UNIVERSITI PUTRA MALAYSIA

PREVALENCE OF HYPERTENSION AND ITS ASSOCIATED FACTORS AMONG MEDICAL STUDENTS IN FACULTY OF MEDICINE AND HEALTH SCIENCES, UNIVERSITI PUTRA MALAYSIA SERDANG IN 2013

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Prevalence of Hypertension and Its Associated Factors Among Medical Students in Faculty of Medicine and Health Sciences (FHMS),Universiti Putra Malaysia (UPM) Serdang in 2013

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ABSTRACT

Purpose/Aim: Hypertension has become a significant problem in many developing countries which are undergoing epidemiological transition from communicable to non-communicable diseases. The main causes of hypertension and other cardiovascular diseases are strongly related to aging, urbanization, sedentary life style, obesity, and alcohol consumption. This study is to identify the prevalence and the associated factors of hypertension among medical students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia Serdang.

Methods: A cross sectional study was conducted. Self –administered questionnaire was used to obtain information on socio demography, family history of hypertension, smoking and physical activity. Height, weight and blood pressure were taken and Body Mass Index (BMI) was calculated. All data were analysed using SPSS version 21.

Result: Out of 355 respondents taking parts in this study, 6.2% of medical students were hypertensive, 42% were pre-hypertensive and the rest were having normal blood pressure. Chi-Square test shows that gender ($P<0.01$) had significant associationwith hypertension. However, there was no association between hypertension and age, ethnicity, family income, family history of hypertension, obesity, smoking and physical activity.

Conclusion: The prevalence of hypertension among medical students in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia Serdang was 6.2% and the gender ($P<0.05$) had a significant association with hypertension.

Key words: Hypertension, Prevalence, Medical students

Prevalen DarahTinggi dan Faktor-Faktor yang Berkaitan Dengannya dalam Kalangan Pelajar Perubatan di Fakulti Perubatan dan Sains Kesihatan (FPSK), Universiti Putra Malaysia (UPM) Serdang Pada Tahun 2013

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ABSTRAK

Objektif: Hipertensi telah menjadi masalah yang signifikan dalam kalangan penduduk negara-negara membangun yang kini sedang mengalami perubahan epidemiologi daripada penyakit berjangkit kepada penyakit yang bukan berjangkit. Punca utama masalah hipertensi dan penyakit kardiovaskular yang lain amat berkaitrapat dengan faktor-faktor seperti penuaan, pemodenan, gaya hidup kurang sihat, obesity dan pengambilan alkohol. Suatu kajian keratin rentas telah dijalankan untuk mengetahui prevalen dan faktor yang berkaitan dengan hypertensi dalam kalangan pelajar perubatan di Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia pada tahun 2013.

Kaedah: Suatu kajian rentas telah dijalankan. Borang soalselidik telah digunakan untuk mendapatkan maklumat tentang demografi sosial, sejarah keluarga hypertensi, status merokok dan tahap aktiviti fizikal.Tinggi, berat badan dan tekanan darah telah diambil dan indeks jisim badan dikira dengan menggunakan formula.Semua data dianalisis dengan menggunakan SPSS versi 21.0.

Keputusan: Daripada 355 responden yang telah mengambil bahagian dalam kajian ini, 6.2% pelajar perubatan mengalami hypertensi, 42% mengalami pre-hypertensi dan yang selebihnya mempunyai tekanan darah yang normal. Ujian Chi-Square menunjukkan bahawa jantina ($P<0.05$) mempunyai perkaitan yang signifikan dengan hypertensi. Namun tiada hubungan antara hypertensi dengan usia, etnik, pendapatan keluarga, sejarah keluarga hypertensi, obesiti, status merokok dan tahap aktiviti fizikal. ($P>0.05$)

Kesimpulan: Prevalen hypertensi dalam kalangan pelajar perubatan di Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia adalah 6.2% dan jantina ($P<0.05$) mempunyai perkaitan signifikan dengan hypertensi.

Kata Kunci: Hypertensi, Prevalen, dan pelajar perubatan

TABLE OF CONTENTS

Title Page	i
Abstract	ii
Abstrak	iii
Acknowledgement	iv
Certification page	v
Declaration form	vi
Table of contents	vii
List of tables	xi
List of figure	xi
List of abbreviations	xiii
1.0 CHAPTER 1 INTRODUCTION	
1.1 Background	1
1.2 Problem statements	3
1.3 Significance of study	4
1.4 Objectives and hypothesis	4
1.4.1 Objectives	5
1.4.1.1 General objective	5
1.4.1.2 Specific objective	5
1.4.2 Research hypothesis	6
1.5 Conceptual Framework	8
2.0 CHAPTER 2 LITERATURE REVIEW	
2.1 Overview of hypertension	9

2.1.1 History of hypertension 9

2.1.2 Global hypertension 9

2.2 Risk factors 10

2.2.1 Age group 10

2.2.2 Gender 10

2.2.3 Ethnicity 11

2.2.4 Family income 12

2.2.5 Family history of hypertension 13

2.2.6 Obesity 14

2.2.7 Smoking 14

2.2.8 Physical activity 15

2.2.9 Marital status 16

2.2.10 Educational level 17

2.2.11 Occupational status 18

3.0 CHAPTER 3 MATERIALS AND METHODS

3.1 Study location 19

3.2 Study design 19

3.3 Study duration 19

3.4 Sampling 19

3.4.1 Study population 19

3.4.2 Study sample 20

3.4.3 Sampling frame 20

3.4.4 Sampling unit 20

3.4.5 Sampling method 21

3.4.6 Sampling size 21

3.5 Instrument and data collection 23

3.5.1 Instrument/questionnaire 23

3.5.1.1 Socio demography 23

3.5.1.2 International physical activity questionnaire 23

3.5.1.3 Family and social history 25

3.5.1.4 Anthropometric measurement 25

3.5.2 Data collection techniques 27

3.5.3 Quality control 28

3.6 Data analysis 29

3.7 Study ethics 29

3.8 Variables 29

3.8.1 Dependent variable 29

3.8.2 Independent variables 29

3.9 Definition of term 30

4.0 CHAPTER 4 RESULTS

4.1 Response rate 33

4.2 Characteristics of respondent 34

4.3 Prevalence of hypertension 36

4.4 Association between hypertension and socio-demographic characteristics 37

4.5 Association between hypertension and family history of hypertension 38

4.6 Association between hypertension and obesity 38

4.7 Association between hypertension and smoking 39

4.8 Association between hypertension and physical activity 39

5.0 CHAPTER 5 DISCUSSIONS AND CONCLUSIONS

5.1 Prevalence of hypertension 40

5.2 Socio demographic factors 41

5.2.1 Age 41

5.2.2 Gender 42

5.2.3 Ethnicity 43

5.2.4 Family Income 43

5.3 Family history of hypertension 44

5.4 Nutritional status 44

5.5 Smoking 45

5.6 Physical activity 45

5.7 Conclusion and recommendations 46

5.7.1 Conclusion 46

5.7.2 Recommendations 47

5.8 Strength and limitation 48

References 50

Appendix

LIST OF TABLE

Table		Page
Table I	Sample Size Calculation	22
Table II:	Classification of blood pressure for adults age 18 and older by CPG	26
Table III:	Classification of weight by BMI according to Malaysia CPG	27
Table IV:	Characteristic of medical students in UPM Serdang	35
Table V:	Prevalence of hypertension among medical students in UPM Serdang	36
Table VI:	Association between socio-demographic characteristics and hypertension among medical students in UPM Serdang	37
Table VII:	Association between family history of hypertension and hypertension among medical students in UPM Serdang	38
Table VIII:	Association between nutritional status and hypertension among medical students in UPM Serdang .	38
Table IX:	Association between smoking and hypertension among medical students in UPM Serdang	39
Table X:	Association between physical activity and hypertension among medical students in UPM Serdang	39

LIST OF FIGURE

Figure		Page
1.	Conceptual Framework of Hypertension	8

LIST OF ABBREVIATION

CPG	: Clinical Practice Guideline
NCD	: Non Communicable Disease
WHO	: World Health Organization
NHMS II	: Second National and Health Morbidity Survey
NHMS III	: Third National and Health Morbidity Survey
NHMS IV	: Fourth National and Health Morbidity Survey
FABP4	: Fatty Acid Binding Protein 4
MANS	: Malaysian Adults Nutrition Survey
BMI	: Body Mass Index
CVD	: Cardiovascular Disease
IPAQ	: International Physical Activity Questionnaire
MET	: Metabolic Equivalent
BP	: Blood Pressure
PKU	: PusatKesihatanUniversiti
CDC	: Centers for Disease Control
T2DM	: Type II Diabetes Mellitus

CHAPTER 1

INTRODUCTION

1.1 Background

Hypertension is defined as persistent elevation of systolic blood pressure of 140 mmHg or greater and/or diastolic blood pressure of 90mmHg or greater (CPG Management of Hypertension, 2008). Hypertension is a silent disease which results in the majority of cases remained undiagnosed (CPG Management of Hypertension, 2008). Untreated or undiagnosed hypertension will lead to increase in cardiovascular, cerebrovascular and renal morbidity and mortality (CPG Management of Hypertension, 2008). Hypertension has become a significant problem in many developing countries which are undergoing epidemiological transition from communicable to non-communicable diseases (Dodu, 1988). The main causes of hypertension and other cardiovascular diseases are strongly related to aging, urbanization, sedentary life style, obesity, alcohol consumption and salt intake of the population (Omran, 1971). The changing of socio-demographic and life in those developing countries contributes to the increase prevalence of hypertension. In other word, hypertension is subjected to intervention as some of its contributing factor such as sedentary lifestyle, obesity, alcohol consumption and salt intake are modifiable. Removal of those factors may reduce the prevalence of hypertension worldwide. Other than that, pharmacological intervention to treat hypertension has been proven to be effective in reducing cardiovascular event even though the treated patient blood pressure is higher than the normotensive people (Collins et al., 1990). Measures such as increased physical activity and control of body weight are effective in lowering blood pressure (Arroll&Beaglehole, 1992). Lifestyle interventions always have the potential to reduce the medication required by the patient and serves as preventive measures for non-hypertensive people.

