to be as effective as the 30 item version.

Questions include:

Have you recently been:

1. Able to concentrate on whatever you are doing.
2. Lost much sleep over worry.
3. Felt that you are playing a useful part in things.
4. Felt capable of making decisions about things
5. Felt constantly under strain.
6. Felt you couldn't overcome your difficulties.
7. Been able to enjoy your normal day to day activities.

8. Been able to face up to your problems.

9. Been feeling unhappy and depressed.

10. Been losing confidence in yourself.

11. Been thinking of yourself as a worthless person.

12. Been feeling reasonably happy, all things considered.

(Sources: Pevalin, D.J. (2000) Multiple applications of the GHQ-12 in a general population sample: an investigation of long-term retests effects. Social Psychiatry and Psychiatric Epidemiology, 35(11): 508)[21]

3.5.1.2 Food Frequency Questionnaire

Semiquantitive food frequency questionnaire is to assess habitual diet by asking about the frequency with which food items or specific food groups are consumed over a reference period (e.g. A months or a year before).

The foods listed should be

a) major sources of a group of nutrients

b) foods which contribute to the variability in intake between individuals

c) commonly consumed in the study population.

The frequency of food consumption is assessed by a multiple response grid in which respondents are asked to estimate how often a particular food is consumed. The categories ranging from 'never',' once a month' ,to 'daily' were used and participants had to choose one of these options.

3.5.1.3 International Physical Activity Questionnaire

The International Physical Activity Questionnaire (IPAQ) was used as a standardized measure to estimate habitual practice of physical activities of populations from different countries and socio-cultural contexts. Two-forms of the IPAQ have been developed: a short and a long version, both of which involve 7-day recall of physical activity. The short-form (SF) was designed for use in surveillance studies, in which time is limited, and consists of 8 items to estimate the time spent performing physical activities (moderate to vigorous) and inactivity (time spent sitting). The long form (LF) was designed to provide a comprehensive evaluation of daily physical activities, and assesses the time spent walking, doing moderate-intensity and vigorous-intensity activity within the domains of work, transportation, domestic and gardening (yard) activities, and leisure-related activities.

(Sources: L.CORA et al, International Physical Activity Questionnaire: 12-Country Reliability and Validity, *Official Journal of the American College of Sports Medicine*)[22]

Next, the International Physical Activity Questionnaire (IPAQ) is to determine the level of physical activity of the respondent.[25] IPAQ is an instrument designed primarily for population surveillance of physical activity among adults. The development of an international measure for physical activity was commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken in 12 countries (14 sites) across 6 continents during 2000. The final results suggested that these measures have acceptable measurement properties for use in many settings and in different languages.

IPAQ is suitable for use in regional, national and international monitoring and surveillance systems and for use in research projects and public health program planning and evaluation. International collaboration on IPAQ is on-going and an international prevalence study is under development. It has been developed and tested for use in adults (age range of 15-69 years) and until further development and testing is undertaken the use of IPAQ with older and younger age groups is not recommended. According to IPAQ classification, physical activities are classified into 3 categories score:

Low / Inactive (category 1)

This is the lowest level of physical activity. Those individuals who do not meet the criteria for Categories 2 or 3 are considered to have a 'low' physical activity level

Moderate / Minimally active (category 2)

This category includes either 3 or more days of vigorous activity of at least 20 minutes per day or 5 or more days of moderate-intensity activity or walking of at least 30 minutes per day or 5 or more days of any combination of walking, moderate-intensity or vigorous activities achieving a minimum of at least 600 metabolic equivalent (MET)-min/week.

High / HEPA Active (category 3)

This category includes those who are either having vigorous-intensity activity on at least 3 days and accumulating at least 1500MET-minutes/week OR 77 or more

days any combination of walking, moderate-intensity activities achieving a minimum of at least 3000MET-minutes/week.

Sources: International physical activity questionnaire. Retrieved 26th January 2012 from http://www.ipaq.ki.se/ipaq.htm

Instruments

Hand grip dynamometer

The grip strength is obtained by using handgrip dynamometer. The subject holds the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. The handle of the dynamometer is adjusted if required - the base should rest on first metacarpal (heel of palm), while the handle should rest on middle of four fingers. When ready the subject squeezes the dynamometer with maximum isometric effort, which is maintained for about 5 seconds. No other body movement is allowed. The subject should be strongly encouraged to give a maximum effort. The scoring is done by several trials on each hand with at least 15 seconds recovery between each effort.

The scoring of dynamometer.

