PREVALENCE OF PREHYPERTENSION AND ITS ASSOCIATED FACTORS AMONG SMOKERS ATTENDING KLINIK KESIHATAN BANDAR KOTA BHARU

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LIST OF ABBREVIATIONS

ASH	American Society of Hypertension
BMI	Body mass index
CVD	Cardiovascular diseases
DALY	Disability adjusted life years
DASH	Dietary approaches to stop hypertension
DBP	Diastolic blood pressure
FTND	Fagerstrom Test for Nicotine Dependence Questionnaire
HDL-C	High density lipoprotein
HREC	Human Research Ethic Committee
IPAQ	International Physical Activity Questionnaire
ISH	International Society of Hypertension
LDL-C	Low density lipoprotein
MOH	Ministry of Health
NHMS	National Health and Morbidity Survey
NCD	Non-communicable diseases
SBP	Systolic blood pressure
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization
WC	Waist circumference

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ABSTRACT

Introduction : Cardiovascular diseases are the leading cause of premature death in our country. Among the risk factors for cardiovascular diseases are prehypertension and smoking. Up to date there was no study looking for associated factors for prehypertension among smokers.

Objective : To determine the prevalence of prehypertension and its associated factors among smokers attending Klinik Kesihatan Bandar Kota Bharu.

Methodology : A cross sectional study involving a total of 333 current smokers aged more than 18 years at Klinik Kesihatan Bandar Kota Bharu from January to April 2017 by using convenient sampling. Respondents answered a questionnaire consists of socio-demographic back ground, IPAQ-M, MyNCDs – dietary assessment and FTND-M and followed with physical measurements for BP,weight, height and waist circumference. Data was analysed using descriptive analysis and logistic regression.

Result : The mean (SD) age of respondents was 32.6 (10.3) and 57.7% (192) of current smokers have prehypertension. Through multivariate analysis using multiple logistic regression test, this study showed age (adjusted OR=1.03,95% CI 1.00, 1.05,p=0.020), BMI (adjusted OR=1.1195% CI 1.03,1.20,p=0.006), family history of hypertension (adjusted OR=1,78,95% CI 1.04,2.71,p=0.034), unhealthy diet (adjusted OR= 4.48,95% CI 1.88,10.63,p=0.001) and central obesity (adjusted OR=2.68,95% CI 1.22,5.89,p=0.014) were the associated factors for prehypertension.

Conclusion : Prehypertension is common among current smokers and associated with many factors. Lifestyle modifications need to be given to reduce the incidence of prehypertension and prevent from progressing to hypertension and cardiovascular disease.

ABSTRAK

Pengenalan : Penyakit kardiovaskular adalah penyebab utama kematian awal dalam kalangan rakyat Malaysia. Prahipertensi dan merokok adalah faktor-faktor risiko kepada penyakit kardiovaskular. Setakat ini tiada lagi kajian dijalankan untuk mengetahui faktor-faktor yang mengaitkan prahipertensi dengan merokok.

Objektif : Untuk menentukan peratusan prahipertensi dan faktor –faktor yang berkaitan di kalangan perokok semasa yang hadir ke Klinik Kesihatan Bandar Kota Bharu.

Metodologi : Sebuah kajian keratan rentas melibatkan 333 perokok semasa yang berumur 18 tahun dan ke atas yang hadir ke Klinik Kesihatan Bandar Kota Bharu pada bulan Januari hingga April 2017. Perokok semasa dipilih menggunakan proses persampelan mudah. Kajian telah dijalankan dengan menggunakan borang kaji selidik yang mengandungi maklumat latar belakang, IPAQ-M, MyNCDs – penilaian diet dan FTND-M serta pengambilan tekanan darah, ukuran berat, tinggi dan lilit pinggang. Data telah dianalisa dengan statistik deskriptif dan regresi logistik .

Keputusan : Umur min (SD) adalah 32.6 (10.3) tahun dan 57.7% (192) daripada perokok semasa mempunyai masalah prahipertensi. Melalui analisa regresi logistik berganda, didapati umur (OR=1.03,95% CI 1.00, 1.05,p=0.020), jisim berat badan (OR=1.1195% CI 1.03,1.20,p=0.006), sejarah darah tinggi dalam keluarga (OR=1,78,95%CI1.04,2.71,p=0.034), diet tidak sihat (OR= 4.48,95% CI 1.88,10.63,p=0.001) dan obesiti pusat (OR=2.68,95% CI 1.22,5.89,p=0.014) adalah faktor-faktor yang mengaitkan prahipertensi dan merokok.

Kesimpulan : Secara amnya, masalah prahipertensi dalam kalangan perokok adalah tinggi dan faktor – faktor yang berkaitan adalah banyak. Pengubahsuaian gaya hidup ke arah cara hidup sihat perlu di terapkan untuk mengurangkan kejadian prahipertensi dan mencegah sebelum menjadi hipertensi dan penyakit kardiovaskular.

CHAPTER ONE : INTRODUCTION

In the era of 21st century, non-communicable diseases (NCD) are one of the important health challenges affecting the population. It is a major cause of human sufferings hence affecting the socio-economic of the inflicted country.

World Health Organization (WHO) had released second global status report on non-communicable disease in 2014. The report showed 38 million deaths out of total 56 million were due to NCDs and the leading cause for that premature death was cardiovascular diseases, (17.5 million deaths, or 46.2% of NCDs death).Furthermore, total number of death due to NCDs are projected to increase to 52 million by year 2030 (WHO, 2014a)

According to Malaysia's 2014 NCD profile that was released from WHO, an estimated 73% of total death in our country were contributed by death from NCD which major cause was cardiovascular diseases. A worrying 35% of this group is premature death of our working population who are individuals aged less than 60 years old (WHO, 2014b).

Data published by the Institute for Public Health on The Second Burden of Disease Study for Malaysia showed that hypertension, smoking, diabetes, high cholesterol and high body mass index (BMI) were the biggest contributors for disability adjusted life-years (DALY) and deaths (MOH, 2015). Furthermore, Framingham Heart Study also reported among the classical factors for cardiovascular diseases were hypertension, hyperlipidaemia, smoking, diabetes mellitus, physical inactivity and obesity (O'Donnell and Elosua, 2008).

JNC defined prehypertension as a systolic blood pressure (SBP) of 120 to 139 mmHg or a diastolic blood pressure (DBP) of 80 to 89 mmHg in adults 18 years and older. Studies have shown that people with prehypertension are at risk for progression towards hypertension and due to the fact that prehypertension itself as an independent cardiovascular disease risk factor (Chobanian *et al.*, 2003).

In Malaysia, the comparison between prehypertension and hypertension is apparent when the data from National Health and Morbidity Survey 2006 (NHMS III) revealed that prehypertension prevails more among our adult population at 37%, higher than prevalence of hypertension which was 32.2% (MOH, 2008). The latest available data reported by Salmiah et al. She noted that the prevalence of prehypertension in Malaysia among public university students was 34.1% (Salmiah *et al.*, 2014).

Cigarette smoking is another well documented risk factor for cardiovascular disease. For the past three decades, smoking related diseases such as cancer and cardiovascular diseases remain the main causes of premature death in Malaysia. Every year, 20 000 Malaysians were killed because of smoking and if this smoking habit does not improve then the figure will increase to 30 000 by the year 2020 (MOH, 2016). In Latest National Health and Morbidity Survey 2015, current smokers amounted to 22.8%, of the respondents and statistic showed a decrease compared to National Health Morbidity Survey in 2011. This means in 2015, there were nearly five million Malaysians aged 15 years and above who smoke (MOH, 2015).

Many had done studies in determining the associated factors for prehypertension among general population. Risk factors including weight, dyslipidaemia and impaired glucose metabolism were observed. In regard to prehypertension, the association between prehypertension and smoking still remain unclear. However, multiple prospective

studies have consistently shown that cigarette smoking is associated with increased risk for hypertension (Dochi *et al.*, 2009; Halperin *et al.*, 2008). By considering smoking itself an independent risk factor for cardiovascular disease and smokers also at risk for hypertension, study on prehypertension among smokers are thus required.

As concurrent risk factors, the risk for cardiovascular disease increased in multiplicative rather than additive fashion (Vander Weg *et al.*, 2008). In view of prehypertension as a precursor for hypertension and an independent risk factor for cardiovascular disease, the same result is expected. So far there are not many studies looking specifically on associated factors for prehypertension among smokers.

We are hoping by doing this study, it will help in in evaluating association of smoking and prehypertension hence recognizing other risk factors that would relate smokers to prehypertension. By knowing the associated factors, early intervention could be taken to prevent them from progressing to hypertension and cardiovascular disease which could spare them the related morbidity and mortality. Studies have shown earlier preventative efforts were effective in delaying or preventing the onset of hypertension (Gupta *et al.*, 2011; Gupta *et al.*, 2010).

CHAPTER TWO: LITERATURE REVIEW

2.1 Prevalence of prehypertension.

Since JNC 7 introduced the new prehypertension classification in 2003, the prevalence of prehypertension and its associated risk factors has been investigated worldwide. The Malaysian Clinical Practice Guidelines Management of Hypertension (4th Edition) has also adopted this definition (MOH, 2014). Multiple studies have shown that prevalence of prehypertension in general population are varied in a very wide range across the countries (Aekplakorn *et al.*, 2008; Wang and Wang, 2004; Xu *et al.*, 2016)

In the US, data collected from 4805 respondents age 18 years and older in the 1999 - 2000 National Health and Nutrition Examination Survey showed 31% of them were prehypertensive (Wang and Wang, 2004). This percentage was almost similar to findings of the same study made in a few other countries whereby it was 33% in Japan (Ishikawa *et al.*, 2008), 32.8% in Netherland (Agyemang *et al.*, 2007), 32.3% in India (Yadav *et al.*, 2008) and 32.8% in Thailand (Aekplakorn *et al.*, 2008). However, a study done in Nigeria showed a high prevalence of prehypertension, at about 58.7% (Isezuo *et al.*, 2011) and the same was in Iran,52.1% (Janghorbani *et al.*, 2008) and China, 54.6 (Yang *et al.*, 2010). However, a stark difference is revealed in a study from Turkey which shown low prevalence of prehypertension, at about 14.5% (Erem *et al.*, 2009).

In Malaysia, the prevalence of prehypertension in adult population aged 18 and above in 2006 was about 37%(MOH, 2008). A study done in 2010 by Hassan and colleague among 290 subjects in Raub, Pahang showed prevalence of prehypertension was 33% (Hassan *et al.*, 2012). On the other hand, a study on cardiovascular risk among

University Malaysia Sarawak undergraduate students showed 42.9 % out of 237 students were prehypertensive (Lee *et al.,* 2010).

2.1.1 Cardiovascular disease and prehypertension

Patients with prehypertension are susceptible to an increased risk for progression to hypertension. Vasan and colleague had demonstrated in the Framingham Heart Study, the high normal BP group (130-139/85-89) conversion rate to hypertension in 4 years was 37% (Vasan *et al.,* 2001). Trial of Preventing Hypertension (TROPHY) study had in fact discovered an even higher conversion rate in which over a period of 4 years, stage 1 hypertension developed in two thirds of untreated prehypertensive patient (Julius *et al.,* 2006).