Hypertension is one of the risk factors of non-communicable disease which is a leading risk factors for mortality (Gurpreet et al., 2012). It causes around half of all deaths from stroke and heart disease. Globally, the adult prevalence of hypertension is 26.4% (95% CI 26.0-26.8%) in 2000 and it is predicted to increase to 29.2% (95% CI 28.8-29.7) in 2025. Prevalence of hypertension keep on increasing from one year to another (L. Rampal, S. Rampal, Azhar&Rahman, 2008). Besides that, in 2006, there is an estimated of 4.8 million Malaysians age 18 years and above living with hypertension (Feisul, 2009). The prevalence of overall hypertension is significantly higher among the elderly, other native groups, no formal education, retirees, lower social income and rural residents compared to the other groups.

In developing countries, population surveys carried out since the 1970s until 1988 which included 23 population groups show that the prevalence of hypertension can range from as low as 1% in some African countries to over 30% in Brazil. An analysis of the mortality statistics for 35-74 year-olds showed a downward trend in mortality from hypertension and cerebrovascular diseases in most of these countries. However, the total number of hypertension cases in the developing world is high, and it is because these countries cannot afford the same drug treatment levels as developed countries. It is based on the assessment of the variety of antihypertensive treatment (Nissinen, 1988).

In 2011, there were 6,267,376 people above 18 years with hypertension in Malaysia. The projected prevalence of hypertension in 2020 is 35.8%, with estimation of 7.6 million Malaysians aged 18 years and above. Hypertension is still an important public health problem

in Malaysia and needs to be addressed seriously. Hypertension cannot be tackled in isolation, but has to be together with other NCD risk factors (Gurpreet et al., 2012).

The odds of having hypertension in Malaysia increased with advance age, in males, in individual with a family history of hypertension, a body mass index which is high, in non-smokers and with lower level of education. Only 34.6% of the Malaysians with hypertension were aware of their hypertensive status, and 32.4% were taking antihypertensive medication. Amongst the group who were taking antihypertensive medication, only 26.8% had their blood pressure under control. The prevalence of hypertension amongst those aged 30 years and above has increased from 32.9% in 1996 to 40.5% in 2004(Rampal et al., 2008). Study conducted on university students showed Pre-hypertension was detected in 27.1% (38% males, 11.2% females) and hypertension in 2.2% (3.3% males, 0.4% females). Pre-hypertension and hypertension were associated with obesity (r_s=0.252, $p<0.001$) and smoking ($p<0.05$). No relationship was detected between students' Blood pressure and sedentary behavior, family history of hypertension/coronary artery disease, or consumption of fast food. The prevalence of increased Body mass index and blood pressure among males was significantly higher than females ($p<0.001$) (Yasin, et al. 2012).

1.2 Problem statement

Cardiovascular disease is responsible for 30% of death worldwide (WHO, 2001). Of these deaths, an estimated 7.3 million were contributed by coronary heart disease and 6.2 million by stroke (WHO, 2011). About 9.4 million deaths each year, or 16.5% of all deaths can be attributed to high blood pressure(Limet al., 2012). Hypertension is the leading but

treatable risk factor for cardiovascular disease (World Health Organization, 2009; Lewingtonet al., 2002; Ezzatiet al., 2002). Global hypertension prevalence in adults aged 25 and above was around 40% in 2008. The proportion of world population having hypertension is decreasing from 1980 to 2008.This may be due to the increasing of awareness and effectiveness of prevention programs. However, increases in global population and aging issue causes a rise of uncontrolled hypertension from 600 million in 1980 to nearly 1 billion people in 2008(Global HealthObservatory, 2013).

In Malaysia, cardiovascular disease has been the leading cause of death for the past 40 years (Rampal et al., 2008). There are many people with hypertension but up to two thirds of them are unaware of it(Kirabatake, 2009). According to National Health and Morbidity Survey (NHMS) in 1986, the prevalence of hypertension in Malaysia was 14.4% (First National Health and Morbidity Survey, 1986) while NHMS II 1996 showed that, there were 32.9 % of adults aged more than 30 years old were having hypertension (NHMS II, 1996). NHMS III 2006 showed a higher hypertension prevalence of 42.2% (NHMS III, 2006). This indicates that the hypertension rate in the Malaysia is increasing. Latest NHMS IV 2011 which includes adults aged 18 and above, showed that the prevalence of hypertension was 32.7% (NHMS IV, 2011).

1.3 Significance of Study

Previous study concluded that there was an alarming prehypertensive subgroup in the community which needs to be identified and informed of the future complications. The prevalence of prehypertension among medical students in Coastal Karnataka was high which was 55.4% (Shobha&Avinash, 2012). Other than that, Knowledge, Attitude and Practice

(KAP) on hypertension were also important for the reduction in prevalence of hypertension. Prevention and control of hypertension require the lifelong adoption of healthy lifestyle (Aubert et al., 1988). Proper understanding and assessing KAP factor would be the key point to understand the observed behaviour among the population and thus guiding the changing of the behavior (Aubert et al. 1988).

In this study, prevalence of hypertension among medical students was identified and informed for further intervention to reduce complication involved. Medical students were also be assessed on several risk factors which were associated with hypertension to determine the current health status of medical students.

1.4 Objectives and hypothesis

1.4.1 Objectives

1.4.1.1 General Objective

This study is to determine the prevalence of hypertension and its associated factors among medical students in Faculty of Medicine and Health Sciences (FHMS) Universiti Putra Malaysia (UPM) Serdang.

1.4.1.2 Specific Objective

1 To determine the socio demographic characteristics, family history of hypertension, obesity, smoking and physical activity among medical students of FHMS, UPM Serdang.

2 To determine the prevalence of hypertension among respondents.

3 To determine the association between hypertension and socio demographic characteristics which include age, gender, ethnicity, and family income.

4 To determine the association between hypertension and family history of hypertension.

5 To determine the association between hypertension and obesity.

6 To determine the association between hypertension and smoking.

7 To determine the association between hypertension and physical activity.

1.4.2 Hypothesis

H_A1: There is association between hypertension and age.

H_01: There is no association between hypertension and age.

H_A2: There is association between hypertension and gender.

H_02: There is no association between hypertension and gender.

H_A3: There is association between hypertension and ethnicity.

H_03: There is no association between hypertension and ethnicity.

H_A4: There is association between hypertension and family income.

H_04: There is no association between hypertension and family income.

H_A5: There is association between hypertension and family history of hypertension.

H_05: There is no association between hypertension and family history of hypertension.

H_A6: There is association between hypertension and obesity.

H_06: There is no association between hypertension and obesity.

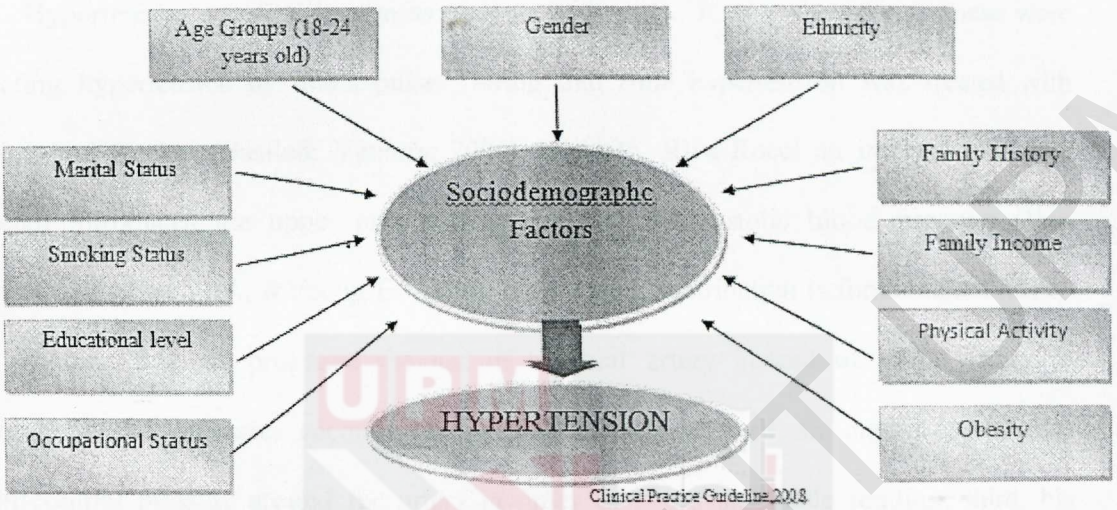
H_A7: There is association between hypertension and smoking.

H_07: There is no association between hypertension and smoking.

H_A8: There is association between hypertension and physical activity.

H_08: There is no association between hypertension and physical activity.

1.5 Conceptual Framework



CHAPTER 2

LITERATURE REVIEW

2.1 Overview of hypertension

2.1.1 History of hypertension

Hypertension was first known as early as 2600 B.C.. It was when the Chinese were suspecting hypertension by one's pulse. During that time hypertension was treated with bleeding and leeches (Basile& Ventura, 2006). In 1896, Riva Rocci an internal medicine physician introduced the upper arm cuff to measure the systolic blood pressure (Van Montfrans, G., Bos, J-W., &Verrij, E. ,2008). Riva Rocci contribution is fundamental due to three reasons; first, he proposed the use of brachial artery instead of radial artery in measuring blood pressure; second, his pneumatic cuff allowed an equal exertion of circumferential pressure around the artery in order to avoid unreliable reading; third, his instrument was simple and small which make it a friendly user (Mancia, 1997) . In 1905, Korotkoff, a Russian surgeon described the systolic and diastolic blood pressure using stethoscope just below the level that Riva Rocci described. During the early years, hypertension was said to be a natural adaptive to pathology reaction and can be divided into two which are white hypertension (kidneys) and red hypertension (blood vessels). In 1917, it was stated that it is neither a cause of nephritis or arteriosclerosis nor it is cause by them, but there is some association between them to some extent (Basileet al, 2006).

2.1.2 Global hypertension

In 2008, approximately there were approximately 40% of adult aged 25 years and above who were diagnosed with hypertension. Hypertension is common among people in low and middle income countries and the number of citizens with undiagnosed cases of hypertension was higher in these countries. The increasing trend of hypertension is attributed to population growth, ageing and behavioural risk factors such as unhealthy diet, lack of

physical activity, harmful use of alcohol, obesity and persistent stress. The complications of hypertension were compounded as those who were diagnosed with hypertension were likely to have other health risk factors that can increase the odds of having heart attack, stroke and kidney failure. Therefore, if appropriate action is not taken, there will be increase mortality due to cardiovascular diseases. (WHO, 2013).