	MALES		FEMALES	
rating*	(lbs)	(kg)	(lbs)	(kg)
Excellent	>141	>64	>84	>38
very good	123-141	56-64	75-84	34-38
above average	114-122	52-55	66-74	30-33

Average	105-113	48-51	57-65	26-29
below average	96-104	44-47	49-56	23-25
Poor	88-95	40-43	44-48	20-22
very poor	<88	<40	<44	<20

Sources: http://www.topendsports.com/testing/tests/handgrip.htm[23]

FIGURE 2 :SCORING OF HANDGRIP DYNAMOMETER

3.5.2.2 **Digital bathroom scale**

Weight was recorded using the digital bathroom scale weighing machine on which the students will be made to stand. Two measurements were taken for both weight and height and the average of the two values were used in the analysis. After each respondent, the weighing machine was reset to zero. It was checked frequently by the use of a known weight. The students were requested to stand barefoot on the middle of the weighing machine, with the head looking straight in front, arms by the side and with only basic clothing. When the reading of the machine is stable, the weight was recorded.

SECA body meter

The height will be measured by using SECA body meter. Height was measured by suspending the body meter, 2 meter high from the floor against a straight wall, parallel to either door frame or pillar. The student stood barefoot under the center of the measuring tongue of the body meter without cap or songkok and then to lean against the wall with

3.5.4 Validation and reliability

The questionnaire will be pre-tested in students who were not included in the sample to determine the validity of the questionnaire.

3.6 Study ethics

Ethics approval was obtained from the Ethics Committee of UPM on Human Research UPM before data collection. Informed consent was obtained from the respondents and the parents before data collection.

3.7 Data analysis

The data was analyzed by using the Social Package for Social Sciences (SPSS). In descriptive analysis, prevalence of obesity among students of UPM was described in terms of frequency, percentage, and central tendency (mean, mode and median) and dispersion. Inferential analysis was done using the chi-square test which is performed to test for the association between categorical variables (such as gender, ethnicity, physical activity, and stress level and well being) and t-test for the continuous variables (such as age, height, weight, BMI)) to compare means of these variables between 2 categories of well-being. For the chi-square test, if the expected value for any of the cell was less than 5in more than 20% of cells, Fischer's exact test was used instead of Chi-square test. Multiple linear regression was performed, regressing GHQ scores on socio-demographic factors, BMI, nutritional intake, grip strength, and physical activity.

the back and head looking straight ahead so that an imaginary plane that connect the eyes and ears will be parallel to the floor. The student's heel was made to rest together against the wall or pillar, and the hands were loosely by the sides.

Body Mass Index (BMI) was then be calculated as weight in kilograms divided by the square of height in meters. The respondents were categorized according to age and gender specific for BMI for adolescents. Underweight is defined as BMI-for Age < 5^{th} percentile (WHO, 1995). Although there is currently no clear definition of obesity among adolescents, the most widely accepted definition is that a body mass index (BMI; in kg/m^2) between the 85^{th} and 95^{th} percentile indicates a risk of overweight and that a BMI greater than the 95^{th} percentile indicates overweight.

3.5.3 Quality control

During data collection, calibration for equipment like weighing scale and measuring tape will be used according to manufacturer's instruction. This is to ensure the accuracy of the reading. Weight and height will be taken without shoes and in light clothing to ensure that the measurement obtained is accurate. In order to increase the validity and accuracy of the study, proper quality control will be taken. Simple compare and review check will be carried out to prevent data errors while collecting and analyzing data. The interviewers will be trained on the correct way to take the participants height and weight in order to prevent any bias and error due to improper way of measurement. Data entry was checked and verified manually record by record by checking against each questionnaire. Errors detected were corrected.

3.8 Variables

3.8.1 Dependent variable

The well-being of UPM medical students.

3.8.2 Independent variable

Independent variables are risk factors associated with body mass index status, physical activity, grip strength and the dietary intake.

3.9 Definition of terms

Prevalence - the number of cases of a specific disease present in a given population at a certain time.

(Dorland's Pocket Medical Dictionary. 28th ed.2009)

BMI (Body Mass Index)

An anthropometric measure of body mass, defined as weight in kilograms divided by height in meters squared; method of determining caloric nutritional status.

Source: Adapted from WHO, 1995, WHO, 2000 and WHO 2004[24]

Grip strength –The measure ability to exert pressure with the hand, fingers, or both. It is measured by having the student forcefully squeeze, grip, or pinch dynamometers: results are expressed in either pounds or kilograms of pressure.

(Mosby's Medical Dictionary, 8th edition.2009.Elsevier)

Ethnic Groups - Based on birth certification

Obesity - A condition in which an individual has equal or more than 30 kg/m^2.[1]

3.10 Limitations

Our study will be carried out in Faculty of Medicine and Health Science, so this may not be easily generalized (the effect of student BMI, dietary intake and physical activity and the other associated factor on health status and well being) to other students. The study design itself may not determine the cause-effect relationship between the health status and associated factor. This is because cross-sectional studies can only be used to study the prevalence at a particular time or short period of time. Moreover, temporal sequence of events may not be clear. The time required to finish this research is short and it took great effort difficult to complete the research.

3.10.1 Bias and confounding

The possible bias that will be arising from the questionnaire is the information bias. This bias may happen when the questionnaires do not measure what is supposed to be measured. This problem can be avoided by using standardized and validated questionnaires. Another bias that may arise is the recall bias. This happens when the respondents cannot remember clearly regarding the risk factors asked in the questionnaire.