The relationship between BP vulnerability towards cardiovascular events is continuous, consistent and independent of other risk factors. The chance for myocardial infarction, heart failure, stroke and kidney disease are greater with higher BP level. For individual aged 40 to 70 years, every increment of 20 mmHg in SBP or 10 mmHg in DBP doubles the risk of CVD across the entire BP range from 115/75 to 185/115.It has been shown that almost a third of BP-related deaths from coronary heart disease occur in individuals with SBP between 110 – 139 (Lewington S, 2002).

On top of that, a few studies demonstrated that prehypertension tends to come into cluster with other CVD risk factors such as glucose abnormalities, dyslipidaemia and obesity (Greenlund *et al.,* 2004; Grotto *et al.,* 2006; Kanauchi *et al.,* 2004). Evidence has shown that prehypertension itself is and independent CVD risk factor (Kanauchi *et al.,* 2004; Zhang *et al.,* 2006).

2.2. Cigarette smoking and prehypertension

Multiple studies have approvingly documented cigarette smoking is associated with increased risk of hypertension. Dochi and colleague had conducted a 14 year longitudinal study among Japanese male workers at a steel company between 1991 and 2005. The result was positive on smoking being independently related to the onset of hypertension and systolic hypertension in Japanese male workers (Dochi *et al.*, 2009). Other study by Niskanen et al and Halperin et al resulted in similar association (Halperin *et al.*, 2008; Niskanen *et al.*, 2004).

Multiple factors had been postulated for development of hypertension with cigarette smoking. Research has shown cigarette smoking can stimulate oxidative stress (Burke and FitzGerald, 2003), sympathetic nervous activation (Narkiewicz *et al.*, 1998), vasopressor effect (Barutcu *et al.*, 2004), vascular inflammation and injury (Sharrett *et al.*, 2006), endothelial dysfunction (Li *et al.*, 2005) and increase in arterial stiffness (Narkiewicz *et al.*, 2005). All the aforementioned elements contribute to the aetiology of hypertension (Oparil *et al.*, 2003; Sesso *et al.*, 2003).

Since prehypertension is a precursor for hypertension, the same association of smoking with hypertension was expected. However, studies have shown that the association between smoking and prehypertension still remain unclear. A study in Kunming, China showed heavy smokers was significantly associated with prehypertension (Cheng *et al.*, 2015). However, Gupta V et al (Gupta *et al.*, 2013b) and Grotto et al (Grotto *et al.*, 2006) found no significant association between smoking and prehypertension.

2.2.1 Prehypertension among cigarette smoker

Throughout this literature research, there is not much articles on the study of prehypertension prevalence among cigarette smokers. In the CHPSNE Study by Meng XJ, prevalence of prehypertension among current cigarette smokers in urban adults from 33 communities in China was 32.7% (Meng *et al.*, 2012) similar to a study in Taiwan which showed almost same prevalence, 31.9% (Lin *et al.*, 2010). This shows prevalence of prehypertension among cigarette smokers is not much different in prevalence of prehypertension among general population. Nevertheless, a study among our public university students showed slightly higher prevalence that was 45% (Salmiah *et al.*, 2014).So another study was required to ascertain the prevalence of prehypertension especially among smokers in our population.

2.3 Risk factors for prehypertension

From this literature review, it seems like there was no study found looking into factors that associated with prehypertension among smokers. Most of the studies were looking into associated risk factors for prehypertension in general population.

The risk factors for prehypertension can be classified into two groups of factors, modifiable and non-modifiable. Age, gender, race and history of hypertension in first degree family members are considered non modifiable. Body mass index (BMI), waist circumference (WC), diabetes, dyslipidaemia, dietary factor, physical inactivity, alcohol consumption and smoking characteristic are considered modifiable.

2.3.1 Age

Cross sectional surveys and prospective observational cohort studies have consistently showed a positive relation between age and blood pressure in most populations regardless geographical, cultural and socioeconomic characteristics (WHO, 1996). A study by Meng XJ discovered people aged older than 18-34 years, suffered higher risk of getting prehypertension and the odds of getting prehypertension higher with increasing age (Meng *et al.*, 2012). Esam et al showed mean systolic and diastolic blood pressure increased steadily with increased in age (Esam and Husain).

2.3.2 Gender

Sexual differences in the distribution of prehypertension and hypertension apparently exist. Meta-analysis of 20 cross sectional and 6 longitudinal studies on epidemiology and risk factors for prehypertension showed pool prevalence of prehypertension among males much higher compared to female (Guo *et al.*, 2011). This finding was similar to a study on hypertension in Korea, where the prevalence in men was also higher than women (Jo *et al.*, 2001). Furthermore, Gupta et al demonstrated men have higher prevalence of prehypertension and gender was significantly associated with development of prehypertension and hypertension (Gupta *et al.*, 2013b).

2.3.3 Race

In NHMS 2015, prevalence of hypertension was highest among Other Bumiputras about 33.4%, followed by Indians at 32.4%, Malay at 31.1% and lastly Chinese at 30.8% (MOH, 2015). A study in Singapore that look at risk factors for prehypertension in three

Asian groups produced a different results with prevalence of prehypertension among Malay was highest at about 68.9%, followed by Chinese at 58.9% and lastly Indian at 57.7% (Chiang *et al.*, 2013).

2.3.4 Family history of hypertension

Genetics contribute to the development of prehypertension and hypertension. A study in India among healthy young females showed significant association between family history of hypertension in first degree relatives with prehypertension (Chaudhry *et al.*, 2012). Xu et al also demonstrated subjects with positive family history had higher risk for prehypertension (Xu *et al.*, 2016).

2.3.5 Body Mass Index and Waist Circumference

Higher body mass indices and waist circumferences were found in individuals with prehypertension compared to individuals with normotension, with waist circumferences showed greater relative differences. A meta-analysis of 24 case control studies in China reported that being overweight is an important risk factor for prehypertension (Guo *et al.*, 2011).

From the series of NHMS in our country, overweight, obesity and central obesity showed increasing trend among Malaysians. The prevalence of overweight and obesity among our adult aged ≥ 18 (2006, 2011, 2015) demonstrated 29.1%, 29.4% and 30.0% for overweight and 14.2%, 15.1% and 17.7% for obesity respectively (MOH, 2008; MOH, 2011; MOH, 2015)

The prevalence of central obesity among our adult aged ≥ 18 showed similar increasing trend from 17.4% in 2006 to 48.6% in 2015(MOH, 2008; MOH, 2015). The central obesity prevalence in our population was higher compared to world prevalence. This shows that our adult population are very at risk of prehypertension, looking at the increasing prevalence of overweight, obesity and central obesity in our country.

2.3.6 Dietary factor

American Heart Association has listed specific dietary component with scientific proofs for their effect on blood pressure. Among them are salt and alcohol that increases the BP while potassium and omega -3 fatty acids lower the BP. Other than that, body weight is also strongly related to blood pressure and Dietary Approaches to Stop Hypertension (DASH) and a vegetarian diet are considered to lower the BP (Appel, 2009; Karanja *et al.*, 2007; Pickering, 2006).

WHO STEPwise approach to non-communicable disease risk factor surveillance divided unhealthy diet into two components – low fruit and vegetable intake and diet high in salt (WHO, 2017). Listed below is the table showing the summarized recommendations on diet related lifestyle in lowering blood pressure by JNC 7.

Table 1 : Lifestyle modifications to manage hypertension (Chobanian *et al.*, 2003)

Modification	Recommendation	SBP reduction (mmHg)
Weight reduction	Maintain normal body weight (BMI 18.5 – 24.9kg/m^2)	5 – 20/10kg weight loss

DASH eating plan	Consume a diet rich in fruits, vegetables and low fat dairy products	8 - 14
Dietary sodium reduction	Not more than 2.4g Na/ 6g NaCl	2 - 8
Physical activity	Regular aerobic activity such as brisk walking (at least 30 minutes/day, most days in a week)	4 - 9
Alcohol	≤ 2 units/day (men), ≤ 1 unit/day (women)	2 - 4

2.3.7 Physical activity

Physical inactivity has been identified as a risk factor for raised blood pressure, raised blood sugar and overweight (WHO, 2010). A study on prevalence and risk factors for prehypertension in five Indian cities showed strong associations between sedentary lifestyle and prehypertension (SIngh *et al.*, 2011). In support, a meta-analysis on 35 human clinical training studies demonstrated physical training reduced blood pressure in normotensive people (Kelley and Tran, 1995).

Study also shown hypertensive subjects in aerobic exercise group reduced both SBP and DBP by 4.7mmHg and DBP respectively compared with non-exercise group subjects. Similar study also revealed aerobic exercise more effective than resistance type of exercise like weight lifting (Halbert *et al.*, 1997).

2.3.8 Alcohol consumption

A close association between alcohol consumption and hypertension have been established through epidemiological and experimental investigations. Some studies

have recorded a linear-dose response relationship and other studies showed ingestion of smaller quantities of alcohol may reduce blood pressure (Fuchs *et al.*, 2001; Gillman *et al.*, 1995).

A meta-analysis on alcohol and blood pressure by Lina Chen and colleague showed alcohol intake increased blood pressure even among moderate drinkers (Chen *et al.*, 2008).However, a meta-analysis on prehypertension showed unclear association between alcohol and prehypertension (Guo *et al.*, 2011).

2.3.9 Smoking characteristics

Cigarette smoking caused direct inhalations of nicotine, tar products, nitric oxide-derived free radicals, carbon monoxide and numerous other chemicals. All this chemicals induced promotion of atherogenesis, unfavourably changed lipid profile, increased blood viscosity, alters platelet function, promotes thrombosis and enhance adrenergic activity (Barutcu *et al.*, 2004).

Among the component in cigarette smoke, nicotine is the most studied component. Nicotine is well known addictive substance in cigarette smoke, it also plays a major role in smoking-related increases in cardiac output, heart rate and blood pressure by stimulate the body to produce adrenaline. Due to its addictive qualities, it likely perpetuate exposure to other more detrimental components in cigarette smoke (Ambrose and Barua, 2004).

Inhaled nicotine from cigarette smoking is metabolized to cotinine in liver and finally excreted in urine as the major nicotine metabolite. A study by Alshaarawy and colleague demonstrated second hand smokers with higher levels of serum cotinine were

positively associated with prehypertension independent of cofounders (Alshaarawy *et al.*, 2013).

Studies have reported number of cigarettes smoked per day is associated with hypertension (Cheng *et al.*, 2015; Liu *et al.*, 2013). Liu T and colleague demonstrated that smokers consuming more than 15 cigarettes per day significantly increased the risk for hypertension (Liu *et al.*, 2013). This is supported by a study among male factory workers in Kunming, China showed heavy smoker (> 20 cigarettes/day) is associated with prehypertension and they were more dependent on nicotine than others (Cheng *et al.*, 2015).

A study in Vietnam showed those who had smoked for 30 years or more and those who smoked 20 pack-years or more were at higher risk for hypertension compared to those who never smoke. However, same study also showed current smokers were not at higher risk of hypertension than never smokers (Thuy *et al.*, 2010).