2.2Risk Factors

2.2.1 Age groups

Prevalence of hypertension in Malaysia by age groups which are above 18 years in 2011 is 8.1% in 18-19 age group, 11.8% in 20-24 age group, and 14.3% in 25-29 age group(Gurpreetet al., 2012). This indicates that the prevalence of hypertension increases with age. In the latest NHMS 2011 report, the overall prevalence of hypertension which includes known and undiagnosed hypertension among adults of 18 years and above in this survey was 32.7% (95% CI: 31.6 - 33.7). There was a general increasing trend in prevalence with age, from 8.1% (95% CI: 6.1 - 10.7) in the 18-19 years old age group, reaching a peak of 74.1% (95% CI: 69.6 - 78.3) among the 65-69 year olds (NHMS IV, 2011).

2.2.2 Gender

The prevalence of hypertension by gender which are above 18 years in 2011 was 33.7% in male and 31.6% in female. This shows that the prevalence for both genders are about similar. Among Malaysians aged 15–39 years, hypertension was significantly more prevalent in males than females (Gurpreetet al., 2012). However, the prevalence of hypertension in males and females was not significantly different

above the age of 40 years. In other study, the prevalence of hypertension had also been proved to be increasing with age in both sexes. In this study, the prevalence estimates of hypertension were higher in males compared with females for those aged less than 50 years. For those aged more than 50 years, the prevalence estimates of hypertension were higher among females. In short, prevalence of hypertension is high in both males and females with a serious threatening problem of low awareness, low treatment and poor control (Rampal et al., 2008).In this study, the mean systolic blood pressure for males (124mmHg, 95% CI 123–124) was significantly higher than thatfor females (121mmHg, 95% CI 121–122). Similarly,the mean diastolic blood pressure for males (80mmHg, 95% CI 80–81) was significantly higherthan that for females (78mmHg, 95% CI 78–78) (Rampal et al., 2008).

2.2.3 Ethnicity

Prevalence of hypertension among Malaysian by ethnicity above 18 years in 2011 was34.0% in Malay, 32.3% in Chinese, 30.6% in Indians, 36.4% in other native groups and 20.9% in others(Gurpreetet al,2012). This shows that ethnicity in Malaysia does not play a major role in determining risk factor of hypertension. The NHMS in 1996 reported overall prevalence of the Malaysian regardless of the ethnicity despite that different races (Malays, Chinese and Indians) have been living in Malaysia for many years. For population aged more than 30 years in Malaysia, there was a difference in the estimated prevalence of hypertension between the different ethnic groups, but these differences were not statistically significant. The differences in prevalence between ethnic groups may be attributed to their genetic (Rampalet al., 2008). In the similar study, for those respondents aged 15 years and above, the

Chinese had the highest prevalence of hypertension (30.6%), followed by the Malays (26.7%) and the Indians (25.1%). The indigenous people from the state of Sarawak, 'Sarawak Bumiputra' had a higher prevalence of hypertension (31.1%) compared with other ethnic group in the similar study (Rampalet al., 2008).The prevalence of hypertension in those aged 30years and above is very high. Malays and the indigenous people from the state of Sabah 'Sabah Bumiputra' had the highest prevalence estimates (41.3%) followed by the 'Sarawak Bumiputra' (40.4%), the Chinese (40.0%) and the Indians (37.7%). These differences in estimates were not significantly significant (P=0:72) (Rampalet al., 2008).

2.2.4 Family income

Based on the NHMS IV 2011 report, the prevalence of hypertension for income groups of less than RM 400, RM 400 - RM 699, RM 700 - RM 999, RM 1000 - RM 1999, RM 2000 - RM 2999, RM 3000 - RM 3999, RM 4000 - RM 4999, RM 5000 and above were 40.0%, 33.6% 36.4%, 34.1%, 34.0%, 34.6%, 33.7%, 35.8% respectively. Low and high incomes individuals may be related with psychological tensions which may be associated with hypertension (Abdallaet al., 2011). Population with low income has slightly higher risk of hypertension which is 26.3%, but the prevalence is subjected to confounding such as tobacco consumption, which is highly prevalent among the poor. Poor people also tend to consume diet with lower cost but rich in saturated fat and simple sugars. However, hypertension also common among population with high income as they consume more fast food, soft drink, junk food with low physical activity due to increased usage of advanced technology. The prevalence of hypertension among high income population is 25.3% (Abdallaet al.,

2011).Jamaica's population in both the lowest and highest income groups had elevated blood pressure and hypertension prevalence relative to those in intermediate categories. Mean blood pressure and hypertension were generally highest in the top income group. (Mendez, et al., 2003)

2.2.5 Family History of Hypertension

Prevalence of hypertension among positive family history of hypertension and negative family history of hypertension was 12.0% and 11.3% respectively (Rampal et al., 2011). Offspring with maternal history of hypertension had significantly higher average 24 hours systolic blood pressure (BP) compared to subjects with no history of parental hypertension (mean difference 7.95, 95% CI: 0.77 to 15.13 mmHg) suggesting a possible maternal factor for the emerge of high blood pressure(Stabouli et al., 2010). Besides that, young normotensive men with a family history of hypertension will have elevation of serum fatty acid-binding protein 4 (FABP4/A-FABP/aP2) which will have decreased insulin sensitivity compared to subjects without a family history of hypertension. The normotensive men with family history of hypertension had significantly lower M value as an insulin sensitivity (218.0 ± 17.0 vs. 299.9 ±13.7 mg/m2/min) and higher level of FABP4 (15.1 ± 1.0 vs. 11.4 ± 0.9 ng/ml) than those without family history group (Tomohiro et al., 2012).

However, there are studies that indicate that neither of family factors contributed to increases in blood pressure even though individuals with a strong family history of hypertension (two hypertensive parents) showed higher values for insulin and insulin resistance(Goldstein, Shapiro, & Weiss, 2008).

2.2.6 Obesity

There are increased risk for hypertension in the healthy obesity [hazard ratio (HR): 2.20, 95% CI:1.34–3.60], unhealthy overweight (HR: 1.47, 95% CI: 1.00–2.14), and unhealthy obesity (HR: 2.45, 95% CI: 1.79–3.37) compared with the healthy normal weight group after adjusting for age, sex, cohort, physical activity, smoking, alcohol consumption, and family history(Lee,2013). However, the mechanism that links obesity and increased risk of hypertension still remains unclear.

Prevalence of obesity in Malaysia in 1996 was 4.4% (NHMS II, 1996), in 2003 was 12.7% (MANS, 2003), in 2005 was 16.3% (MyNCDS-1, 2005), and in 2006 was 14.0% (NHMS III, 2006). In 2006, it was estimated that 1.7 million Malaysians age 18 years and above are obese (Aubert et al., 1998). In conclusion, more Malaysian will have increased risk of hypertension as the prevalence of obesity increases. Prevalence of hypertension based on nutritional factors are 3.2% for lean body weight, 6.5% for normal body weight, 16.6% for risk of overweight, 42.3% for overweight(Rampalet al., 2011).

2.2.7 Smoking

The prevalence of hypertension for smoker and non-smoker are 34.4% and 29.7% respectively (Aubertet al., 1998).After adjustment for body weight throughout life with BMI, there are positive associations between both maternal and paternal smoking during pregnancy with the risk of hypertension in their adulthood, and the body weight throughout life (Jonge,2013). This hypothesis is supported by studies

about associations between lower birth weight and elevated blood pressure in later life (Davies, Smith, May, & Ben-Shlomo, 2006). However, there are epidemiology studies about blood pressure levels in offspring and parental smoking during pregnancy that shows inconsistent result (Power, Atherton,& Thomas, 2010).

Besides that, there are associations between high risk of developing hypertension in a dose-response fashion and smoking duration (Thuy et al., 2010). There is a link between norepinephrine and epinephrine release and adrenergic mediation of smoking-associated hemodynamic and metabolic events that cause acute increases in blood pressure in experimental settings (Cryer, 1976). This was due to increased sympathetic flow in humans (Narkiewicz et al., 1998). It may be due to increase release and/or reduced clearance of catecholamines at the neuroeffector junctions (Grassi et al., 1994). In the conclusion, smoking is significantly associated with high risk of hypertension.

2.2.8 Physical Activity

Prevalence of hypertension based on the reported levels of exercise were 36.4% for low level of activity, 28.0% for intermediate level of activity and 35.1% for high level of activity(NHMS II 1996).Low physical activity and poor diet which are lifestyle risk factors tend to cluster within families(Rossow& Rise, 1994). This may represent another possible pathway by which parental history influences risk of developing hypertension and cardiovascular diseases (CVDs) in later life(Gopinath et al., 2012). This may be due to hypertensive parents who may have been better

awareness about the risk of future development of CVD complications in their offspring and the necessity of lifestyle modifications(Winnickiet al., 2006). To top it all, development of hypertension are inversely associated with physical activity(Parker et al., 2007). Therefore, physical inactivity is significantly associated with high risk of hypertension.

Conducted study supports the use of the IPAQ as measures of physical activity for the purpose of epidemiological research, such as periodic national surveys. It has ability to demonstrate systematic bias toward underestimation of physical activity-related energy expenditure at higher levels of physical activity. Appropriate calibration factors could be used to correct for this measurement error and hence improve estimation of activity-related energy expenditure. No single valid, reliable field measure of physical activity exists which is logistically feasible for use in all population setting. Although recall questionnaires are the most practical means of measuring physical activity in large population studies, but they have the tendency of recall bias and hence calibration instrument should be always available to correct the over or underestimation of the result(Maddison et al., 2007).

2.2.9 Marital status

Prevalence of hypertension by marital status above 18 years in Malaysian in 2011 was 16.2% among single, 37.0% in married, and 62.9 % among widow/widower/divorcee(Gurpreetet al., 2012). Based on the latest NHMS report 2011, prevalence of hypertension among single population is 5.5% with 95% CI (4.6-

6.5), married population was 18.4% (95% CI: 17.3-19.5), and among widow/widower/divorcee was 27.2% (95% CI: 24.4-30.3) (NHMS IV, 2011).