CHAPTER 4

RESULTS

4.1 Response Rate

A total 215 respondents from medical student of Faculty of Medicine and Health Science were approached and 200 respondents participated in the study giving the response rate of 93%.

4.2 Descriptive (Univariate) Analysis

4.2.1 Distribution of respondent's socio-demographic characteristic.

Table 2 shows the distribution of respondents by socio-demographic characteristic. Most of respondents were 111(55.5%) for Malay,66(33%) for Chinese, followed by Indian 17(8.5%) and others 6(3%).Majority of respondents were in 2nd Year that showed 76 respondents(38%), followed by 4th Year that showed 51(25.5%)respondents, 5th Year 32(16%) respondents.

TABLE 2: Distribution of respondent's socio-demographic characteristic (n=200)

Variables	Mean ± SD	N	%
Age (years)	**21.28 ± 1.144**	**200**	**-**
Gender			**-**
Male	**-**	**100**	**50**
Female	**-**	**100**	**50**
Ethnicity			
Malay	**-**	**111**	**55.5**
Chinese	**-**	**66**	**33.0**
Indian	**-**	**17**	**8.5**
Others		**6**	**3.0**

Years of study	-		
1st year	-	**41**	**20.5**
2nd year	-	**76**	**38.0**
4th year	-	**51**	**25.5**
5th year	-	**32**	**16.0**

4.2.2 Distribution of Grip strength, body mass index and physical activity of medical student

The grip strength reading showed majority of respondent have below the average of grip strength that was 51(25.5%), followed by average 45 respondents (22.5%), above average 39 respondents (19.5%),poor reading showed 32 respondents (16%),followed by very poor that involved 21 respondents (16%) and the lowest respondent of very good grip strength that were 12(6%) respondents.

Table 3 showed the distribution of body mass index which showed majority of respondent are categorized in normal BMI range which showed 137 (68.5%), underweight were 26 (13%), overweight were 24(12%) and obese showed 13 (6.5%).

And the physical activity, majority of student were in high physical activity that showed 146 (73%), followed by moderate physical activity 47(23.5%) and low physical activity 7(3.5%).

TABLE 3: Grip strength, body mass index and physical activity of medical student

Variables	N	%(percent)
Grip strength		
Very poor	**21**	**10.5**
Poor	**32**	**16.0**
Below average	**51**	**25.5**
Average	**45**	**22.5**
Above average	**39**	**19.5**
Very good	**12**	**6.0**
Body mass index		
Underweight	**26**	**13.0**
Normal	**137**	**68.5**
Overweight	**24**	**12.0**
Obese	**13**	**6.5**
Physical activity		
High physical activity	**146**	**73.0**
Moderate physical activity	**47**	**23.5**
Low physical activity	**7**	**3.5**

4.3 Bivariate Analysis

4.3.1 The association between BMI, Physical activity, Grip Strength and Well Being

Table below shows the association between well being and BMI (0.594), physical activity (0.436), grip strength (0.152) of medical students. Each variable with well being of respondents showed no significant which $p>0.05$.

TABLE 4: The association between BMI, Physical activity, Grip Strength and Well Being

Variables	Well being		Chi-square X^2	*p*-value
	Facing problems N(%) (stress)	Psychological healthy (low stress) N (%)		
BMI (kg/m^2)				
Non obese	183	4	0.284	0.594
Obese	13	0		
Physical Activity Level				
High	144	2	1.658	0.436
Moderate	45	2		
Low	7	0		
Hand-Grip strength				
Good	12	0	3.768	0.152
Average	84	0		
Poor	100	4		

4.3.2 The association between BMI, Physical activity, Grip Strength and Physiological distress among medical students.

Table 5 below shows the association between physiological distress and BMI (0.890), physical activity (0.436), grip strength (0.829) of medical students. Each variable with well being of respondents showed no significance which p is>0.05.

TABLE 5: The association between BMI, Physical activity, Grip Strength and Physiological distress.

Variables	**Well being**		**Chi-square** X^2	***p*-value**
	Facing problems N(%) (stress)	Psychological healthy (low stress) N (%)		
BMI (kg/m^2)				
Non obese	126	61	0.019	0.890
Obese	9	4		
Physical Activity Level				
High	144	2	1.658	0.436
Moderate	45	2		
Low	7	0		
Hand-Grip strength				
Good	9	3	0.376	0.829

Average	57	27		
Poor	69	35		

4.3.3 The association between BMI, Physical activity, Grip Strength and Social dysfunction

Table 6 below shows the association between physiological distress and BMI (0.708), physical activity (0.436), grip strength (0.926) of medical students. Each variable with well being of respondents showed no significant which $p>0.05$.

TABLE 6: Association between BMI, Physical activity, Grip Strength and Social dysfunction.