2.3.10 Impaired glucose tolerance and diabetes

A meta-analysis by Guo et al looked into association between fasting plasma glucose and prehypertension found significant association between both (Guo *et al.*, 2011). This was proved by Yadav et al showed subjects with prehypertension had higher prevalence of impaired glucose tolerance and diabetes compared to normotensive subject (Yadav *et al.*, 2008).

Greenlund et al reported that subjects with prehypertension were 1.65 times likely to have one other adverse cardiovascular risk factor (Greenlund *et al.*, 2004). Due to fund limitation, this factor was not included in the study.

2.3.10 Dyslipidaemia

Multiple studies have shown the significant association between dyslipidaemia with prehypertension (Agyemang *et al.*, 2007; Gupta *et al.*, 2013b; Ishikawa *et al.*, 2008). SUNSET study on Dutch population showed higher cholesterol level in prehypertensive subjects and total cholesterol was independently associated with prehypertension (Agyemang *et al.*, 2007).

A meta-analysis on prehypertension showed total cholesterol and LDL-C were significantly associated with prehypertension and HDL-C was shown as a protective factor (Guo *et al.*, 2011). However, it is not included in the study due to limitation of budget.

2.4 Measuring tools and instruments

There are various methods or tools in assessing specific associated factors for prehypertension.

2.4.1 Measurement of blood pressure

Blood pressure should be measured correctly with standard protocols and the common devices used are mercury column sphygmomanometer, electronic devices, aneroid sphygmomanometer and automated ambulatory BP devices. Even though sphygmomanometer is the gold standard, it is gradually being replaced by electronic blood pressure measurement (MOH, 2014). According to American Society of Hypertension and International Society of Hypertension (ASH/ISH), the electronic

device is preferred due to its reproducible results and it is not influenced by variations in technique or bias of the observers (Weber *et al.*, 2014).

In term of frequency in BP taking, different guideline came out with different frequency. Most clinical guidelines recommend averaging ≥ 2 BP measurements on each visit (Handler *et al.*, 2012). Malaysia Clinical Practice Guidelines of Hypertension (4^{th} Edition) follows Canadian recommendations to take three readings in the same arm with later two readings averaged (MOH, 2014). However, JNC 7 and ASH/ISH recommended 2 readings with 1 to 2 minutes apart and use the average of these measurements (Chobanian *et al.*, 2003; Weber *et al.*, 2014). In this study, an electronic device OMRON (HEM – 7203) was used and 2 readings of BP were taken and the average values were taken as final BP.

2.4.2 Physical activity assessment

The goal standard for assessing total energy expenditure is the doubly labelled water method. Due to the expensiveness, high subject burden and time intensive, it is not often used for research studies. Many methods are there in assessing physical activity, the most commonly used are self-report questionnaires due to its cost effectiveness and ease of administration. Others are self-report activity diaries/log, direct observations or usage of devices like accelerometers, pedometers, armbands and heart-rate monitors (Sylvia *et al.*, 2014).

The commonly used self-report questionnaire is International Physical Activity Questionnaire (IPAQ), which is available in a short form or long form. Both forms are available in a number of languages and easily available through the IPAQ website. Both have been tested for reliability and validity in a number of countries (IPAQ, 2017). Chu

and her colleagues has demonstrated good validity and reliability of the Malay International Physical Activity Questionnaire (IPAQ-M) for the evaluation of physical activity (Chu and Moy, 2015).

In this study, the IPAQ-M short form was used in assessing physical activity among the respondents due to cost effectiveness. Moreover it does not require longer time to complete the questionnaire. The IPAQ-M short form also was used in NHMS 2015 to assess our population physical activity (MOH, 2015).

2.4.3 Assessing diet

In measuring an individual's dietary intake, several different approaches have been used. Generally, the methods of dietary assessment involved obtaining observations of a subject food intake by 24-H dietary recall or food record methods or attempts to get average of usual food intake by inquiring about the frequency of consumption. Food frequency questionnaire have been adopted in many studies to minimize day-to-day variation (Bazzano, 2005).

In assessing healthy dietary practice in this study, only the portion of fruits and vegetables intake was assessed. The food frequency questionnaire in Malaysia NCD Surveillance -1 2005/2006 was used. It was adapted from WHO STEPwise approach to non-communicable disease risk factor surveillance (STEPS) 2001 and translated into Malay language to be used in our population (MOH, 2006).

Consuming less than five total servings of fruit and vegetables per day is indicator for unhealthy diet-low fruit and vegetable intake. Our Malaysian Dietary Guidelines 2010 also used the same indicator. The same food frequency questionnaire was used in our

NHMS 2015 in assessing dietary practice plus intake of plain water (MOH, 2015). Salt intake was not assess in this study in view of instrument used not included salt intake component. Furthermore, studies have shown in assessing high salt intake in diet, measurement of 24-hour urinary sodium excretion is the preferred method because of difficulties in estimating sodium intakes using dietary surveys (Brown *et al.*, 2013).

2.4.4 Assessing smoking characteristic through nicotine dependency

Nicotine is the major addictive component in cigarette smoke. After smoking regularly, smokers will have both physical and psychological dependent. Due to this dependency, they have to smoke regularly to avoid the physical and psychological discomfort (Picciotto, 1998). Studies have shown there are associations between smoking and blood pressure due to the components in cigarette (Alshaarawy *et al.*, 2013; Ambrose and Barua, 2004).

To objectively associate the components in cigarette smoke with prehypertension are not feasible in this study. The closest tools to associate cigarette component with prehypertension is The Fagerstrom Test for Nicotine Dependence questionnaire (FTND). It was derived from eight item Fagerstrom Tolerance Questionnaire (Fagerstrom and Schneider, 1989). This questionnaire is commonly used in clinical treatment and research. It is a six items self-report questionnaire, easy to use, feasible, and gives immediate feedback with good sensitivity and specificity (Heatherton *et al.*, 1991).

The Malay Version Of Fagerstrom Test For Nicotine Dependence (FTND-M) was validated and reliable to use in assessing nicotine dependence (HA *et al.*, 2011). In this

study, FTND-M was used to assess nicotine dependence and the details will be explained in methodology segment.

2.5 Rationale of the study

Since JNC 7 introduced prehypertension in new classification of hypertension back in 2003, it generated a widespread interest in this relatively new category. The new classification had merged the previous designated normal and high normal BP level where the patient in this group of BP are now required to do follow up and lifestyle changes(Chobanian *et al.*, 2003). Studies have shown that prehypertensive group of people at risk advancing towards hypertension and also at risk for cardiovascular disease later in life (Julius *et al.*, 2006; Lewington S, 2002; Vasan *et al.*, 2001).

Since 2003, many have studied regarding the prevalence for prehypertension and its associated factors among general population and some had extracted the prevalence of prehypertension among smokers. Studies have shown cigarette smoking is associated with prehypertension and hypertension (Alshaarawy *et al.*, 2013; Dochi *et al.*, 2009) but some did not find any significant association (Grotto *et al.*, 2006; Gupta *et al.*, 2013b).

However, looking at evidence both prehypertension and cigarette smoker are independent risk factors for cardiovascular disease, the risk for cardiovascular disease in cigarette smoker are higher. So far, there was no study looking specifically into associated factors among smoker with prehypertension yet.

According to the latest NHMS 2015, among 5 million adult smokers in our country, most of them were in age group of 35 – 39 years old (MOH, 2015). Looking at the figures, these smokers are at risk for prehypertension and cardiovascular disease later.

Hence this study was done to evaluate what other associated risk factors for them to get prehypertension other than smoking since most of previous studies focusing on general population.

The data and results obtained from this study will be used to improve our management among cigarette smoking patients. By detecting prehypertension among smokers and knowing their associated factors, early interventions and lifestyle modifications can be implemented to reduce their risk from developing cardiovascular events and motivated them to quit smoking and applied healthier lifestyle.

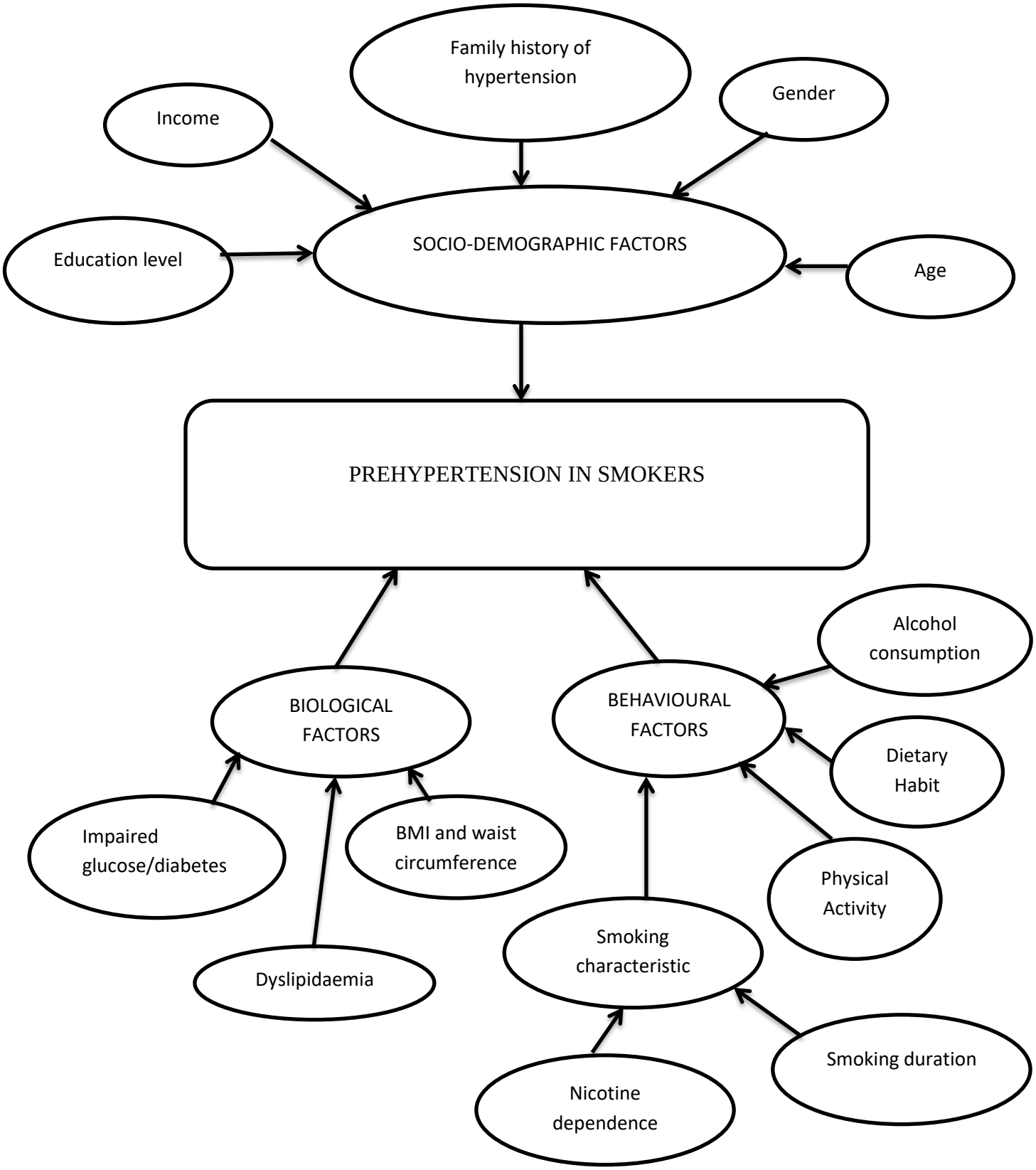

Figure 1: Conceptual framework

CHAPTER THREE: OBJECTIVES AND RESEARCH HYPOTHESIS

3.1 Objectives

3.1.1 General objectives

To determine the prevalence of prehypertension and its associated factors among smokers attended Klinik Kesihatan Bandar Kota Bharu, Kelantan.