2.2.10 Educational level

There is epidemiological transition which will cause longer life expectancy. Consequently, it will lead to greater economic development and better social organization and industrialization. However, the epidemiological transition will change the lifestyle in the population and this will increases the factors associated with hypertension. Hypertension can contribute to degenerative disease like cardiac failure, renal failure, blindness, and cerebral vascular disease. Women is predominated for hypertension but there is study shows that the higher education level in women, the lower the risk to get hypertension, thus reduce the risk from getting chronic degenerative disease(Sanchez-Barriga,2012).

Besides, prevalence of hypertension by educational level above 18 years in Malaysia in 2011 showed that there were 56.3% in no formal education, 46.4% in primary education, 29.6% in secondary education and 20.7% in tertiary education (Gurpreetet al,2012).

Based on latest NHMS IV report, the prevalence of hypertension among those with no formal education population was 22.4% (95% CI:19.5-25.5) , primary education was 22.2% (95% CI: 20.4-24.1), secondary education was 13.7% (95% CI:

12.6-14.9), tertiary education 10.2% (95% CI: 8.9-11.7) and unclassified education 10.9% with 95%CI (6.6-17.6)(NHMS IV 2011).

2.2.11 Occupation status

The prevalence of hypertension by occupation status at above 18 years in Malaysian in 2011 was 24.8% for employed 38.0% for self-employed, 40.6% for homemaker and underpaid worker and 72.6% for retirees(Gurpreetet al.,2012). The prevalence among the retirees is mostly high and it may be due to that retirees are mostly among the population aged 65 and above. Based on the latest NHMS IV, 2011, prevalence of hypertension among Government/semi government employee is 14.6% with 95% CI (12.5-16.9) Private employee is 10.5% with 95% CI (9.3-11.8) Self-employed is 16.8% with 95% CI (15.1-18.7), unpaid worker/home maker 17.5% with 95% CI (15.8-19.3), retiree is 36.0% with 95% CI (32.9-39.3).

CHAPTER 3

MATERIALS AND METHODS

3.1 Study Location

The study was conducted in the Faculty of Medicine and Health Science (FMHS) of Universiti Putra Malaysia (UPM) Serdang, Selangor.

3.2 Study Design

This was a cross-sectional study to determine the prevalence of hypertension and its associated factors.

3.3 Study Duration

The study was conducted from March 2013 until September 2013

3.4 Sampling

3.4.1 Study Population

This study revolved around 506 medical students in Faculty of Medicine and Health Science, Universiti Putra Malaysia, Serdang.

3.4.2 Study Sample

This study involved all the medical students from the Faculty of Medicine and Health Science, Universiti Putra Malaysia, Serdang.

3.4.2.1 Inclusion criteria

All Malaysian Medical students of 2012/2013 academic year aged between 18 to 24 years old.

3.4.2 Exclusion criteria

Students who were away from the faculty and remaineduncontactable during the data collection period.

3.4.3 Sampling frame

List of names of all registered all medical students of 2012/2013 academic year in FMHS UPM Serdang.

3.4.4 Sampling unit

A registered medical student in FMHS UPM Serdang.

3.4.5 Sampling methods

Sample was selected using universal sampling. The total number of medical students was 506 and all medical students were selected.

3.4.6 Sample Size

a) $$n=\frac{z^2_{1-\alpha/2}P(1-P)}{d^2}$$

$$=\frac{1.96^2 \text{x } 0.327(1-0.327)}{(0.05)^2}$$

$$= 338.16$$

Approximates to 339 sample size

where,

P = estimated proportion

D = desired precision

Estimation of proportion is extracted from Ministry of Health. Fourth National Health and Morbidity Survey 2011.

Table I: Sample Size Calculation

Associated factors	P_1	P_2	Sample size calculation
Age	0.102 (Proportion of age group 20-29 which have hypertension)	0.067 (proportion of age group 15-19 which have hypertension)	$n = \frac{\{z_{1-\alpha/2}\sqrt{2}\,\square\,(1-\square\,) + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$ $= \frac{\{1.96\sqrt{2}(0.0845)\,(1-0.0845) + .842\sqrt{0.102(1-0.102)+0.067(1-0.067)}\}^2}{(0.102-0.067)^2}$ $= 990.439$ Proportion of estimation is extracted from Rampal, L., Rampal,S., Azhar, M.Z, Rahman, A. R (2008). Prevalence, awareness, treatment and control of hypertension in Malaysia: A national study of 16440 subjects. Public Health, 122(1), 11-18
Gender	0.139 (proportion of male among age group 20-29 which have hypertension)	0.064 (proportion of female among age group 20-29 which have hypertension)	$n = \frac{\{z_{1-\alpha/2}\sqrt{2}\,\square\,(1-\square\,) + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$ $= \frac{\{1.96\sqrt{2}(0.1015)\,(1-0.1015) + .842\sqrt{0.139(1-0.139)+0.064(1-0.064)}\}^2}{(0.139-0.064)^2}$ $= 253.39$ Proportion of estimation is extracted from Rampal, L., Rampal,S., Azhar, M.Z, Rahman, A. R (2008). Prevalence, awareness, treatment and control of hypertension in Malaysia: A national study of 16440 subjects. Public Health, 122(1), 11-18
Family history of hypertension	0.296 (proportion of group with positive family history of hypertension which have hypertension)	0.164 (proportion of group without positive family history of hypertension which have hypertension)	$n = \frac{\{z_{1-\alpha/2}\sqrt{2}\,\square\,(1-\square\,) + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$ $= \frac{\{1.96\sqrt{2}(0.23)\,(1-0.23) + .842\sqrt{0.296(1-0.296)+0.164(1-0.164)}\}^2}{(0.296-0.164)^2}$ $= 158.41$ Proportion of estimation is extracted from Masahiko Tozawa, SaoriOshiro, Chiho Iseki et al Family History of Hypertension and Blood Pressure in a screened cohort.
Obesity	0.280 (proportion of overweight group which have hypertension)	0.199 (proportion of normal weight group which have hypertension)	$n = \frac{\{z_{1-\alpha/2}\sqrt{2}\,\square\,(1-\square\,) + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$ $= \frac{\{1.96\sqrt{2}(0.2395)\,(1-0.2395) + .842\sqrt{0.28(1-0.28)+0.199(1-0.199)}\}^2}{(0.28-0.199)^2}$ $= 434.73$ Proportion of estimation is extracted from http://www.sciencedirect.com/science/article/pii/S0091743509003041
Smoking	0.453 (proportion of smoker which have hypertension)	0.390 (proportion of non-smoker which have hypertension)	$n = \frac{\{z_{1-\alpha/2}\sqrt{2}\,\square\,(1-\square\,) + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$ $= \frac{\{1.96\sqrt{2}(0.425)\,(1-0.425) + .842\sqrt{0.453(1-0.453)+0.397(1-0.397)}\}^2}{(0.453-0.397)^2}$ $= 1222.44$ Proportion of estimation is extracted from MireiDochi, Kouichi Sakata, Mitsuhiro Oishi et al Smoking as an independent risk factor for hypertension: a 14 year longitudinal study in male Japanese workers
Physical Activity	0.208 (proportion of group with low physical activity which have hypertension)	0.127 (proportion of group with high physical activity which have hypertension)	$n = \frac{\{z_{1-\alpha/2}\sqrt{2}\,\square\,(1-\square\,) + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$ $= \frac{\{1.96\sqrt{2}(0.335)\,(1-0.335) + .842\sqrt{0.208(1-0.208)+0.127(1-0.127)}\}^2}{(0.208-0.127)^2}$ $= 466.95$ Proportion of estimation is extracted from Nina Haapanen,SeppoMilunpalo, IlkkaVuori et al Association of leisure time physical activity with the risk of coronary heart disease, hypertension and diabetes in middle-aged men and women

Due to limitation in number of medical student in UPM Serdang which was only 506, sample size with the total number of 506 was selected. The result obtained from the sample size of 506 was sufficient to represent the whole population as it constituted of all the population.

3.5 Instrument and data collection

3.5.1 Instrument/ questionnaire

A pre-tested 4 parts-structured self-administered questionnaire was used. The first part consists of patient's socio-demography questions. The second part consisted of family history and social questions. The third part consisted of International Physical Activity Questionnaire (IPAQ) to access the level of physical activity and the last part was on the anthropometric measurement of the respondents.

3.5.1.1 Socio demography

The socio demographic profile of the respondents obtained in this study included age, gender, ethnicity, and family income.

3.5.1.2. International Physical Activity Questionnaire (IPAQ)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain

internationally comparable data on health related physical activity. However, in this study, only short version was used.

The physical activities were classified into 3 categories score:

Low (category 1)

This is the lowest level of physical activity. Those medical students who did not meet the criteria for categories 2 or 3 were considered to have a 'low' physical activity level.

Moderate (category 2)

This category included 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 (category 3)

This category included those who were either having vigorous intensity activity on at least 3 days and accumulated at least 1500 MET-minutes/week or 7 or moredays any combination of walking, moderate intensity activities achieving a minimum of at least 3000MET-minutes/week.

3.5.1.3 Family and social history

The family history included history of hypertension in family members while smoking history was included under social history.

3.5.1.4 Anthropometric measurement

Anthropometric measurements taken were the height and weight of the respondents. A clinically approved digital BP measuring device with a standard adult cuff was used. However, a calibrated mercury sphygmomanometer brand ACCOSON with adult and large adult cuff was used for obese participants and a stethoscope was used to measure the blood pressure. A calibrated weighing scale brand DETECTO and body meter brand SECA were used to measure the weight and height

Blood pressure taking.

For participant, the participant was asked to sit comfortably on a chair and relax themselves, and his /her arm shall be placed on a stable surface at the heart level. Then, an appropriate cuff (The bladder length should encircle at least 80% of the circumference whilst the width should be at least 40% of the circumference of the arm. Standard bladder size was 13 cm x 24cm) was placed around the biceps muscles above the elbow joint adequately.

The equipment to measure blood pressure in children should have a smaller cuff.This study used automated blood pressure device for non-obese participants as most studies have shown that home blood pressure monitoring (digital device) was a better determinant of

target-organ damage than office blood pressure (manual device).It also can avoid random error due to large sample size.