Variables	**Well being**		**Chi-square** X^2	***p*-value**
	Facing problems N(%) (stress)	Psychological healthy (low stress) N (%)		
BMI (kg/m^2)				
Non obese	2	185	0.140	0.708
Obese	0	13		
Physical Activity Level			1.658	0.436
High	144	2		
Moderate	45	2		
Low	7	0		
Hand-Grip strength				

Good	0	12	0.154	0.926
Average	1	83		
Poor	1	103		

4.3.4 The Association between BMI, Physical activity, Grip Strength and Cognitive dysfunction.

Table 7 below shows the association between physiological distress and BMI (0.357), physical activity (0.436), grip strength (0.540) of medical students. Each variable with well being of respondents showed no significant which $p>0.05$.

TABLE 7: The association between BMI, Physical activity, Grip Strength and Cognitive dysfunction.

Variables	**Well being**		**Chi-square** X^2	***p*-value**
	Facing problems N(%) (stress)	Psychological healthy (low stress) N (%)		
BMI (kg/m^2)				
Non obese	172	15	0.847	0.357
Obese	11	2		
Physical Activity Level				
High	144	2	1.658	0.436
Moderate	45	2		
Low	7	0		

Hand-Grip strength				
Good	12	0	1.231	0.540
Average	76	8		
Poor	95	9		

4.3.5 : The association between dietary intake and well being

Table 8 shows the association between dietary intake and well being, psychological distress, social dysfunction and cognitive dysfunction. The mean for total calories of students per day showed 1284.35kcal, total carbohydrate is 182.33g, total protein 68.73g and total fat 33.76g per day. The association shows significance with total general health ($p<0.001$) for total calories, ($p<0.001$) for total carbohydrate, (0.050) for total protein and ($p<0.001$) for total fat. The association of dietary intake with the psychological distress were not significant with respect to calories, total carbohydrate, total protein and total fat respectively ($p=0.143$), ($p=0.310$). ($p=0.119$) and ($p=0.101$); for social dysfunction there was also no significance ($p=0.410$), ($p=0.308$), ($p=0.999$) and ($p=0.446$)respectively; the same go for cognitive dysfunction which showed no significance ($p=0.248$),($p=0.249$), ($p=0.397$), and ($p=0.249$) for each variable of dietary intake respectively.

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TABLE 8: The association between dietary intake and well being, psychological distress social dysfunction and cognitive dysfunction.

Variables	Mean ± SD	F (*p*-value)			
		Well being	Phychological distress	Social dysfunction	Cognitive dysfunction
Total calories (kcal)	1284.35 ± 527.99	**13.36 (0.000)**	2.16 (0.143)	0.681 (0.410)	1.344 (0.248)
Carbohydrate (g)	182.33±77.58	**10.44 (0.001)**	1.037 (0.310)	1.045 (0.308)	1.337 (0.249)
Protein (g)	68.73±29.90	**3.88 (0.050)**	2.45 (0.119)	0.000 (0.999)	0.721 (0.397)
Fat (g)	33.76±19.15	**17.77 (0.000)**	2.714 (0.101)	0.584 (0.446)	1.339 (0.249)

CHAPTER 5

DISCUSSION

5.1.1 Distribution of hand grip strength

Based on our study, we found out that most of the medical students in UPM have hand grip strength that is below average and minority of students have very good strength(only 6% of respondents). There were 51 of them who had below average hand grip strength that is 25.5% of total students who took part in the study. There were no studies done before this related with handgrip strength among medical students.

5.1.2 Distribution of body mass index among medical students in UPM

Based on our study, most of medical students have normal body mass index (BMI).There were 137 students who had normal BMI (68.5% of total respondents). According to the research done in 2007, the mean BMI of female students was 21.4 and the male students was 23.6 (Maie ojamma., et al). Furthermore, according to a study by O O Ogentibeju et all among medical students in Saint Lucia, the mean BMI of the students who participated was 21.9 Kg/m2.

This study strongly supports our finding which shows that majority of medical students have normal body mass index.

5.1.3 Distribution of physical activity among medical students in UPM

Based on our study, most of the medical students practice a high level of physical activity. Consistent with our study research done in 2011 at 7 different universities in United Kingdom, 66% of students practiced high level of physical activity which shows most of the students practice high level of physical activity (Walid el Ansari., et al).In another study by O O Oguntubeju et all, majority of medical student (20.1%) spent more than >7hours per week for general physical activity. According to the study, walking to school is being considered to be associated with increased physical activity among students. Most of the students in this study reside very close to the medical school and the students' involvement in walking as a form of exercise. This research supports our finding which shows that medical students are physically active.

5.1.4 The distribution of dietary intake among medical students in UPM

Based on our study, the mean for total calories of students per day was 1284.35kcal.According to the research done in 2004 among medical students in Greece university, their mean for total calories per day was 2493kcal (Ioannis mammas., et al).The recommended daily calorie intake for men and women around the age 20-39 according to Malaysian Food Composition Database Programme ranges from 2000-2530kcal per day. The result from our study is in contrast with the research done in Greece University. This shows that medical students in UPM are not practicing a good dietary habit which causes their daily intake to be insufficient.