3.1.2 Specific objectives

1.To determine the prevalence of prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu.

2.To determine the associated factors for prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu

3.2 Research questions

1. What is the prevalence of prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu?

2.What are the factors which contribute to prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu?

3.3 Research hypothesis

Specific sociodemography and modifiable behavioural factors are associated with prehypertension.

CHAPTER FOUR: METHODOLOGY

4.1 Study design, Operational Area and Timeline

This study is a cross sectional study and conducted from January 2017 to April 2017 at Klinik Kesihatan Bandar Kota Bharu, Kota Bharu, Kelantan. This clinic is located in the center of Kota Bharu district and 400m away from Hospital Raja Perempuan Zainab 2. This clinic is a type 1 health clinic with daily attendance rate of 800 to 1000 patients per day. The clinic opens every day from 7.30am to 9.30pm on working days and 8.00am to 12.00pm during weekend and public holiday. The services covered are out patient, chronic disease and maternal and child health.

4.2 Reference population

The reference population in this study was all smokers in Kota Bharu, Kelantan.

4.2.1 Source population

The source population was all current smokers attending Klinik Kesihatan Bandar Kota Bharu from January 2017 to April 2017.

4.2.2 Sampling Frame

Klinik Kesihatan Bandar Kota Bharu attendees who currently smoke and fulfilled the inclusion and exclusion criteria as stated below:

4.2.2 (a) Inclusion Criteria

1. Age 18 and above

4.2.2 (b) Exclusion Criteria

1. Having hypertension, diabetes mellitus, coronary heart disease, renal disease and stroke
2. Suffered from mental illness
3. Too ill during encounter
4. Currently pregnant

4.3 Sample size calculation

The sample size for objective 1 was calculated by using the single proportion formula and objective 2 was based on comparing two proportions formula using Power and Sample Size software version 3.0.10.

According to the study done by Cheng KW et al in 2012,(Cheng *et al.*, 2015) the prevalence of prehypertension among smokers was 24%. This figure was used for the calculation sample size in objective 1.

Objective 1: To determine the prevalence of prehypertension in smokers attending Klinik Kesihatan Bandar Kota Bharu

By using the single proportion formula, the confidence interval was set at 95% and taking precision as 0.05, the calculated sample size was:

$N = (Z/\Delta)^2 P(1-P)$

n = minimum required sample size

Z = value of standard normal distribution = 1.96

Δ = precision value 0.05

P = proportion of prehypertension among smokers was 0.24

$N = (1.96/0.05)^2\ 0.24(1 - 0.24)$

= 281

When considering non response rate as 10%, the minimal sample size required was 310.

Objective 2 : To determine the associated factors for prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu.

The sample size was calculated by comparing two proportions using Power and Sample Size software version 3.0.10. The indicators required for the calculation was stated below.

n = the required sample size

Power = 0.8

m = ratio between smokers with and without prehypertension

P_0 = the proportion of exposed associated factor without prehypertension in general population (there was no study on associated factors for prehypertension among cigarette smokers found)

P_1 = the proportion of exposed associated factor with prehypertension in smokers

The sample size calculation for associated factors for prehypertension among smokers in this study are shown in the following table.

Table 2 : Sample size calculation based on literature review

Variable	P0	P1	m	Minimal sample
Gender (Xu *et al.*, 2016)	0.26	0.41	1	308
Educational level (Xu *et al.*, 2016)	0.30	0.5	1	186
Family history of hypertension (Meng *et al.*, 2012)	0.28	0.44	1	280
Abdominal obesity (Xu *et al.*, 2016)	0.17	0.35	1	184
Heavy smoker(Cheng *et al.*, 2015)	0.56	0.72	1	280

From sample size calculation above, gender from objective 2 yields the highest sample size. Therefore the required minimum sample was 339 after considering 10% of non response rate.

4.4 Sampling method

Convenient sampling was used in this study. The researcher was aware about the limitation of this sampling method however this was applied in view of limited time frame and the respondents involved in this study include the registered and unregistered attendees to Klinik Kesihatan Bandar Kota Bharu.

4.5 Research tools

The case report form consist of questionnaires for patient to answer and details of weight, height and blood pressure measurements by researcher. (Appendix 1)

- Part A : The socio-demographic background of the respondents
- Part B : Assessment on physical activity which was adapted from IPAQ-M short form
- Part C : Assessment on dietary habit which was adapted from Malaysia NCD Surveillance-1 2005/2006
- Part D : Assessment on smoking behaviour by using FTND-M
- Part E : Physical measurements consist of BP, height, weight and waist circumference

4.5.1 Part A : Socio-demographic data

The first part of questionnaire consist data about gender, age, race, marital status, level of education, monthly income, family history of hypertension, past medical illness, duration of smoking and alcohol consumption.

4.5.2 Part B : Physical activity assessment(IPAQ-M)(IPAQ, 2017)

Physical activity of respondent was assessed by using the Malay validated International Physical Activity Questionnaire (IPAQ-M). It was designed primarily for population surveillance of physical activity among adults aged 18 – 69 years old. This instrument assesses three specific types of physical activity undertaken during leisure time,

domestic and gardening activities, work related and transport related activity and sitting for the past seven days. The three specific types of activity are walking, moderate intensity and vigorous intensity. There are total of seven questions in this instrument. Question 1 and 2 are on number of days and duration involved in vigorous physical activity. The activity considered vigorous if it required a lot of physical effort and make breathing much harder than usual. The examples of vigorous activities are heavy lifting, aerobic exercises or fast cycling. Question 3 and 4 are on number of days and duration involved in moderate physical activity. The activity considered moderate if it required moderate physical effort and breathing somewhat harder than usual. The examples of moderate physical activities are mopping floor, cycling bicycle at normal pace or playing badminton in double. Question 5 and 6 are on number of days and duration on walking. Question 7 is asking duration of time spent sitting in a day during normal working day. The duration of each three specific types of activity must be at least 10 minutes, if the responses are less than 10 minutes, it was recode as zero.

The respondents were considered not active physically if their activity pattern was less than 'moderate'. The following criteria was classified as moderate:

a) 3 or more days of vigorous-intensity activity of at least 20 minutes per day or
b) 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day or
c) 5 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600-MET-minutes/week

4.5.3 Part C : Dietary assessment (MOH, 2006)

For the assessment of healthy diet, the Malay version of dietary component from Malaysia NCD Surveillance-1 2005/2006 (MyNCDS-1) was used. It was adopted from WHO STEPwise approach to chronic disease risk factor surveillance (STEPS).The questions assess the intake of servings of fruits and/or vegetables per day. There are four questions in the instrument. First question (Q1) is enquiring about number of days eating fruit in a typical week and Q2 is about number of servings of fruit intake in a day. Q3 is asking about number of days eating vegetables in a typical week and Q4 is clarifying the number of servings of vegetable intake in a day. The subjects were considered unhealthy diet if inadequate intake of fruits and vegetables if it less than five total servings per day. Intake of fruit and vegetables referred to all kinds of fruit and vegetables taken at meal times or as snacks. A medium size of fruit, a cup of raw green leafy vegetables and half cup of cooked vegetables are considered one serving. A template for common fruits and vegetables was included in questionnaire.

4.5.4 Part D : Fagerstrom Test for Nicotine Dependence(FTND)-Malay validated (HA *et al.*, 2011)

There are six questions in FTND about smoking behaviour. The first question (Q1) is assessing the time of the first cigarette after waking up in the morning. Q2 is asking about the difficulty to refrain from smoking in the smoking forbidden places. Q3 is regarding the hardest cigarette to give up in a day. Q4 is about the amount of cigarettes smoked in a day. Q5 is the ability to smoke less during the first hours after waking up compared to the rest of the day and Q6 is asking about the ability to stop smoking in case of sickness. Based on the answers given, a score between 0 to 10 is obtained, with

higher scores indicating stronger dependence to nicotine. If the score is less than 4, subject is considered minimally dependent. If the score is between 4 to 6, subject is considered moderately dependent and if the score is 7 to 10, subject is considered highly dependent.

4.5.5 Part E : Physical measurements (WHO, 2017)

4.5.5 (a) Blood Pressure

The measurements obtained by using a digital automatic blood pressure monitor, OMRON (HEM-7203) with appropriate cuffs size with the subjects. The subjects were in sitting position with the back supported, both feet on the floor and right arm supported on the table. During the measurements, the subject was advised not to talk. Two measurements were taken with 30 seconds to 1 minute apart on the same arm and the averaged value of that two readings were used in the analysis.

4.5.5 (b) Weight and height

Each participant weight and height were measured to get body mass index(BMI) by using a standardized protocol. To measure the height, the SECA stadiometer was used. Before measuring the height, subjects were asked to remove their foot wears. They were asked to stand with feet together and heels against the back board, eyes looking straight ahead and same level as the ears. Height will be measured to nearest 0.5cm.

For weight measurement, a SECA scale was used. The scale was put on a firm and flat surface. Before measuring the weight, the subjects was asked to remove the shoes, bags

if any and empty out their pockets of mobiles, keys and wallets. They were asked to stand still, face forward and both arms on the side. Weight was measured with a lever balance to the nearest 100g.

4.5.5 (c) Waist circumference

It was measured using a measuring tape directly over the skin. The measurer sat by the side of the subject and fits the measuring tape snugly but not compressing soft tissues at the midpoint between the lower margin of the last palpable rib and the iliac crest. The The circumference was measured to the nearest 0.1cm.

4.6 Ethical approval

The study protocol was cleared by Human Reseach Ethics Committee USM (HREC) on 2nd August 2016. The approval for the study from Medical Research and Ethics Committee was applied and approved. (NMRR-16-2589-33491 (IIR).

(Appendix 2 and 3)

4.7 Data Collection Procedures

The attendees to Klinik Kesihatan Bandar Kota Bharu were conveniently screened for smoking status. The cigarette smokers were invited to join the study if they fulfilled the inclusion and exclusion criteria. If they verbally consented to join the study, the subjects were brought to the consultation room and given patient information sheet and signed the consent forms.(Appendix 4). After that, the subjects were given questionnaire as

mentioned in research tools to fill up. After complete filling up the questionnaire, the blood pressures were measured and the second BP measurements were repeated after 30 seconds to 1 minute rest. Then, the subjects were measured for height, weight and waist circumference. All the measurements procedure followed the standard stated in physical measurements above. Once finished, the subjects were informed about the findings and subjects with abnormal findings were referred for further managements and follow up.