Table II: Classification of blood pressure for adults age 18 and older (CPG Guidelines)

Category	Systolic		Diastolic
Optimal	<120	And	<80
Pre-hypertension	120-139	and/or	80-89
Hypertension			
Stage 1	140-159	and/or	90-99
Stage 2	160-179	and/or	100-109
Stage 3	>180	and/or	>110

Weight and height measurements.

Weight and height were taken without shoes and in light clothing. The study subjects must not wear jackets and their pockets were emptied before the weight measurement being taken. The respondents were also be told to have their feet flat on the ground, their back against the wall, looked straight ahead and a set-square will rested lightly on the top of the head to project that level onto scale, not the hair to ensure that the measurement obtained were accurate.

All the data for height and weight obtained were used to compute the body mass index (BMI) and BMI was calculated as mentioned earlier up to two decimal points. The following is the classification of BMI for Asian Pacific:

Table III: classification of weight by BMI

Classification	BMI (kg/m2)	Risk of co-morbidities
Underweight	<18.5	Low (but increase risk of other clinical problems)
Normal range	18.5 – 22.9	Increasing but acceptable risk
Overweight	≥23	
Pre-obese	23.0 – 27.4	Increased
Obese I	27.5 – 34.9	High
Obese II	35.0 – 39.9	Very high
Obese III	≥40.0	Extremely High

3.5.2 Data collection technique

The study subjects were informed and reminded by sending them SMS (Short Messaging System) and calling them

For the data collection, all of the group members were involved in data collection. Students were informed about the study using a written participants' information sheet and they were asked for their permission and agreement to participate in the study. The questionnaire was only be given and the anthropometric measurement was taken if the student agreed to participate by giving a written consent. Confidentiality was maintained by omitting the participant's identification data. Findings of anthropometric measurements were revealed to the participants upon request.

The anthropometric measurement was done after the participants had finished answering the questionnaire to make sure that all the questionnaires were completed. For

those participants who were willing to involve in our study but busy, a meeting was arranged with them to enable the measurement performance and data collection.

For the selected participants who were not able to be contacted via sms or phone, a visit to their rooms was done. If after these three attempts and the participants were still not contactable, then they were considered as non-respondents.

For those who were noted to have hypertension and obesity during screening/ anthropometric measurement was referred to PKU for further assessment and management. (Canadian PTF)

3.5.3 Quality control

Data collection and analysis were monitored by supervisors. The questionnaire chosen was first evaluated and examined by the supervisors before it was used. A pre-test by randomly selecting 30 respondents other than medical students in college 17 at University Putra Malaysia was performed to evaluate the questionnaire. This was done to improve the questionnaire and to estimate the expected time to be given for the medical students to complete the questionnaire. It was also to ensure that the language used in the questionnaire was well understood by the study respondents.

3.6 Data analysis

For the categorical variables such as age, gender, ethnicity, family income, family history of hypertension, obesity, smoking and physical activity, chi-square test was used to determine their association with hypertension

3.7 Study ethics

The ethical forms was submitted to the Medical Research Ethic Committee, UPM while a request letter for approval was also sent to the faculty of medicine and health science in UPM.

3.8 Variables

3.8.1 Dependant variable

The prevalence of hypertension among medical students in Universiti Putra Malaysia Serdang.

3.8.2 Independent variables

- Age
- Gender
- Ethnicity
- Family income
- Family history of hypertension
- Obesity
- Smoking
- Physical activity

3.9 Definition of terms

Term	Definition
Medical Student	A student who studies medicine. In this study, the students were from Universiti Putra Malaysia Serdang.
Hypertension	Persistent elevation of systolic BP of 140 mmHg or greater and/or diastolic BP of 90 mmHg or greater. (CPG guideline) Based on two average reading using a digital or mercury BP measuring device.
Systolic blood pressure (SBP)	The blood pressure when the heart is contracting. It is specifically the maximum arterial pressure during contraction of the left ventricle of the heart. The time at which ventricular contraction occurs is called systole.(Ganong's review of medical physiology 23rd edition) Clinically, The SBP estimated initially by palpation. While palpating the brachial/ radial artery, the cuff was inflated until the pulse disappeared. The cuff should then be inflated to a further 20 mmHg. The cuff was then slowly deflated and the pressure at which the palpable pulse was the estimated SBP. (CPG guidelines) -The bladder was again inflated to 20 mmHg above the previously estimated SBP and the pressure reduced at

	1-2 mmHg per second whilst auscultating with the bell of the stethoscope. The bell should not be placed under the cuff. The point at which repetitive, clear tapping sounds first appeared (Korotkoff Phase I) gives the SBP.(CPG guidelines)
Diastolic blood pressure	The lowest pressure when the chambers of the heart are relax. (Ganong's review of medical physiology 23rd edition) Clinically, The complete disappearance of sound (Korotkoff Phase V) wasthe diastolic reading.
Socio-demographic	Information related to the society and population. (Oxford dictionary)
Age	The length of time that a person has lived or a thing has existed. (Oxford dictionary)In this study, it was based on the participants' identity card (Mycard).
Gender	The state of being male or female. (Oxford dictionary) In this study, it was based on the participants' identity card (Mycard).
Ethnicity	The fact or state of belonging to a social group that has a common national or cultural tradition. (Oxford dictionary) In this study, it was based on birth certification. Non-malay ethnic groups included

	chinese, indian, and other minority ethnic group.
Family income	In this study, family income was categorized into 3 groups which were <RM1000-RM1999, RM2000-RM3999, ≥RM4000
Family history of hypertension	In this study, it was reviewed on whether the respondent had first degree relatives which were hypertensive.
Obesity	According to Ministry of Health clinical guidelines on obese 2004, a person is considered overweight if having BMI 23 m^2/kg and above.
Smoking	Respondents who reported smoking at least 100 cigarettes in their lifetime and who, at the time of survey, smoked either every day or some days were defined as Current Smoker. Respondents who reported smoking at least 100 cigarettes in their lifetime and who, at the time of the survey, did not smoke at all were defined as Former Smoker. Respondents who reported never having smoked 100 cigarettes were defined as Never Smoker. (CDC guideline) In this study, current smokers were grouped as smoker whereas former and never smoker was grouped as non-smoker
Physical activity	In this study, it was categorized into 3 groups based on international physical activity questionnaire (IPAQ) guidelines.

CHAPTER 4

RESULTS

4.1 Response Rate

Out of the 506 respondents aged 18 and above that were approached, only 355 respondents had agreed to participate in this study which made the overall response rate to be 70.15%.

$$\text{Response Rate} = \frac{\text{Total number of respondents}}{\text{Total number of medical students approached – out of scope}} \times 100\%$$

$$= \frac{355}{506 - 0} \times 100\%$$

$$= 70.15\%$$

4.2 Characteristics of Respondents

Table 4 showed characteristic of medical students in UPM Serdang. About 203(57.2%) of the respondents aged between 19-21 year old and majority of the respondents were female (61.7%). For the ethnicity, 58% of the respondents were Malay which was equivalent to 206 respondents. Non-Malay comprised of 42% and among these included Chinese, Indian, Sikh, Iban and other minority groups. For the family income, the percentage were quite equally divided for family incomes <RM1000-RM1999, RM2000-RM3999, and ≥RM4000 with the percentage of 31.8%, 33.8%, and 31.4% respectively. 70.1% of the respondents had claimed to have positive family history of hypertension while 29.9% of the respondents did not have any family members who had diagnosed hypertension. Table 4 showed the percentage of respondents by BMI status, it show that out of the 355 respondents who took part in this study, 121(34.1%) respondents were overweight. (BMI≥23kg/m^2). Almost all of the respondents were not smoker and only 9 (2.5%) reported of smoking. Last but not least, Table 4 also showed the physical activity level of the respondent. Most of the respondents had a moderate physical activity which constituted 41.4%.

Table IV: Characteristic of medical students in UPM Serdang

Characteristic Of Respondent	Mean ± SD	Frequency (n=355)	Percentage
Age (years)			
Mean	21.26 ± 1.202		
19-21		203	57.2
22-24		152	42.8
Gender			
Male		136	38.3
Female		219	61.7
Ethnic			
Malay		206	58.0
Non-Malay		149	42.0
Family Income			
<RM1000-RM1999		113	31.8
RM2000-RM3999		120	33.8
≥RM4000		122	34.4
Family History of Hypertension			
Yes		249	70.1
No		106	29.9
BMI status (kg/m^2)			
Mean	22.37 ± 4.191		
Underweight(<18.5)		48	13.5
Normal(18.5-22.9)		186	52.4
Overweight(≥23)		121	34.1
Smoker			
Smoker		3	0.8
Non-smoker		352	99.2
Physical Activity			
Low		65	18.3
Moderate		147	41.4
High		143	40.3

4.3 Prevalence of hypertension

Classification of the hypertension was done using classification of Malaysia Clinical Practice Guideline (CPG Management of hypertension). Table 5 showed the percentage of respondents by blood pressure status, it showed that out of the 355 respondents who took part in this study, 6.2% were hypertensive, 42.0% were pre-hypertensive and 51.8% were normotensive.

Table V: Prevalence of hypertension among medical students in UPM Serdang

Blood pressure status	Frequency (n=355)	Percentage
Hypertension	22	6.2
Prehypertension	149	42.0
Normal	184	51.8

4.4 Association factors for hypertension among respondents

Table VI showed that there was no association between hypertension and socio demographic status such as age, ethnicity and family income. However, this study revealed that hypertension was associated with gender.

Table VI Association between socio-demographic characteristics and hypertension among medical students in UPM Serdang

Socio-demographic characteristic	Hypertensive N(%)	Non-hypertensive N(%)	X^2/Fisher 's Exact Test	df	P-value
Age					
19-21	10(45.5)	193(58.0)	1.318	1	0.251
22-24	12(54.5)	140(42.0)			
Gender					
Male	14(63.6)	122(36.6)	6.365	1	0.012*
Female	8(36.4)	211(63.4)			
Ethnicity					
Malay	10(45.5)	196(58.9)	1.522	1	0.217
Non-Malay	12(54.5)	137(41.1)			
Family Income					
<RM1000-RM1999	8(36.4)	105(31.5)	0.540	2	0.763
RM2000-RM3999	8(36.4)	112(33.6)			
≥RM4000	6(27.3)	116(34.8)			

*statistically significant (P<0.05)

4.5 Association between hypertension and family history of hypertension

The table showed that there was no significant association between hypertension and family history of hypertension

Table VII Association between hypertension and family history of hypertension among medical students in UPM Serdang

Family History of Hypertension	Hypertensive N(%)	Non-hypertensive N(%)	X^2/Fisher 's Exact Test	df	P-value
Yes	13(59.1)	236(70.9)	1.367	1	0.242
No	9(40.9)	97(29.1)			

4.6 Association between hypertension and obesity

The table showed there was no significant association between hypertension and obesity.