5.1.5 Association between grip strength and well being, physiological distress, social dysfunction and cognitive dysfunction among medical students in UPM

In our study, there was no significant association between grip strength and well being, physiological distress, social dysfunction and cognitive dysfunction among the medical students. There were no studies done previously on the association between grip strength and well being among medical students.

5.1.6 Association between body mass index and well being, physiological distress, social dysfunction and cognitive dysfunction among medical students in UPM

In our study, we found out that there was no significant association between body mass index and well- being, physiological distress, social dysfunction and cognitive dysfunction among the medical students. But, according to studies by Jane Wardle et all, there is significant association of BMI and well being. It showed a normal weight controls category found higher levels of depression. In contrast, obese adolescents are subjected to social rejection, discrimination and negative stereotyping. Such experiences could be expected to lead to negative consequences in terms of self-image, self-esteem and mood, and there is a widespread assumption that obesity has profound psychological costs[28].

5.1.7 Association between physical activity and well being, physiological distress, social dysfunction and cognitive dysfunction among medical students in UPM

In our study, we found out that there is no significant association between physical activity and well being among the students. In the study conducted in 2011 in United Kingdom, there was significant association between physical activity and well being among the students. The difference in association in these two studies might be due to the medical students in UPM are not practicing the physical activity up to the right level. In a study for medical university of Silesia, the students did not meet the recommended level of physical activity and did not apply their knowledge in everyday life. Regular physical activity contributes to good health, and healthy habits will help promote physical activity in future patient.(Magdalana Dabrowska et all)

5.1.8 Association between dietary intake and well being, physiological distress, social dysfunction and cognitive dysfunction among medical students in UPM

In our study, we found out that there was significant association between dietary intake and well-being among the medical students as the p value was ($p<0,001$) for total calories intake, $p=0.001$ for total carbohydrate, $p=0.050$ for total protein, $p<0.001$ for total fat) with well being. According to a study by Jane Wardle et all in a community of adult showed a significant work-stress × restraint interactions for total energy intake [$F(1,76) = 3.88, p < 0.05$], fat intake [$F(1,76) = 3.59, p < 0.05$], and saturated fat intake [$F(1,76) = 8.98, p < 0.01$]. Restrained eaters (high stress) had higher energy intake and fat and saturated fat intake in the high- compared with the low-work-stress session, but non restrained (low stress) eaters did not. In addition, the percentage of energy derived from fat was also greater in the high- compared with low-work-stress session

in the restrained, but not the non restrained participants [$F(1,76) = 4.73, p = 0.03$]. The dietary data supported previous results on work stress finding modest increases in energy, fat, and sugar intake in periods of high compared with low work stress. This would suggest that, if work stress is either prolonged or frequent, then adverse dietary changes could result, increasing the likelihood of weight gain and increased cardiovascular risk that affect the health condition[27]. This study supports our finding that shows there is significant association between dietary intake and well being among the students.

6 Limitations

One of the limitations that we faced in our research was the respondents did not answer the questionnaires in a proper way. Some of them just filled up the questionnaire even without reading the questions in it causing information bias. Another limitation was non-response bias. Some selected respondents did not return our questionnaires or refused to participate in our study. However our response rate was still high. Respondents might not have understood all the items stated in the questionnaire but pre test had been done to make sure all the items could be understood easily.

5.3 Conclusion

From our study, we found out that most of medical students have below average hand grip strength, normal BMI, high level of physical activity and insufficient daily calorie intake. There was no significant association between hand grip strength and well being of the medical students

(p=0.144).There was also no significant association between BMI and well being of medical students (p=0.154).There was also no significant association between physical activity and well being of medical students (p=0.436).There was significant association between dietary intake and well being of medical students (p<0,001).This research helped us to understand more about the lifestyle of medical students in UPM.

5.4 Recommendation

Not many studies have been done on hand grip strength among medical students and its association with well being. There should be more research done on the hand grip strength among medical students. This kind of research can also be done in any course such as dental, nursing or engineering. This study should ideally be allocated a longer period of time for data collection. A cross sectional study does not provide temporal sequence to this study. To obtain the causal relationship, a prospective cohort study should be conducted for a longer duration in a larger population. This prospective cohort study can also serve to evaluate the effectiveness of the intervention programs, such as more active lifestyle and healthier diet, as the obese group can be follow up after the intervention of such activities.

The information obtained from this study will act as a guide to University Putra Malaysia to provide a health promotion program towards reducing obesity among medical students in Faculty of Medicine and Health Sciences. Besides that, every student in this faculty should equip themselves with enough awareness on the importance of weight regulation in order to prevent diseaseS resulting from obesity, practice physical activity in a proper way and a good diet for everyday lifestyle.