4.8 Data Entry and Analysis

Total number of subjects recruited for this study was 339, however only 333 subjects completed the questionnaire. The data entry and analysis of 333 subjects were performed by using Statistical Package for the Social Sciences (SPSS) Statistic version 22. Prior to analysis, data were checked, explored and cleaned. The distribution and frequencies were examined. All numerical variables were expressed as mean and standard deviation (SD) while categorical variables in frequency and percentage (%). The numerical variables include :

1) Age of subjects
2) Income of subjects
3) Duration of smoking
4) BMI
5) Fagerstrom score

The categorical variables include:

1) Gender
2) Race

3) Marital status
4) Education level
5) Family history of hypertension
6) Alcohol consumption
7) Physically active
8) Healthy diet
9) Central obesity

The dependent variable in this study was prehypertension.

Simple logistic regression was used to screen the variables for further step of analysis. It was then followed with multiple logistic regression analysis for variables with p-value of less than 0.25 and factors that have clinical significant. Then, the selected variables were analysed with backward and forward stepwise method to come out with preliminary model. The inclusion of variables in the preliminary model was based on the p value of less than 0.05. Then, the model were checked for multicollinearity and interaction. Finally, the fitness of the final model was checked using the Hosmer-Lemeshow test, the classification table and the Reciever Operating Characteristic (ROC) curve for final model adequacy.

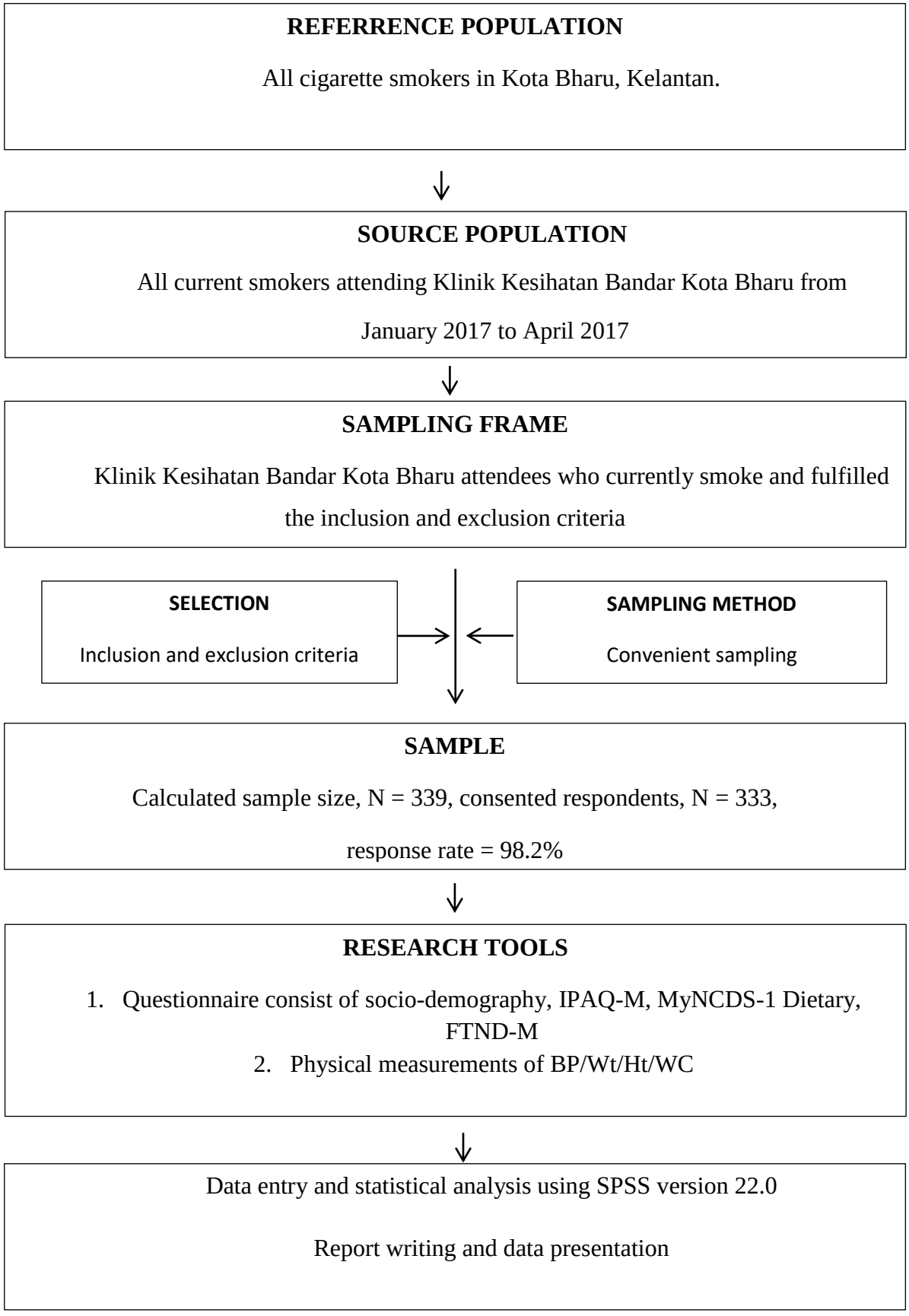

Figure 2: Flowchart of the study

4.9 Operational Definitions

1. Current smoker is defined as adult who have smoked 100 cigarettes in their lifetime and currently smoke cigarettes every day or some days (CDC, 2009).
2. Prehypertension is defined as systolic blood pressure from 120 to 139mmHg or diastolic blood pressure from 80 to 89mmHg (Chobanian *et al.*, 2003).
3. Race is classified into Malay and Others (Indian, Chinese and other races).
4. Marital status is defined as current status of respondent. It was classified into unmarried, married, widow and divorcee. It was collapsed into married or single during analysis. The respondent who is never married, widow or divorcee was considered as single.
5. Tertiary education level is defined as any formal education after secondary school. For analysis purpose, education level categorised into lower or high. Lower will comprised of primary and secondary level and high referred to tertiary level of education.
6. Family history of hypertension is defined as any parent or sibling of respondent having hypertension.
7. Body mass index (BMI) is defined as the weight in kilograms divided by the square of height in meters (kg/m^2). It was categorised based on Malaysian Clinical Practice Guidelines of Obesity, 2004. Underweight (BMI < 18.5), Normal(BMI 18.5 – 22.9), Overweight (23 – 27.49), Obese (≥27.5) (MOH, 2003). For statistical analysis with simple logistic regression and multiple logistic regression, the numerical data was used.

8. Central obesity is defined as waist circumference measurement 90cm or more for male and 80cm or more for female based on International Diabetes Institute/Western Pacific World Health Organization/International Association for the study of Obesity/International Obesity Task Force 2000 (MOH, 2015)
9. Physical inactivity is determined from validated Malay version of International Physical Activity Questionnaire (IPAQ) short form.

   The respondents were considered physically inactive if the pattern of activity is less than 'moderate'.

   The pattern of activity to be classified as 'moderate' if

   a) 3 or more days of vigorous-intensity activity of at least 20 minutes per day or
   b) 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day or
   c) 5 or more days of any combination of walking,moderate-intensity or vigorous-intensity activities achieving a minimum total physical activity of at least 600METS-minutes/week (IPAQ, 2017).
10. Unhealthy diet (low fruit and vegetable) is defined as not achieved dietary target total intake of fruits and vegetable 5 servings of per day (MOH, 2006)
11. Fagerstrom score was derived from FTND-M questionnaire, whereby the score was expressed from 0 to 10. The higher the number reflex higher nicotine dependency. The three severity for nicotine dependency are low if the score 0 -3, 4 to 6 signified moderate and 7 to 10 signified severe. For logistic regression and multiple logistic regression statistical analysis, the numerical data was used (HA *et al.*, 2011)

CHAPTER 5 : RESULTS

5.1 Overview of study respondents

A total 333 of 339 cigarette smokers attending Klinik Kesihatan Bandar Kota completed the questionnaire with a response rate 98.2%. Other 6 respondents were unable to complete the questionnaire due to being called for consultation (n=4) and were in hurry to go back.

5.2 Prevalence of prehytension and characteristics of respondents (n=333)

The prevalence of prehypertension among smokers was 57.7% (n=192) and Table 3 shows the characteristic of respondents. All the respondents were male and did not consume alcohol. Table 3 showed the characteristics of the respondents. The mean (SD) age of respondents was 32.6 (10.3) with the minimum age was 18 years old and and maximum age was 62 years old. Majority of them were Malay (95.8), with more than half (57.1%) were married. The mean (SD) years of smoking among respondents in prehypertensive group 15.6 (8.8) with mean (SD) Fagerstrom score was 2.7 (2.4) which is translated into low dependency to nicotine. Mean (SD) BMI of respondents was 23.7 (4.8) ,with half of the respondents were overweight and obese with majority of them not eating enough fruits and vegetables. Among the overweight and obese respondents, 69% and 78% respectively, belong in the prehypertensive group. More than 60% of respondents in prehypertensive group had positive family history of hypertension in first degree relatives.

Table 3 : Characteristics of respondents

Characteristics	Total (n=333)	Normotension (n =141)	Prehypertension (n=192)
	n (%)	n (%)	n (%)
Age (years)[a]	32.6 (10.3)	30.6 (9.4)	34.1 (10.7)
Income (RM)[a]	1414.6 (1087.6)	1361.6 (1018.8)	1361.6 (1018.8)
Smoking duration (years)[a]	14.4 (9.0)	12.9 (9.1)	15.6 (8.8)
Fagerstrom score [a]	2.59 (2.3)	2.5 (2.0)	2.7 (2.4)
BMI (kg/m²)[a]	23.7 (4.8)	21.9 (4.4)	25.0 (4.8)
Race			
Malay	319 (95.8)	136(42.6)	183(57.4)
Others	14 (4.2)	5 (35.7)	9 (64.3)
Marital status			
Single	142 (42.9)	70(49.0)	73(51.0)
Married	190 (57.1)	71(37.4	119(62.6)
Level education			
Low	232 (69.7)	95(40.9)	137(59.1)
High	101 (30.3)	46(45.5)	55 (54.5)
Family history hypertension			
No	172 (51.7)	84(48.8)	88(51.2)
Yes	161 (48.3)	57(35.4)	104(64.6)
Physical inactive			
No	120 (36.0)	95(44.6)	118(55.4)
Yes	213 (64.0)	46(38.3)	74(61.7)
Unhealthy diet			
No	34 (10.2)	19(55.9)	15(44.1)
Yes	299 (89.8)	122(40.8)	177(59.2)
Central obesity			
No	231 (69.4)	121(52.4)	110(47.6)
Yes	102 (30.6)	20 (19.6)	20 (19.6)

[a] The variables are expressed as mean (SD)

5.3 Associated factors for prehypertension

There were 14 variables intended for exploration of associated factor. However, the variable sex and alcohol was not suitable to be included due to the inavailability of the sample. Twelve variables were proceded with simple logistic regression. Table 4 shows the findings of associated factors for prehypertension using simple logistic regression.