Table VIII Association between hypertension and obesity among medical students in UPM Serdang

BMI status (kg/m^2)	Hypertensive N(%)	Non-hypertensive N(%)	X^2/Fisher 's Exact Test	df	P-value
Underweight(<18.5)	2(9.1)	46(13.8)	1.446	2	0.485
Normal(18.5-22.9)	10(45.5)	176(52.9)			
Overweight(≥23)	10(45.5)	111(33.3)			

4.7 Association between hypertension and smoking

The table showed there was no significant association between hypertension and smoking

Table IX Association between smoking and hypertension among medical students in UPM Serdang

Smoking	Hypertensive N(%)	Non-hypertensive N(%)	X^2/Fisher 's Exact Test	df	P-value
Smoker	1(4.5)	2(0.6)	Fisher's	1	0.175
Non-smoker	21(95.5)	331(99.4)	Exact test		

4.8 Association between hypertension and physical activity

The table showed there was no significant association between hypertension and physical activity.

Table X Association between physical activity and hypertension among medical students in UPM Serdang

Physical Activity	Hypertensive N(%)	Non-hypertensive N(%)	X^2/Fisher 's Exact Test	df	P-value
Low	5(22.7)	60(18.0)	0.341	2	0.843
Moderate	9(40.9)	138(41.4)			
High	8(36.4)	135(40.5)			

CHAPTER 5

DISCUSSIONS AND CONCLUSIONS

This chapter discusses the findings obtained in this study. The major finding in this study was the prevalence of hypertension among medical students in the Faculty of Medicine and Health Sciences (FMHS) in Universiti Putra Malaysia (UPM) and its association factors. The results were comparable with the prevalence of hypertension among age group 18-19 and 20-24 in national health and morbidity survey IV (NHMS,2011) since medical students in this study were aged 19 to 24. The finding showed that hypertension had association with the gender.

5.1 Prevalence of hypertension

From the result obtained, the prevalence of hypertension among medical students was 6.2% whereas 42% of medical students were pre-hypertensive. The classification of hypertension and prehypertension used in this study was based on Malaysian Clinical Practice Guideline (CPG management of hypertension) where by hypertension is defined as systolic blood pressure ≥140mm/Hg and/or diastolic blood pressure ≥90mm/hg whereas prehypertension is defined as systolic blood pressure 80-89mm/Hg and/or diastolic blood pressure 130-139mm/Hg. The prevalence of hypertension among medical students in this study was slightly lower compared to the prevalence of hypertension among age group 18-19 and 20-24 in Malaysia National Health and Morbidity Survey 2011 (NHMS, 2011) which was 8.1% and 11.8% respectively. This is probably due to the fact that NHMS 2011 involved larger population size from all the states in Malaysia while this study focused only on medical students of UPM. In a similar study in India, 55.4% of the Indian medical

studentswere pre-hypertensive. Our result which was 42% showed that the prevalence of prehypertension among UPM medical students were lower than theirs. This is probably because medical students there underwent similar or more stressful condtion during their training period with little physical activity. (Shobha&Avinash,2012)

5.2 Socio demographic factors

5.2.1 Age

From this study, the prevalence of hypertension was higher among respondents of aged between 22 to 24 years old (7.9%). This finding is similar to another study which revealed that the prevalence of hypertension was higher among the respondents with older age (Rampal et al., 2008) The finding was also supported by the another study which showed that systolic blood pressure increased steeply with age and increased systolic blood pressure lowered the threshold of hypertension(Lawes et al., 2006) In short, the prevalence of hypertension increased with age among the general population. Other than that, NHMS 2011 showed that the prevalence of hypertension was higher in the age group of 20 to 24 years old as compared to the age group of 18 to 19 years old which was 11.8% and 8.1% respectively.(NHMS, 2011)

The study found that there was no significant association between hypertension and age. However, the previous study among Malaysians aged 15 and above in year 2008 found that there was a significant association between hypertension and age. (Rampal et al., 2008). This may be due to the difference of study population, sample size and environment. Present study only involved independent medical students in a public university and a much smaller

sample size while the previous study involved 16640 residents of East and Penisular Malaysia. Other than that, the previous group involved age group from 15 to more than 60 years old while the current study only involved age group from 19 to 24 year old. However, both results showed that the prevalence of hypertension increased with age.

5.2.2 Gender

In the present study, there was asignificant association between hypertension and gender. A study conducted among UPM staff showed that the prevalence of hypertension were 45.5 % in men and 22.9% in women. Other than that, it also indicated that hypertension was associated with gender with prevalence of hypertension was higher in male compared to female.(Rampal et al.,2011) The NHMS 2011 showed that the prevalence of hypertension among male and female was quite similar which was 33.7% and 31.6% respectively. Another study conducted among adolescent in an urban Malaysian secondary school also revealed that the mean systolic blood pressure in male was higher than the mean systolic blood pressure in female with a significant difference (Rampal et al., 2011) This indicates that male had higher probability of being hypertensive than female.

The similarity in the result was perhaps due to the similarity in the sample. The sample size used in the previous study was 517 subjects. The present study involved 435 medical students. Other than that, the study location for both studies was the same which was around urban area.

5.2.3 Ethnic

The latest National Health and Morbidity Survey (NHMS, 2011) showed that the prevalence of hypertension among the three main ethnics in Malaysia were quite similar which were 34.0% (Malay), 32.3% (Chinese), 30.6 % (Indian), and 36.4% (Other Bumiputras).

On the contrary, this study found that the prevalence of hypertension among different ethnic group was slightly higher among the Non-Malays which was 8.1% compared to the Malays which was 4.9%. However, this result might not represent the actual reality of prevalence of hypertension in comparison to ethnic group; this is because the number of Malay respondents (58.0%) was higher compared to Chinese (30.7%), Indian (8.2%) and Others (Bajau and Siamese) (3.1%) ethnic, and these three group were categorized together as Non-Malay.

5.2.4 Family Income

This study revealed that the prevalence of hypertension was not associated to the family income. As the family income increases, the prevalence of hypertension decreased. In the NHMS 2011, the result observed was similar. However, there was no statistically significant association between hypertension and family income. In other study conducted, Differences existed by income which was 29.6 percent among low income adults versus 23.8 percent among high income adults) (William, 2011). The difference might be due to medical students live independently from family income and receive financial support from scholarship or government loan.

5.3 Family history of hypertension

Family history of hypertension (FHT) is a primary predictor of high blood pressure (BP) (Goldstein et al., 2006). This is supported by other study that showed the people with FHT have higher night time systolic, diastolic and mean arterial blood pressure variability as compared to the control subjects despite their range BP being within the normotensive range (Rafidah, Azizi, Suhaimi, &Noriah, 2008). However, our study showed that there was no association between hypertension and family history of hypertension thought prevalence of hypertension among student with positive history was higher. It might be due to some medical students were unclear about their family health status and giving wrong response.

5.4 Obesity

From previous study, relative risk regression models showed that BMI was associated with hypertension, type 2 diabetes mellitus (T2DM), and hypertriglyceridemia (Feng et al., 2012). Hypertension had stronger association with BMI than waist-to-hip ratio (WHR), in men ($P<0.001$) and had the strongest with BMI than the others (waist-to-hip ratio (WHR) $P<0.001$; waist-to-stature ratio (WSR) $P<0.01$; and waist circumference (WC), $P<0.05$) in women. (Nyamdorjet al., 2008)

From our findings, hypertension was not associated with obesity. It might be due to lower number of people who were overweight and other confounding factors. From other study, the odds ratio for having hypertension increased significantly as BMI cut-off point increased which is 23.0 kg/m^2 in men and 24.0 kg/m^2 in women (Cheong et al., 2013).

5.5 Smoking Status

It showed that prevalence of hypertension among smoker (4.5%) was lower compared to non-smoker (95.5%). This result was similar with another study which was done before (Mikkelsen et al., 1997; Green et al., 1986). However, not all studies showed that former smokers have lower blood pressure compared to current and never smoker (Primatesta et al., 2001).

Besides that, from the past study conducted in UPM, it also showed that a non-smoker was 1.3 times more likely to have hypertension compared with a smoker with odds ratio 1.8 (Rampal et al., 2008).

This finding was probably due to the mild reduction in BP in smokers that was related to decreased body weight which would reduce the risk of hypertension (Perkins et al., 1989). This observation was supported by another study that showed smokers with BMI <25 kg/m^2 had a significantly lower risk of hypertension than non-smokers with BMI <25 kg/m^2 (reference group). Compared with the reference group, overweight non-smokers had a significantly higher risk of hypertension (Nishiyama, Kimijima, Muto & Kimura, 2012).

5.6 Physical activity

Based on this study, we found the trend that increased levels of physical activity were corresponding with increased prevalence of hypertension though there was no significant association between hypertension and physical activity.

In another study in Finland, physical activity was foundto be inversely associated with prevalence of hypertension. (Haapanen, Miilunpalo, Vuori, Oja, &Pasanen, 1997) The results obtained for both study were found to be in contrast. However, as this study involved medical students we can only suggest that other than physical activity, other factors such as caffeine intake and stress level of the students might have affected the result of this study. A study of stress and depression among medical students in UPM and discovered that the prevalence of psychological stress among medical students was 41.9% which was quite high (Sherina,Rampal&Kaneson, 2003) and this might be in relation with increased of blood pressure level among medical students.

5.7 Conclusion and recommendation

5.7.1 Conclusion

This cross sectional study on 355 respondents showed that prevalence of hypertension among medical students in Faculty of Medicine and Health Sciences was 6.2%.This is lower than NHMS, 2011 which showed that the prevalence of hypertension among the general population was 32.7%. However, the results were not comparable as both studies involved different study groups. This study also had a lower prevalence of prehypertension as compared to Indian study (Shobha&Avinash, 2012) which showed a higher prevalence of prehypertension of 55.4%.