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Section A : Socio-demographic information

Please tick (√) in the relevant box given and choose only **ONE** answer for each question. *Sila tandakan (√) di dalam kotak yang releven yang diberikan dan pilih hanya **SATU** jawapan untuk setiap soalan.*

1. Age/*Umur* : _____year/*tahun* ____month/*bulan*

2. Gender/*Jantina* : ☐ Male/*Lelaki* ☐ Female/ *Perempuan*

3. Ethnicity/*Bangsa* : ☐ Malay/*Melayu* ☐ Indian/*India*
☐ Chinese/*Cina* ☐ Others/ *Lain-lain*

4. Year of study/*Tahun pengajian* : _____ year/*tahun*

SECTION B: Anthropometric Measurement

a) Weight: _____kg

b) Height: _____cm

c)BMI status: _____

Hand grip measurement (by dynamometer)

	Right hand	Left hand	Mean(highest score)
Reading			

Section C
Part 1 : Physical activity

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE
SOAL SELIDIK AKTIVITI FIZIKAL ANTARABANGSA

We are interested in finding out about the kinds of physical activities that people do as the part of their everyday lives. The question will ask you about the time you spent being physically active for the past 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place , and in your spare time for recreation, exercise or sport.

Think about all the vigorous activities in the past 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you to breathe much harder than normal.

Kami berminat untuk mengetahui aktiviti fizikal yang dilakukan oleh masyarakat umum dalam kehidupan harian mereka.Soalan-soalan berikut akan menyoal anda tentang jumlah masa yang telah digunakan untuk berada dalam keadaan aktif secara fizikal dalam tempoh 7 hari yang lepas ini. Sila jawab soalan soalan ini walaupun anda berpendapat bahawa anda bukanlah seorang yang aktif.Sila fikirkan tentang aktiviti aktiviti yang anda lakukan di tempat ,sebahagian daripada kerja rumah,pergi dari tempat ke tempat , dan dalam masa lapang untuk rekreasi dan senaman.

Fikirkan tentang aktiviti fizikal yang kuat dalam masa 7 hari yang lepas.Aktiviti fizikal yang kuat memerlukan daya fizikal yang tinggi dan memerlukan anda bernafas kuat daripada biasa.

1. How many days in a week have you done vigorous activities such as jogging, swimming, riding bicycle for the past 7 days?
   Berapa kali sehari anda melakukan aktiviti fizikal berat seperti larian, berenang, mengayuh basikal dalam tempoh 7 hari yang lepas?

   ( ) Days per week / *hari seminggu*

   No vigorous activities / *Tiada aktiviti fizikal berat* ⟶ (Skip to question 3)

2. How long did you spend doing the following vigorous activities on one of does days?
   Berapa lama anda akan lakukan aktiviti fizikal berat dalam sehari?

   ( ) Hours per day / *jam sehari*

   ( ) Minutes per day / *minit sehari*

   ( ) Not sure / *tidak pasti*

Think about all the moderate activities that you did for the past 7 days. Moderate activities means low to medium intensity exercises and make to breathe harder than normal. Think about the activities that you did for at least 10 minutes.

Fikirkan tentang semua aktiviti fizikal sederhana yang anda telah lakukan pada 7 hari yang lepas. Aktiviti fizikal sederhana adalah aktiviti yang memerlukan anda bernafas dengan kuat. Fikirkan tentang aktiviti yang anda telah lakukan sekurang–kurangnya dalam 10 minit.

3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at regular pace, or double tennis? Do not include walking.
Dalam tempoh 7 hari yang lepas ini, berapakah hari anda telah melakukan aktiviti fizikal sederhana, contohnya mengangkat muatan ringan, mengelap lantai, berbasikal pada kelajuan biasa, atau bermain badminton? Ini tidak termasuk berjalan kaki.

( ) days per week / *hari seminggu*

( ) No moderate physical activities / *Tiada aktiviti fizikal sederhana* → Skip to question 5 / *Terus ke soalan 5*

4. How much time did you usually spend doing moderate physical activities on one of those days?
Berapakah masa yang anda biasa gunakan untuk melakukan aktiviti fizikal sederhana pada salah satu daripada hari berkenaan?

( ) hours per day / *jam sehari*

( ) minutes per day / *minut sehari*

( ) Don't know / not sure, *Tidak tahu / Tidak pasti*

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

Fikirkan tentang masa yang anda telah gunakan untuk menjalan kaki dalam tempoh 7 hari yang lepas ini. Masa ini merangkumi berjalan kaki di tempat kerja dan di rumah, berjalan kaki dari satu tempat ke tempat lain, dan berjalan kaki semata-mata untuk rekreasi, bersukan, bersenam atau pada masa lapang.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

Dalam tempoh 7 hari yang lepas ini, berapakah hari anda telah berjalan kaki selama sekurang-kurangnya 10 minit pada sesuatu masa?

( ) days per week / *hari seminggu*

( ) NO walking / *Tiada berjalan kaki* → skip to question 7 / *Terus ke soalan 7*

6. How much time did you usually spend walking on one of those days?
Berapakah masa yang anda biasa gunakan untuk berjalan kaki pada salah satu daripada hari berkenaan?