All clinically and statistically significant variables were included for multiple logistic regression analysis.

Based on multiple logistic regression, five variables, namely, age (p=0.020), family history of hypertension (p=0.034), unhealthy diet (p=0.001), BMI (p=0.006) and central obesity (p=0.014) were significantly associated with prehypertension as shown in Table 5.

Table 4: Associated factors for prehypertension among cigarette smokers by Simple Logistic Regression

Variables	Regression coefficient (b)	Crude odds ratio (95% CI)	Wald statistic	p-value
Age (years)	0.03	1.04 (1.01, 1.06)	9.4	0.002
Income (RM)	0.00	1.00 (1.00, 1.00)	0.6	0.446
Smoking duration (years)	0.03	1.04 (1.01, 1.06)	6.9	0.008
Fagerstrom score	0.05	1.05 (0.95, 1.15)	0.94	0.332
BMI	0.16	1.17 (1.11, 1.24)	30.8	<0.001
Race				
Malay		1		
Others	0.29	1.34 (0.43, 4.08)	0.26	0.609
Marital status				
Single		1		
Married	0.47	1.61 (1.03,2.49)	4.46	0.035
Family history hypertension				
No		1		
Yes	0.55	1.74 (1.12, 2.70)	6.10	0.013
Education level				
Low		1		
High	-0.18	0.83 (0.52, 1.32)	0.61	0.435
Physical inactivity				
No		1		
Yes	0.26	1.29 (0.82, 2.04)	1.23	0.267
Unhealthy diet				
No		1		
Yes	0.61	1.84 (0.89, 3.76)	2.78	0.095
Central obesity				
No		1		
Yes	1.51	4.51(2.59,7.83)	28.5	<0.001

Model assessment shows that there was no multicollinearity problem and significant interaction terms. Hosmer-Lemeshow test with p-value (0.632), the overall correctly classified percentage from classification table (69.4%) and the area under the ROC curve was 0.749 (95% CI 0.70,0.80) showed that the model was fit. Therefore final model in Table 7 was fit for interpretation.

Table 5 : Associated factors for prehypertension among cigarette smokers by Multiple Logistic Regression

Characteristic	Regression coefficient (b)	Adjusted odds ratio[a] (95% CI)	Wald statistic	p-value
Age (years)	0.03	1.03 (1.00, 1.05)	5.42	0.020
BMI (kg/m²)	0.11	1.11 (1.03,1.20)	7.63	0.006
Family history hypertension				
No	0	1		
Yes	0.52	1.68 (1.04, 2.71)	4.47	0.034
Unhealthy diet				
No	0	1		
Yes	1.50	4.48 (1.88, 10.63)	11.57	0.001
Central obesity				
No	0	1		
Yes	0.99	2.68 (1.22,5.89)	6.05	0.014

[a] Forward LR Multiple Logistic Regression model was used for final model. Multicollinearity and interaction terms were checked and not found. Hosmer-Lemeshow test, (p=0.632), classification table (overall correctly classified percentage=69.4%), and area under the ROC curve (74.9%) were applied to check the model fitness.

5.6 Interpretation of significant results

1. The adjusted OR for age was 1.03 (95% CI 1.00, 1.05,p=0.020). For every one year increase in age, there will be 1.03 times at odds of prehypertension compare to normotension

2. The adjusted OR for BMI was 1.1 times (95% CI 1.03,1.20,p=0.006). For every one kg/m² increase in BMI, there will be 1.11 times at odds of prehypertension compare to normotension

3. The adjusted OR for prehypertension versus normotension for positive family history of hypertension in first degree relatives was 1.7 times (95% CI 1.04,2.71,p=0.034) .There was 1.7 times at the odds family history of hypertension compared to no family history of hypertension

4. The adjusted OR for prehypertension versus normotension for low intake of fruits and vegetables was 4.5 times (95% CI 1.88,10.63,p=0.001). There was 1.7 times at the odds low intake of fruits and vegetables compared to enough intake of fruits and vegetables

5. The adjusted OR for prehypertension versus normotension for central obesity was 2.7 times (95% CI 1.22,5.89,p=0.014). There was 2.68 times at the odds central obesity compared to without central obesity after adjusting for other variables among smokers attending Klinik Kesihatan Bandar Kota Bharu.

CHAPTER 6 : DISCUSSION

Non communicable disease and specifically cardiovascular disease is currently the top silent killer in human population worldwide and locally. Our local and WHO statistic have shown that the trend is becoming worrying since it shows uprising every year. Prehypertension is currently recognised as potential and proven entity in contributing to the development of cardiovascular disease (Chobanian *et al.*, 2003). On the other hand, the effect of smoking on cardiovascular disease already established for a much longer time (Ambrose and Barua, 2004).

Hence, cigarette smokers with prehypertension are exposed to bigger risk for cardiovascular disease. In knowing what are associated factors for smokers to get prehypertension, a timely intervention can be implemented and prevent them from getting prehypertension and subsequently hypertension.

6.1 Socio-demographic background of study respondents

From a few series of NHMS, the national prevalence of current cigarette smokers in adult age 18 and above remained at about 25% since 2011 and 2015. Number of cigarette smokers among adolescents are getting higher whereby every 1 in 10 Malaysians in the age group 13 -17 years old, were smokers (Wee *et al.*, 2016). In 2015, the estimated current smokers among Kelantanese was about 280 000 people or 24.6% out of total population in Kelantan (MOH, 2015) . So, this study only covered a fraction of current smokers in Kelantan.

As shown in the results, all of respondents were male and NHMS 2015 showed number of male smokers were 30 times higher than female smokers (MOH, 2015) and a study had shown being male significantly associated with tobacco used (Wee *et al.*, 2016).

The age range of current smokers in this study were from 18 years old to 62 years old with mean (SD) age in prehypertension group slightly older, 34.1 (10.7), compared to mean (SD) age in normotensive group, 30.6 (9.4), 64% of prehypertension group were married and about 70% of them completed secondary school with mean (SD) income RM1453.6 (1136.5) monthly, showing most of our respondents were above poverty level (JPM, 2017).

Generally, the background findings of our respondents not differ much from national findings of currents cigarette smokers in Malaysia (MOH, 2015). Mean years of smoking duration among respondents in prehypertensive group was 15.6 (±SD), slightly longer duration than normotensive group. However, smoking duration in our respondents slightly shorter compared to a study done previously in Kelantan shown much longer duration, 23.9 years (Wee *et al.*, 2016).

Among the respondents, 64% of them are physically active, similar with finding among our national population about 66.5%. However, almost 90% of our overall respondents not practising healthy dietary habit as their intake of fruits and vegetables were less than 5 servings per day similar with national statistic among general population (MOH, 2015). Respondents in prehypertensive group slightly higher proportion at 59.2% compared to normotensive group at 40.8% in inadequate intake of fruits and vegetables.

Physical characteristic of our respondents were slightly in overweight category, with mean (SD) BMI was 23.7 (4.8) and 30% of them had central obesity. The mean (SD) SBP in our respondents was 120.9 (10.3) and mean (SD) DBP was 74.1 (7.5). A study in Japan among 3432 cigarette smokers shown almost similar findings, mean (SD) BMI 22.8 (2.8), mean (SD) SBP was 120.9 (10.6) and mean (SD) was DBP 73.8 (8.0)(Dochi *et al.*, 2009). Both findings of SBP among cigarette smokers were in prehypertensive range.

6.2 Prevalence of prehypertension among current smokers attending Klinik Kesihatan Bandar Kota Bahru.

In this study, we found that 192 out of 333 (55.7%) current smokers attending Klinik Bandar Kota Bharu had their blood pressure within prehypertensive range with mean (SD) SBP was 127.4 mmHg (7.8) and mean (SD) DBP was 77.9 mmHg (6.6).

In Malaysia, there was not much data for comparison on prevalence of prehypertension. The latest data was from a study among under graduate students in public university done in 2013 shown prevalence prehypertension among cigarette smoking students was 45%.The figure slightly lower compared to our findings.

However that study was done among younger population with their age range from 18 to 26 years old and the number of respondents whom smoked were 40 students only from 495 students involved in the study (Salmiah *et al.*, 2014). This could explained why the prevalence higher because our respondents were in older age group, mean (SD) age was 32.8 (10.7).

A study in Singapore showed prevalence of prehypertension among Malay smoker were 30.4% (Chiang *et al.*, 2013) and a study done in rural Indonesia among young adults age 18 – 25 years old attended a primary health care, showed 15.8% out of total prehypertensive patients were smokers (82) Both of these results showed lower prevalence could be due to different in target population studied. However, a study among male Japanese steel worker showed higher prevalence. Among 3972 prehypertensive workers, 51.1% of them were smokers (14).

Table below summarizes other prevalence of prehypertension in other countries. Most of the studies done on general population, not specifically on smokers. The different in target group and study population, race, age and lifestyle might be the reason for variation in prevalence.

Table 6 : Comparison prevalence prehypertension among smokers between this study and previous studies

Author (year)	Place of study	Population	Prevalence
Balami et al., (2013)	Public universities in Malaysia	Undergraduate students	45%
Chiang PP et al., (2013)	South Western of Singapore	Malay Ethnic	30.4%
Widjaja et al., (2013)	Sukabumi District, West Java	Younger adults age 18 -25 years old	15.8%
Gupta et al., (2010)	Whole Cambodia	General population	32.5%
Xu et al., (2016)	Whole China	General population	39.9%

Ishikawa et al., (2008)	12 rural districts	General population	51.1%
Singh et al., (2011)	5 Indian Cities	General Population	30.5%

6.3 Associated factors for prehypertension among smokers

Besides knowing the prevalence of prehypertension, we aim to know the associated factors for them to develop prehypertension. From multiple logistic regression analysis, there were five factors noted to have significant association with prehypertension among smokers. There were age, BMI, family history of hypertension, inadequate intake of fruits and vegetables and presence of central obesity. Physical inactivity, smoking characteristics and certain socio-demography aspects show no significant association with prehypertension.

6.3.1 Age

From the study noted that with increasing age, cigarette smokers exposed to development of prehypertension (OR=1, 95% CI 1.00,1.05,p=0.020). The finding of significant association between age and prehypertension were demonstrated in other studies(Meng *et al.*, 2012; SIngh *et al.*, 2011; Xu *et al.*, 2016). Study by Vinay Gupta among Cambodian adult in age group 25 – 64 years old revealed age the most significant factor for developing prehypertension and the magnitude of the odd ratio being consistently greater in correlating with the development of hypertension(Gupta *et*

al., 2013b). Esam et al shown both mean SBP and DBP increased steadily with the increase in age (Esam and Husain).