Our finding revealed that there was significant association between hypertension and gender. However, there were no associations between hypertension and age, ethnicity, family income, family history of hypertension, nutritional status, smoking and physical activity.

5.7.2 Recommendation

The result from this study should acts as a guide to FMHS UPM to provide comprehensive and continuing health promotion programmes towards reducing hypertension and prehypertension among medical students in this university. We would recommend a community based primary approach on prevention of hypertension. It will ensure that each medical student gains knowledge and increases their awareness on hypertension. This is because awareness was low even on the hypertensive group. (Musinguzi et al., 2013 ;Rampal et al., 2008)Other than that, improved recognition of the importance of systolic blood pressure (SBP) had been identified as one of the major public health and medical challenges in the prevention and treatment of hypertension.(JNC VI,1997) Therefore, to reduce the prevalence of hypertension, medical student should be educated first about the health risk posed by hypertension.

Recommendation towards healthy lifestyle such as climbing stairs instead of taking escalator, walking short distance instead of driving and maintaining at least moderate physical activity are needed. It is because physical activity helps to control blood pressure as well as managing weight, strengthening heart and balancing stress level. A healthy weight, a strong heart and general good emotional health are important to maintain good blood pressure.(www.heart.org). Therefore we would suggest FHMS UPM to organize more activities such as hypertension walk which involve the active participation of medical students.

Furthermore, healthy dietary behaviour such as low fat diet, more fibre from vegetable and fruit together with low salt intake also should be advocated. A study showed that systolic blood pressure varied significantly depending on fruit consumption.(Keller, Courten, &Draebel,2012) Moreover, a study showed that a 3- to 5-mm Hg systolic and ≈1-mm Hg diastolic change in pressure is associated with a 75 to 100 mmol/24 hour difference in sodium intake. However, the effect on younger and normotensive subjects was less: ≈2 to 3 mm Hg for systolic and <1 mm Hg for diastolic. (Midgleyet al., 1996) This proved that reduced sodium intake lowers systolic and diastolic blood pressure and hence the prevalence of hypertension. Further well-structured longitudinal research to look at the cause and effect of hypertension and an audit on the efficacy of interventions programs might be beneficial.

5.8 Study Strength and Limitations

Strength of this study was a large group of medical students from homogenous age group and socioeconomic status. It involved medical students from age group 19 to 24 and the family income for respondents was quite equally distributed.

Nevertheless, some limitations were observed in this study. Due to the cross-sectional study design, the causal-effect relationship between hypertension and its associated factors could not be determined. The data collection period was conducted over a period of short time which was around 3 weeks. Hence, It was not feasible to demonstrate the temporal relationship between hypertension and its associated factors.

The bias which was found during our study was non-response bias. Non response bias was due to systemic difference in characteristics between those who take part in a study and those who do not. It was expected in this study that the selected student might refuse to be involved in the study because they were busy. There were a small fraction of students who remained uncooperative even after a few visits had been made during the data collection period. Students who refused to participate might be different from those who participated.

Besides that, recall bias also occurred. Recall bias results from differential ability of subject to remember previous exposure. It was expected in this study as selected student had forgotten any activity done in the past. In addition, we also encountered information bias as some of the respondents were unwilling to provide the correct response. For instance, only 9 of the medical students reported smoking though there might be more than that because the Faculty of Medicine and Health Sciences is a non-smoking area.

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Appendix **Dummy Table**

Associated factors	Hypertension	Prehypertension	Normal	Statistical significant
Age				
18				
19				
20				
21				
22				
23				
24				
Gender				
Male				
Female				
Ethnicity				
Malay				
Chinese				
India				
Others				
Family Income				
<RM1000				
RM1000-RM1999				
RM2000-RM2999				
RM3000-RM3999				
≥RM4000				
Family history of hypertension				
Yes				
No				
Obesity				
Underweight				
Normal				
Overweight				
Pre obese				
Obese I				
Obese II				
Obese III				
Smoking				
Current				
Former				
Never				
Physical activity				
Low				
Moderate				
High				

Gantt Chart

Topic/Week	1	2	3	4	5	17	18	19	20	21	22	23	24
Proposal preparation	*	*											
Submission of Proposal to Module Coordinator		**											
Proposal Presentation (preparation)		*											
Proposal Presentation concurrent session				**									
Correction of proposal				*									
Preparation of ethical approval / letter				*									
Submission of ethic form & corrected proposal to DrSuhainizam					**								
Data collection						*	*	*					
Submission of data analysis								**					
Data analysis presentation									**				
Correction of data analysis									*				
Report writing										*	*		
Submission final report / scientific article											**		
Preparation final presentation											*	*	
Final presentation												**	
Correction of final report /scientific article & Submission of log book and final report												**	**

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Budget Planning

No	Items	Estimated cost
1.	Printing	RM 50.00
2.	Hard cover	RM 50.00
3.	Photocopy	RM 100.00
4.	Binding	RM 10.00
5.	Refreshment	RM 50.00
	Total	**RM 260.00**

Part A: Sociodemography of respondent

Age : _____

Gender : ☐ Male

: ☐ Female

Ethnic : ☐ Malay ☐ Chinese

: ☐ Indian ☐ Others: _____

Family Income : ☐ RM1000 ☐ RM1000-RM1999

: ☐ RM2000-RM2999 ☐ 3000-RM3999

: ☐ RM4000

Smoker : ☐ Current ☐ Former

: ☐ Never

NOTES: Respondents who reported smoking at least 100 cigarettes in their lifetime and who, at the time of survey, smoked either every day or some days were defined as **Current Smoker.**

Respondents who reported smoking at least 100 cigarettes in their lifetime and who, at the time of the survey, did not smoke at all were defined as **Former Smoker.**

Respondents who reported never having smoked 100 cigarettes were defined as **Never Smoker**. (CDC guideline)

PART B: Family History

1. Do you have any hypertensive family members (Identified and confirmed by medical doctor)?

a)Yes

b) No

c) don't know

2. If yes, how are they related to you ?

a) Parents

b) Siblings

c) Other relatives (grandmother, grandfather, aunt, uncle, cousin, etc)

Please state: _____

3. Do you have hypertension (Identified and confirmed by medical doctor)?

a)Yes

b) No

PART C:

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ)

The questions are about the time you spent being physically active in the last 7 days. They **include** questions about 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**.

Your answers are **IMPORTANT**.

Please answer **EACH** question even if you **DO NOT** consider yourself to be an active person.

In answering the following questions,

Vigorous physical activities refer to activities that take **hard physical effort** and make you **breathe much harder** than normal.

Moderate activities refer to activities that take **moderate physical effort** and make you **breathe somewhat harder** than normal.

Think about only those physical activities that you did for **at least 10 minutes** at a time.

1a. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, running, playing basketball or football, or fast bicycling?

☐ Yes (please state) _____ days per week

☐ No vigorous physical activities (please go to question 2a)

1b. How much time in total did you usually spendon one of those days doing vigorous physical activities**(please state the estimated time in the line)?**

_____hours per day

_____minutes per day

2a. Again, think only about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

☐ Yes (please state) _____ days per week

☐ No moderate physical activities (please go to question 3a)

2b. How much time in total did you usually spend on one of those days doing moderate physical activities**(please state the estimated time in the line)?**

_____hours per day

_____minutes per day

3a. During the last 7 days, on how many days did you walk for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

☐ Yes (please state) _____ days per week

☐ No walking(please go to question 4)

3b. How much time in total did you usually spend walking on oneof those days**(please state the estimated time in the line)**?

_____hours per day

_____minutes per day

The last question is about the time you spent sitting on weekdays while at work, at home, while doing course work and during leisure time, last 7 days. This includes time spent sitting at a desk, visiting friends, reading traveling on a bus or sitting or lying down to watch television.

4. During the last 7 days, how much time in total did you usually spend sitting on a

week day**(please state the estimated time in the line)?**

_____hours per day

_____ minutes per day

THANK YOU FOR PARTICIPATING.

PART D Anthropometric Measurement and Blood Pressure Reading.

Body Mass Index (BMI)

	I	II	Mean
Weight (kg)			
Height (m)			
BMI (kg/m^2)			
BP (SBP/DBP)			

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

CONSENT FORM (RESPONDENT)

RESEARCH TITLE : Prevalence of hypertension and its association factors among medical students in UPM Serdang

RESEARCHER : LEE CHERN LUEN 161211

NAJWA BINTI AMIR 161643

NABILAH AZIRA BINTI MOHAMAD HASLI 163809

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)

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UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

BORANG PERSETUJUAN RESPONDEN

TAJUK PENYELIDIKAN : Kadar kelaziman hipertensi (tekanan darah tinggi) dan faktor-faktor penyumbang kepada hipertensi dalam kalangan pelajar perubatan UPM Serdang.

PENYELIDIK : : LEE CHERN LUEN **161211**

NAJWA BINTI AMIR **161643**

NABILAH AZIRA BINTI MOHAMAD HASLI **163809**

Saya..... No Kad Pengenalan. .....
beralamat.....
.....dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam menyertai penyelidikan klinikal *(pengajian klinikal/ pengajian soal selidik/ percubaan ubat-ubatan) seperti yang disebut di atas.

Saya telah diberi penjelasan secara menyeluruh mengenai dasar penyelidikan klinikal dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang dijalankan ke atas sampel yang diambil dari saya.

*potong yang tidak berkenaan

Tandatangan .....
(*Responden*)

Tarikh :.....

Tandatangan .....
(*Saksi*)

Nama :.....

No. K/P: .....

Saya mengesahkan bahawa saya telah menerangkan kepada responden sifat dan tujuan penyelidikan klinikal tersebut di atas.

Tarikh .....

Tandatangan .....
(*Penyelidik*)

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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

Prevalence of hypertension and its association factors among medical students in UPM Serdang

INTRODUCTION

Hypertension has become a significant problem in many developing countries which are undergoing epidemiological transition from communicable to non-communicable disease. The main causes of hypertension and other cardiovascular diseases are strongly related to aging, urbanization, sedentary life style, obesity, alcohol consumption and salt intake of the population. The changing of socio-demographic and life in those developing countries contributes to the increased prevalence of hypertension. Therefore, the main objective of this research study is to determine the prevalence and the factors associated with hypertension among medical students in UPM Serdang. This study will provide information on the factors related to hypertension and further preventive and intervention measures can be performed for the hypertensive students.