( ) hours per day / *Jam sehari*

( ) minutes er day / *Minit sehari*

( ) Don't know / Not sure, *Tidak tahu / Tidak pasti*

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down watching television programs.

Soalan terakhir ini adalah berkaitan masa yang anda telah gunakan untuk duduk pada hari-hari bekerja dalam tempoh 7 hari yang lepas ini. Masukkan masa yang dihabiskan duduk di tempat kerja, di rumah, sewaktu belajar dan di masa lapang. Masa ini juga merangkumi waktu yang dihabiskan duduk di meja, menziarahi kawan-kawan, membaca, atau duduk atau baring sambil menonton televisyen.

7. During the last 7 days, how much time did you spend sitting on a week day?
Dalam tempoh 7 hari yang lepas ini, berapakah masa yang anda gunakan untuk duduk pada sesuatu hari bekerja?

( ) hours per day / *jam sehari*

( ) minutes per day / *minit sehari*

( ) Don't know/ Not sure, *Tidak tahu / Tidak pasti*

Now I am going to ask you some question about food you ate ***a month ago****. Take a moment to think where you were in a month ago. I am interested in your typical or usual diet at that time.*

PART 2:DIETARY INTAKE

SEMI QUANTITATIVE FOOD FREQUENCY QUESTIONNAIRE

Code	Food Items	Frequency of intake					
	A. Carbohydrate	**5 daily**	**4 2–3 times a week**	**3 Once a week**	**2 Once a month**	**1 Never**	**Portion Size (plates, quantity)**
A1	Rice						
A2	Porridge						
A3	Glutinous rice						
A4	"meekuning/ instant noodle						
A5	Noodle/ kuehteow/ laksa/ laksam						
A6	bread						
A7	Roti canai/capati						
A8	cereal						
Code	**Food Items**	**Frequency of intake**					
	B. Meat and Protein product	**5 daily**	**4 2–3 times a week**	**3 Once a week**	**2 Once a month**	**1 Never**	**Portion Size (scoop, grams)**
B1	Chicken						
B2	Beef/ buffalo meat						
B3	Mutton						
B4	Burger meat						
B5	Hotdog						
B6	Nugget						
B7	Pork						
B8	Egg						
Code	**Food Items**	**Frequency of intake**					
	C. Fish and sea food	**5 daily**	**4 2–3 times a week**	**3 Once a week**	**2 Once a month**	**1 Never**	**Portion Size (scoop, grams)**
C1	Fish						
C2	Anchovies						
C3	Canned fish						
C4	Shellfish (oyster, clam, scallop)						
C5	Fresh prawn/crab/squid						
Code	**Food Items**	**Frequency of intake**					
	E. Legume and its products	**5 daily**	**4 2–3 times a week**	**3 Once a week**	**2 Once a month**	**1 Never**	**Portion Size (scoop,grams)**
E1	Legume (dhall)						
E2	Bean curd (tofu)						

E3	Tempe						
E4	Groundnut						
Code	Food Items	Frequency of intake					
	F. Milk and dairy products	5 daily	4 2–3 times a week	3 Once a week	2 Once a month	1 Never	Portion Size (cups,grams)
F1	Fresh milk/ UHT						
F2	Yogurt/ dadih/ lassi/ sour cream						
F3	Cheese						
Code	Food Items	Frequency of intake					
	G. Vegetables	5 daily	4 2–3 times a week	3 Once a week	2 Once a month	1 Never	Portion Size (scoops)
G1	kangkong						
G2	sawi						
G3	Chinese cabbage/ Pack choy						
G4	Kailan						
G5	Spinach/bayam						
G6	Spring onions/ daunbawang						
G7	Broccoli						
G8	Soybean/ green bean Sprouts						
G9	Onions						
G10	Tomato						
G11	Carrot						
G12	Sweet potato						
G13	Cabbage, coleslaw						
G14	Pumpkin						
G15	Cucumber						
G16	Mushroom						
Code	Food Items	Frequency of intake					
	H. Fruits	5 daily	4 2–3 times a week	3 Once a week	2 Once a month	1 Never	Portion Size (slices)
H1	Papaya						
H2	Guava						
H3	Mango						
H4	Pineapple						
H5	Banana						
H6	Watermelon						
H7	Apple						
H8	Orange,mandarin						

H9	Grape						
H10	Rambutan						
H11	Lychee						
H12	Honeydew						
Code	**Food Items**	**Frequency of intake**					
	I. Drinks	**5 daily**	**4 2–3 times a week**	**3 Once a week**	**2 Once a month**	**1 Never**	**Portion Size (cup/glass/bottle)**
I1	Plain water						
I2	Tea						
I3	Coffee						
I4	Malted drink (Horlick/Milo)						
I5	Fruit juice						
I6	Carbonated drinks						
I7	Soy beverages						
I8	Herbal drink Specify:.....						
Code	**Food Items**	**Frequency of intake**					
	J. Miscellaneous	**5 daily**	**4 2–3 times a week**	**3 Once a week**	**2 Once a month**	**1 Never**	**Portion Size (pieces/grams)**
J1	Local cake/ doughnuts						
J2	Cakes						
J3	Biscuits						
J4	Sweets/ice cream						
J5	Jelly/ custard/ puddings						
J6	Chips						

PART3 :General Health Questionnaire

We want to know how your health has been in general over the last few weeks.Please read the questions below and each of the four possible answers. Circle the response that best applies to you. Thank you for answering all the questions.