Midha T et al study also showed significant association between blood pressure and age with mean SBP increased steadily with age but for DBP increment up to 60 years resulted in wide pulse pressure pressure (Midha *et al.*, 2009).The changes of blood pressure with age might be due to changes in vascular system. Increasing age is associated with loss of arterial elasticity which reduced arterial compliance (B. Jani, 2006). Cigarette smokers should be advised to come for regular scheduled medical checked up.

6.3.2 Body mass index

This study had shown with increasing BMI, higher the odds to develop prehypertension (OR=1.1, CI 95% 1.03,1.20,p=0.006). The significant finding of BMI association with prehypertension consistent with findings from other studies (Gupta *et al.*, 2013b; Xu *et al.*, 2016; Yang *et al.*, 2010). A study among our public university undergraduates had demonstrated that overweight and obese were almost 6 times and 11 times respectively, likely to have prehypertension compared to underweight (Salmiah *et al.*, 2014).

A study in Singapore among three ethnics demonstrated BMI were significantly associated with prehypertension with Chinese (OR= 1.42,CI 95% 1.1,1.8), Malay (OR=1.53 CI 95% 1.05,2.24) and Indians (OR=1.49, CI 95% 1.13,1.98) (Chiang *et al.*, 2013). Grotto et al suggested obesity was a major determinant of prehypertension after controlling other risk (Grotto *et al.*, 2006). A meta-analysis revealed higher body mass

associated with prehypertension and with some weight reduction can give some effect of lowering blood pressure(Guo *et al.*, 2011)

A study by Kawamoto and colleague examined the association between body weight status and prehypertension. It revealed increasing BMI categories, higher odds for a person to get prehypertension, from 1.9 in BMI category of 21 – 24 kgm2 to 3.79 in the ≥ 25 kg/m²(Kawamoto *et al.*, 2008). Another study also revealed a close association between continuous variables of BMI with blood pressure and with certain weight reduction can reduced the blood pressure (Jones, 1996). Among documented factors linking obesity to increased blood pressure include dietary factor, metabolic, sodium retention and neuroendocrine imbalances (DeMarco, 2014). Cigarette smokers beyond optimal BMI should be advised for weight reduction.

6.3.3 Family history of hypertension

History of hypertension among first degree relatives was another significant finding noted from this study. Those with positive family history had 1.7 higher odds for prehypertension compared to none.(CI 95% 1.04,2.71,p=0.034).This finding was supported from other study among 4200 employees in China showed 35% among prehypertensive had positive family history of hypertension. The results of analysis showed individuals with positive family history had greater risk of prehypertension and hypertension than those without after adjusting the confounders (Shen *et al.*, 2017).

Another study also shown those with positive family history of hypertension had two times higher in getting prehypertension(Salmiah *et al.*, 2014).. A study in Indonesia

differentiated family history into maternal or paternal side and showed significant finding in positive family history from maternal side compared to paternal (Widjaja *et al.,* 2013). Literature from familial and twin studies has shown 30% -50 % of blood pressure reading due to genetic heritability and environmental factor contribute about 50% (Butler, 2010)

Another study demonstrated having both parents diagnosed with hypertension before the age 55 years old , gave 6.2 times higher for the development of hypertension (Wang *et al.*, 2008). The importance of knowing family medical history should be emphasized on our patient and whom with positive family history should do regular health screening.

6.3.4 Unhealthy diet – inadequate intake of fruits and vegetables

Those with inadequate intake of fruits and vegetables less than five times per day had 4.5 times higher odds for prehypertension (CI 95%1.88,10.63, p=0.001). A study by Li et al showed significant association between elevated diet score and prehypertension. However in this study, they assessed both meat and vegetable consumption in a week. Higher diet score showed higher meat and lower vegetable intake (Li *et al.*, 2014). The well-known DASH diet have shown to reduce blood pressure ((Appel, 2009; Karanja *et al.*, 2007).

However the limitation in this study was dietary salt intake was not assess, however a study in India also showed positive association between prehypertension with low intake of vegetables. The same method for dietary assessment was used just based on vegetable servings without salt intake assessment (Gupta *et al.*, 2013a). Fruits and

vegetables content dietary nutrient like antioxidants, potassium and folic acid in fruits and vegetables give protective effect toward blood pressure and cardiovascular disease (Bazzano *et al.*, 2002) From meta-analysis on food and vegetable consumption with hypertension also showed food and vegetable have inversed relationship with risk for high blood pressure (Li *et al.*, 2016). The patient should be advised on adequate intake of fruits and vegetables with reduced used of salt in daily meal plan.

6.3.5 Central obesity

The findings from this study showed smokers with central obesity were 2.7 times the odds to have prehypertension.(95% CI 1.22,5.89,p=0.014). A study in Cambodia by Gupta and colleague showed central obesity was significantly associated with prehypertension with OR 1.97 (CI 95% 1.54,2.51)(Gupta *et al.*, 2013b). A study in 33 communities in China showed respondents with abdominal obesity had higher SBP (137± 22.7) and DBP (86.4±12.1) compared to those without abdominal obesity (Deng *et al.*, 2013).

A study on almost 7000 subjects from 5 cities in India, showed central obesity was strongly associated with prehypertension in both male (OR=1.22 CI 95% 1.14,1.23) and female (OR=1.19 CI 95% 1.14,1.23)(SIngh *et al.*, 2011). Central obesity was linked to high blood pressure by activation of chronic inflammation from increasing visceral adipose tissue accumulation whereby the same process also commonly associated with hypertension(Chiang *et al.*, 2013). The other important implication of central obesity is in relation to metabolic syndrome. Study have shown that smoking increased risk for

prediabetes development (Aeschbachera *et al.*, 2014) Hence, smokers with abdominal obesity should be screened for metabolic syndrome.

6.3.6 Physical inactivity

Finding from this study showed no significant association between physical inactivity and prehypertension (OD=1.29,CI 95% 0.82,2.04,p=0.267). The study among undergraduate students with the same tool used in our study for physical activity assessment showed no significant association between physical activity with prehypertension even with moderate physical activity (OR=1.2, CI 95%) 0.77,2.78, p=0.467) (Salmiah *et al.*, 2014).

The study in Indonesia also used same assessment tool as our study, showed an association between physical activity but not significant (OR=2.6,CI 95% 0.98,6.93,p=0.052) (Widjaja *et al.*, 2013). However , a study in India with different assessment tool showed sedentary life style significantly associated with hypertension for both sex, female (OR=1.57,CI95% 1.32,1.85) and male (OR=1.59, CI95%1.33,1.88) (SIngh *et al.*, 2011).

The different in results could be due to different instruments used in assessment of physical activity since recent data from prospective study still showed exercise interventions have effect on blood pressure among normotensives and prehypertensives (Diaz and Shimbo, 2013). On the other hand, IPAQ-SF still recommended to use in clinical and research for outcome measure (Shamsuddin *et al.*, 2015; Silsbury *et al.*, 2015). Possibility of over estimation by respondents in assessing self-physical activity

gave the different results. Therefore, regular physical activity as recommended by guideline should be advised to patient.

6.3.7 Smoking characteristic

In this study, smoking characteristic was assessed by the duration of smoking and nicotine dependency through FTND-M questionnaire. For smoking duration, mean (SD) years of smoking among prehypertensive group was 15.6 (8.8). During earlier analysis using simple logistic regression showed significant association, crude OR 1.04(SD 1.01,1.06, p=0.008), but after analysis using multiple logistic regression, there was no significant association seen.

Mean (SD) Fagerstrom score among our prehypertensive group was 2.7(2.4), which was not much different from non-hypertensive group, 2.5(2.0) indicated low dependency to nicotine. The variable was not significant even with simple logistic regression (OR=1.34 ,CI 95% 0.43, 4.08, p=0.609).

Based on a population based study among 910 cigarette smokers in Vietnam looking for association between smoking and hypertension ,both lifetime smoking duration and intensity (pack-years) were associated with hypertension after adjusted other factors (BMI and alcohol). However the duration of smoking > 30years and >20 pack-years showed the significant association for hypertension (Thuy *et al.*, 2010).

Compare to this study, the mean duration of smoking among our respondent was 15.6 and mean fagerstrom 2.7 (low dependency), this could explained the finding of no

significant association found between smoking characteristic with hypertension. The same study also demonstrated current smokers not significantly associated with hypertension, but looking at the mean SBP and DBP among current smokers were in prehypertensive range (Thuy *et al.*, 2010) Another study in Kunming, China among male factory workers showed heavy smokers associated with prehypertension and more dependent on nicotine. Heavy smokers here classified as smoked >20 cigarettes day (Cheng *et al.*, 2015). From these two studies, smokers at risk for prehypertensive if the cigarettes smoked > 20 and life time duration >30 years.

6.3.8 Socio-demographic factor

The socio-demographic factors that were look in for association were race, level of education, monthly income and marital status. From simple logistic regression only being married showed association with prehypertension (crude OR=1.61,CI 95% 1.03, 2.49), however the association was not significant after multiple logistic regression analysis. Meanwhile other factors did not show association with prehypertension. Similar findings were noted in these study (Gupta *et al.*, 2013b; Yang *et al.*, 2010).

A study in Singapore showed lower education positively associated with prehypertension (Chiang *et al.*, 2013), this was supported by finding from Xu et al showed higher educational level was protective factor for prehypertension (Xu *et al.*, 2016).The different categorization for educational level here might explained the opposite findings. The study in Singapore classified into primary and below as one group and secondary and high as second group. Meanwhile, study in China classified

into three categories, illiterate and primary as one group, high school as one group and university in one group.

6.4 Limitation of the study

Through out the process in carrying out this study, all efforts had been made to ensure valid data and reliable results were obtained in this study. Outlined below were some limitations encountered in the study.

The label of prehypertension in this study was based on single visit only and Malaysia Clinical Practice Guidelines on Management of Hypertension (4^{th} Edition) had recommended two different visits were required in diagnosing. The single visit of blood pressure might overdiagnosed prehypertension here despite averaged of two readings were taken as indicator BP.

The represented data were majority from Malay ethnic, thus it not reflect other ethnics in Kota Bharu and this study did not explore other associated factors for prehypertension such as dyslipidemia, dysglycemia and psychological factors that might interact with studied associated factor.

The sampling method used in this study was convenient sampling method that could affect the finding of this study and the tool used for assessment of unhealthy diet only assessed fruits and vegetable intake but not included salt intake assessment as salt are highly associated with blood pressure.

CHAPTER 7 : CONCLUSION

The percentage of prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu is 192 (57.7%). This study identified five factors that had significant association with prehypertension among smokers which were age, BMI, positive family history of hypertension in first degree relatives, unhealthy diet which is inadequate intake of fruits and vegetables less than five servings per day and central obesity

CHAPTER 8 : RECOMMENDATION

Some of the recommendations are more studies are needed to assess other important socio-demographic, behaviour and biological factors that may influence prehypertensive development in cigarette smokers due to lack of study at the moment. Other than that, proper tools for assessment of behaviour associated factors such as objective methods for assessment of physical activity and whole dietary assessment included salt intake component to signify unhealthy diet. Finally, a proper sampling method should be used to get more reliable findings.