WHAT WILL YOU HAVE TO DO?

You have to complete a questionnaire and the researcher will measure your height, weight and blood pressure, if you agree to participate. However, you can opt to withdraw from this study at any time.

WHO SHOULD NOT ENTER THE STUDY?

Non-Malaysian medical students and those who are not in the age group of between 18 to 24 years old.

WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You may know your hypertension status and get the referral letter to the Pusat Kesihatan Universiti if you are hypertensive but unaware of it.

b) TO THE INVESTIGATOR?

The study helps us to identify the subjects who are hypertensive and enables us to provide them suggestion to manage their problem. Besides that, this study also helps encourage other further study about hypertensive status of medical students in UPM.

WHAT ARE THE POSSIBLE RISKS?

There is no anticipated of risk in this study. You are only required to answer the question given by the researcher and the researcher will measure your height, weight and blood pressure with your consent. There will be no invasive procedure and your identity and answers will be kept confidential at all time.

WHAT ARE THE POSSIBLE DRAWBACKS?

There are no possible drawbacks.

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

Yes. All of your information will remain private and confidential.

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

You should contact the following researcher

LEE CHERN LUEN	012-6158807
NAJWA BINTI AMIR	011-15678904
NABILAH AZIRA BINTI MOHAMAD HASLI	011-19104574

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

HELAIAN PENERANGAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

TAJUK KAJIAN

Kadar kelaziman hipertensi (tekanan darah tinggi) dan faktor-faktor penyumbang kepada hipertensi dalam kalangan pelajar perubatan UPM Serdang.

PENGENALAN

Kebelakangan ini, hipertensi telah menjadi masalah yang mendapat perhatian ramai pihak terutamanya dalam kalangan penduduk negara-negara membangun yang kini sedang mengalami perubahan epidemiologi. Punca utama masalah hipertensi dan penyakit kardiovaskular yang lain amat berkait rapat dengan faktor-faktor seperti penuaan, pemodenan, gaya hidup kurang sihat, obesiti, pengambilan alkohol dan pengambilan garam yang berlebihan. Perubahan sosiodemografi dan cara hidup banyak menyumbang kepada kenaikan kadar kelaziman tekanan darah tinggi. Oleh itu, objektif utama bagi kajian ini adalah untuk menentukan kadar kelaziman dan faktor-faktor penyumbang kepada hipertensi dalam kalangan pelajar perubatan UPM Serdang. Kajian ini akan memberi maklumat tentang faktor-faktor penyumbang kepada hipertensi dan justeru kaedah-kaedah intervensi dan pencegahan dapat dilaksanakan terhadap pelajar yang menhidapi hipertensi.

APAKAH YANG PERLU ANDA LAKUKAN?

Anda perlu melengkapkan borang soal selidik dan penyelidik akan mengukur ketinggian, berat badan dan tekanan darah anda sekiranya anda bersetuju untuk menyertai kajian ini sebagai responden. Namun begitu, anda mempunyai pilihan untuk menarik diri dari kajian ini pada bila-bila masa.

SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Pelajar perubatan yang bukan merupakan warganegara Malaysia atau bukan dalam lingkungan umur dari 18 tahun hingga 24 tahun.

APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PENYERTA?

Anda boleh mengetahui status tekanan darah anda dan seandainya pihak penyelidik mendapati bahawa anda mempunyai tekanan darah tinggi, anda akan dirujuk kepada Pusat Kesihatan Universiti UPM

b) KEPADA PENYELIDIK?

Kajian ini akan membantu kami untuk mengenal pasti subjek yang hipertensi and membolehkan kami untuk memberi cadangan bagi menangani masalah mereka. Selain itu, kajian ini juga akan merangsang kajian lain yang lebih mendalam tentang status hipetensi dalam kalangan pelajar perubatan di UPM.

ADAKAH IA BERISIKO?

Kajian ini tidak mempunyai risiko yang dijangkakan. Anda hanya perlu menjawab soalan yang diberi oleh penyelidik dan penyelidik akan mengukur ketinggian, berat badan dan tekanan darah anda dengan kebenaran anda. Kajian ini tidak melibatkan sebarang prosedur yang berbahaya dan identiti serta jawapan anda akan dirahsiakan.

ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Ya. Semua maklumat dan identiti anda akan dirahsiakan.

SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?

Anda boleh hubungi penyelidik-penyelidik dibawah

LEE CHERN LUEN	012-6158807
NAJWA BINTI AMIR	011-15678904
NABILAH AZIRA BINTI MOHAMAD HASLI	011-19104574

Attachment 2

JKEUPM Ref No. : FPSK_Julai(13)01

Members of the JKEUPM who reviewed the documents:

Prof. Dr. Lekhraj Rampal

Date of approval: 11/7/2013

Endorsed at JKEUPM Meeting on **2/8/2013**, attended by:

NAME	DESIGNATION	GENDER	TICK IF PRESENT
Prof. Dr. Norlijah Othman	Paediatrics& Dean. Faculty of Medicine and Health Sciences	Female	√
Prof. Dr Zamberi Sekawi	Medical Microbiologist & Deputy Dean of Research and Internationalization. Faculty of Medicine and Health Sciences	Male	√
Prof. Dato' Dr. Lye Munn Sann	Medical Statistician. Dept of Community Health. Faculty of Medicine and Health Sciences	Male	
Prof. Dr. Tengku AizanAbd Hamid	Gerontologist & Director. Institute of Gerontology	Female	√
Prof. Dr. LekhrajRampal	Medical Statistician. Dept of Community Health. Faculty of Medicine and Health Sciences	Male	
Prof. Dr. Elizabeth George	Pathologist. Dept of Pathology. Faculty of Medicine and Health Sciences	Female	√
Prof. Dr. Lim ThiamAun	Anesthesiologist. Dept of Surgery. Faculty of Medicine and Health Sciences	Male	
Prof. Dr. Wan Omar Abdullah	Medical Parasitologist. Dept of Medical Microbiology and Parasitology. Faculty of Medicine and Health Sciences	Male	
Prof. Dr. Patimah Ismail	Professor of Biomedicine. Dept of Biomedical Sciences. Faculty of Medicine and Health Sciences	Female	√
Assoc. Prof. Dr. Johnson Stanslas	Pharmacologist. Dept of Medicine. Faculty of Medicine and Health Sciences	Male	√
Assoc. Prof Dr. Mansor Abu Talib	Assoc. Professor of Guidance and Counselling. Dept of Human Development and Family Studies. Faculty of Human Ecology	Male	
Assoc. Prof. Dr. Noritah Omar (Lay Person)	Assoc. Professor of English Language. Dept of English Language. Faculty of Communication and Modern Languages	Female	√
Dr. RojanahKahar (Lay Person)	Lecturer of Dept of Human Development and Family Studies. Faculty of Human Ecology	Female	√
Tan Sri Dato' Napsiah Omar (Lay Person)	Chairman. National Population and Family Development Board	Female	

UNIVERSITI PUTRA MALAYSIA

FAKULTI PERUBATAN DAN SAINS KESIHATAN

MS ISO 9001 : 2000 REG. NO. AR

21/6/2013

DR. ADIBAH HANIM BT ISMAIL @ D
KETUA & PAKAR PERUBATAN KELUARG
JABATAN PERUBATAN KELUARGA
FAKULTI PERUBATAN DAN SAINS KESIHA
UNIVERSITI PUTRA MALAYSIA
43400 UPM SERDANG, SELANGOR

20 JUN 2013

Dr Adibah Hanim Binti Ismail@ Daud
Head of Family Medicine Unit,
Department of Medicine, Faculty of Medicine & Health Sciences,
Universiti Putra Malaysia.

Dr,

REQUEST FOR THE MEASURING TOOL FOR RESEARCH STUDY

I, Lee Chern Luen, a team member for this research and a 2nd year student (Matrix no. 161211), of Medical Program, FMHS, UPM, intend to request for the usage of the listed measuring tool below for 2 items on **24th June 2013** until **17th July 2013**.

(a) Automated blood pressure sphygmomanometer.

The tools are needed because I intend to conduct a research entitled: *"Prevalence Of Hypertension And Its Association Factors Among Medical Students In Upm Serdang"*.

We thank your generous help in advance and we assure you that the tools will be well taken care of and be returned on time.

Thanks and wish to hear from you soon.

'WITH KNOWLEDGE, WE SERVE"

Yours sincerely,

Lee Chern Luen,
2nd Year Medical Student,
Faculty of Medicine and Health Sciences,
43400 UPM, Serdang,
Selangor, Malaysia.

C.C. - **DR FAEZAH BINTI HASSAN**
Family Medicine Unit,
Department of Medicine, Faculty of Medicine & Health Sciences,
Universiti Putra Malaysia.

UNIVERSITI PUTRA MALAYSIA

9 MAY 2013

Prof Madya Dr. Muhammad Hanafiah Juni
Community Helath Department
Department of Medicine, Faculty of Medicine & Health Sciences,
Universiti Putra Malaysia.

Madam,

REQUEST FOR THE MEASURING TOOL FOR RESEARCH STUDY

I, Najwa Binti Amir, a team member for this research and a 2nd year student (Matrix no. 161643), of Medical Program, FMHS, UPM, intend to request for the usage of the listed measuring tool below on **24th June 2013** until **17th July 2013.**

(a) measuring tape (for height measurement)
(b) weighing scale
(c) mercury sphygmanometer.

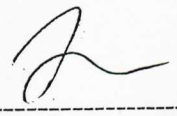
The tools are needed because I intend to conduct a research entitled: *"Prevalence Of Hypertension And Its Association Factors Among Medical Students In Upm Serdang"*.

We thank your generous help in advance and we assure you that the tools will be well taken care of and be returned on time.

Thanks and wish to hear from you soon.

'WITH KNOWLEDGE, WE SERVE"

Yours sincerely,



Lee Chern Luen
2nd Year Medical Student,
Faculty of Medicine and Health Sciences,
43400 UPM, Serdang,
Selangor, Malaysia.

C.C. - **Dr Adibah Hanim Binti Ismail@ Daud**
Family Medicine Unit,
Department of Medicine, Faculty of Medicine & Health Sciences,
Universiti Putra Malaysia.