Kami berminat untuk mengetahui tahap kesihatan anda secara umum pada minggu yang lepas. Sila baca soalan tersebut dan jawab soalan.Bulatkan jawapan yang anda rasakan tepat.Terima kasih atas kerjasama anda.

Have you recently:

1. been able to concentrate on what you're doing?

( )better than usual
( )same as usual
( )less than usual
( )much less than usual

2. lost much sleep over worry?

( )not at all
( )no more than usual
( )rather more than usual
( )much more than usual

3. felt that you are playing a useful part in things?

( )more so than usual
( )same as usual
( )less so than usual
( )much less than usual

4. felt capable of making decisions about things?

( )more so than usual
( )same as usual
( )less so than usual
( )much less than usual

5. felt constantly under strain?

( )not at all
( )no more than usual
( )rather more than usual
( )much more than usual

6. felt you couldn't overcome your difficulties?

( )not at all
( )no more than usual
( )rather more than usual
( )much more than usual

7. been able to enjoy your normal day to day activities?

( )more so than usual
( )same as usual
( )less so than usual
( )much less than usual

8. been able to face up to your problems?

( )more so than usual
( )same as usual
( )less so than usual
( )much less than usual

9. been feeling unhappy or depressed?

( )not at all
( )no more than usual
( )rather more than usual
( )much more than usual

10. been losing confidence in yourself?

( )not at all
( )no more than usual
( )rather more than usual
( )much more than usual

11. been thinking of yourself as a worthless person?

( )not at all

( )no more than usual
( )rather more than usual
( )much more than usual

12. been feeling reasonably happy, all things considered?

( )more so than usual
( )same as usual
( )less so than usual
( )much less than usual

UPM
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JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

RESPONDENT'S INFORMATION SHEET

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

STUDY TITLE

The relationship between Body Mass Index, physical activity, dietary intake and grip strength on the well being of medical students in UPM.

INTRODUCTION

Well being of medical students is affected by many factors.This research focuses on their BMI,physical activity,dietary intake and grip strength.By getting to know these factors,this will help us to give a better view on medical students well being.Well being will be important predictor of future health,productivity and life expectancy of individuals.

WHAT WILL YOU HAVE TO DO?

You will be given a set of questionaire to assess your BMI,dietary intake,physical activity and general health and also an instrument known as handgrip dynamometer to measure your grip strength.You have to answer the questionaire according to the instructions given and also use the handgrip dynamometer to find out the grip strength.You also will be given a consent form which needs to be filled in before you take part in this study.

WHO SHOULD NOT ENTER THE STUDY?

Students who are physically disabled and students who are not willing to take part in this study should not enter this study.Students who are not doing medicine in UPM are also not allowed in this study.

WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) **TO YOU AS THE SUBJECT?**

You can know your BMI,grip strength and general health of your body.This will help you to improve on your BMI, grip strength and health of your body so that you can live a healthy and disease free life.

b) **TO THE INVESTIGATOR?**

This will help the investigator to determine BMI, physical activity, dietary intake, grip strength and general health of medical students.By this, they can determine the well being of medical students in UPM.

WHAT ARE THE POSSIBLE RISKS?

There is no risk in this study.

WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

Your information and identity will remain confidential.

WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

Palani Kumar s/o Chenasammy **017-5491154**
Mussmin Farhana Bt Mat Rodzi **013-4927720**

JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
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SELANGOR, MALAYSIA

CONSENT FORM (RESPONDENT)

RESEARCH TITLE : The relationship between Body Mass Index, physical activity, dietary intake and grip strength on the well being of medical students in UPM.

RESEARCHER : Palani Kumar s/o Chenasammy 159346
Mussmin Farhana Bt Mat Rodzi 160540

I ..... Identity Card No. .....
address.....
.....hereby voluntarily agree to take part in the clinical research *(clinical study, questionnaire study/ drug trial) specified above.

I have been informed about the nature of the clinical research in terms of methodology, possible adverse effects and complications (as written in the Respondent Information Sheet). I understand that I have the right to withdraw from this clinical research at any time without assigning any reason whatsoever. I also understand that this study is confidential and all information provided with regards to my identity will remain private and confidential.

I* wish / do not wish to know the results of the tests performed on any samples taken from me.

* delete where necessary

Signature ..... Signature .....
(*Respondent*) (*Witness*)

Date :..... Name :.....

I/C No. :.....

I confirm that I have explained to the respondent the nature and purpose of the above –mentioned clinical research.

Date ..... Signature .....
(Researcher)