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APPENDIX 1 : Case report form

KAJIAN MENGENAI PREVALENS PRAHIPERTENSI DAN FAKTOR BERKAITAN DI KALANGAN PEROKOK YANG HADIR KE KLINIK KESIHATAN BANDAR KOTA BHARU

Bahagian A: Latarbelakang diri

1. Jantina: ☐ Lelaki ☐ Perempuan

2. Umur: _____ tahun

3. Bangsa: ☐ Melayu ☐ Cina ☐ India ☐ Lain-lain: Nyatakan_____

4. Status perkahwinan:

☐ Bujang ☐ Berkahwin ☐ Berpisah / Kematian pasangan

5. Tahap pendidikan:

☐ Sekolah rendah ☐ Sekolah Menengah

☐ Diploma/ Ijazah

6. Pekerjaan:

7. Pendapatan sebulan : _____(RM) sebulan

8. Sila tandakan (V) pada penyakit yang terdapat dalam adik-beradik atau ibubapa anda

☐ Kencing manis

☐ Tekanan darah tinggi (Hipertensi)

☐ Sakit jantung koronari/saluran jantung tersumbat

☐ Angin ahmar/strok

☐ Kematian mengejut (Sudden death) semasa umur kurang daripada 55 tahun untuk lelaki dan umur kurang daripada 65 tahun)

9.Adakah anda mempunyai penyakit kronik selain dari yang dinyatakan di borang persetujuan kajian

---

10.Berapa lama sudah anda merokok

---

11. Pengambilan alcohol/ minuman keras/ arak/tapai;

- Adakah anda sekarang mengambil sebarang jenis arak seperti bir, wain, tuak yang ditapai atau apa-apa minuman keras?

	Tidak	(<1 unit seminggu untuk wanita/ <2 unit seminggu untuk lelaki)

	Sederhana	(<1 unit sehari untuk wanita/ <2 unit sehari untuk lelaki
	Teruk	(melebihi 3 unit sehari atau 7 unit seminggu bagi wanita) /(melebihi 4 unit sehari atau 14 unit seminggu bagi lelaki)

Satu unit arak: Beer (12 aun=355ml); wine (5 aun=148ml);alcohol lain(1.5 aun=44ml)

B. Aktiviti Fizikal (IPAQ –M)

Sila fikirkan tentang aktiviti anda di tempat kerja, di rumah dan kawasan halaman, untuk bergerak dari satu tempat ke tempat yang lain, dan pada waktu lapang untuk rekreasi, senaman atau bersukan.

1. Dalam tempoh **7 hari yang lepas ini**, berapa harikah anda telah melakukan aktiviti fizikal berat, sekurangkurangnya **10 minit pada sesuatu masa**?

Aktiviti fizikal **berat** adalah aktiviti menggunakan daya tenaga fizikal yang kuat dan membuat anda bernafas jauh lebih kuat daripada biasa, contohnya mengangkat barang berat, mencangkul, senaman aerobik atau berbasikal laju.

_____ **hari seminggu**

☐ Tiada aktiviti fizikal berat **Lompat ke soalan 3**

2. Berapakah masa yang anda biasa gunakan untuk melakukan aktiviti fizikal **berat** pada salah satu daripada hari berkenaan?

_____**jam** _____**minit sehari** ☐ Tidak tahu / Tidak pasti

3. Dalam tempoh **7 hari yang lepas ini**, berapa harikah anda telah melakukan aktiviti fizikal **sederhana**, sekurang-kurangnya **10 minit pada sesuatu masa?**

Aktiviti fizikal **sederhana** adalah aktiviti yang menggunakan daya tenaga fizikal yang sederhana dan membuatkan anda bernafas agak lebih kuat daripada biasa, contohnya mengangkat muatan ringan, mengelap lantai, berbasikal pada kelajuan biasa, atau bermain badminton beregu? Ini tidak termasuk berjalan kaki.

_____**hari seminggu**

☐ Tiada aktiviti fizikal sederhana **Lompat ke soalan 5**

4. Berapakah masa yang anda biasa gunakan untuk melakukan aktiviti fizikal sederhana pada salah satu daripada hari berkenaan?

_____**jam** _____**minit sehari** ☐ Tidak tahu / Tidak pasti

5. Dalam tempoh **7 hari yang lepas ini**, berapa harikah anda telah **berjalan kaki** selama sekurang-kurangnya 10 minit pada sesuatu masa?

_____**hari seminggu**

☐ Tiada berjalan kaki **Lompat ke soalan 7**

6. Berapakah masa yang anda biasa gunakan untuk **berjalan kaki** pada salah satu daripada hari berkenaan?

_____**jam** _____**minit sehari** ☐ Tidak tahu / Tidak pasti

7. Dalam tempoh **7 hari yang lepas ini**, berapakah masa yang anda telah gunakan untuk **duduk** pada **sesuatu hari bekerja?**

_____**jam** _____**minit sehari** ☐ Tidak tahu / Tidak pasti

C. Pemakanan (Bagi menentukan saiz bagi satu hidangan, sila lihat lampiran yang disertakan)

1. Dalam masa seminggu biasa anda, berapa harikah anda makan buah-buahan? _____ hari
2. Dalam satu hari yang biasa, berapa hidangan buah-buahan yang anda makan?_____sajian
3. Dalam masa seminggu biasa anda, berapa harikah anda makan sayur-sayuran? _____ hari
4. Dalam satu hari yang biasa, berapa hidangan sayuran yang anda makan?_____sajian

D. Borang Skor Fagerstrom

1.Berapa cepatkah anda menghisap rokok yang pertama selepas bangun dari tidur?

Dalam masa 5 minit (3)

6 hingga 30 minit (2)

31 hingga 60 minit (1)

Selepas 60 minit (0)

2. Adakah anda berasa sukar untuk tidak merokok di tempat larangan merokok? Contohnya di sekolah, kompleks membeli belah, perhentian bas

Ya (1)

Tidak (0)

3. Menghisap rokok yang manakah yang paling sukar untuk anda tinggalkan

Yang pertama di sebelah pagi (1)

Yang lain (0)

4. Berapa batang rokok yang anda hisap dalam sehari?

10 atau kurang (0)

11 hingga 20 (1)

21 hinggaa 30 (2)

31 atau lebih (3)

5.Adakah anda lebih kerap merokok dalam jam pertama selepas bangun tidur berbanding masa lain sepanjang hari

Ya (1)

Tidak (0)

6. Adakah anda masih merokok walaupun anda sakit teruk dan terpaksa berbaring di atas katil untuk kebanyakan masa

Ya (1)

Tidak (0)

Jumlah markah :

BAHAGIAN E: PEMERIKSAAN

1. Tinggi :

2. Berat :

3.BMI :

4. WC :

5. BP : 1.

2.

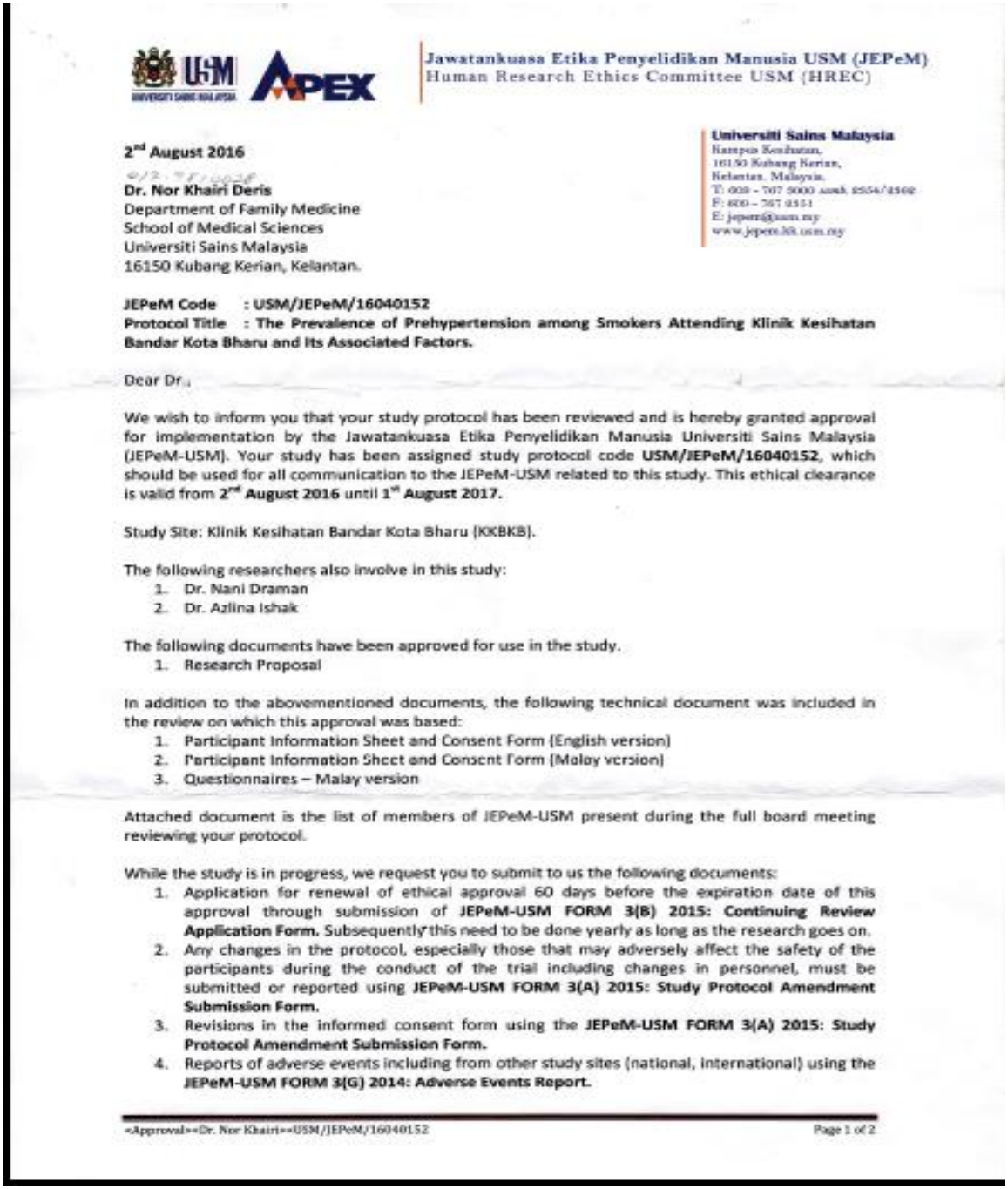
Purata :

LAMPIRAN PEMAKANAN

Satu sajian sayur-sayuran	
Sayuran berdaun hijau dengan batang (dimasak)	½ cawan
Sayuran berbuah (dimasak)	½ cawan
Ulam	1 cawan

Satu sajian buah-buahan (15 g CHO)	
Betik/tembikai/nenas	1 potong
Pisang Berangan (saiz sederhana)	1 biji
Pisang Emas (saiz kecil)	2 biji
Mangga/Ciku/Lai/Epal	1 biji
Mandarin/oren	1 biji
Jambu batu/pir	$^1/_2$ biji
Anggur	8 biji
Durian	3 ulas
Prun	4 biji
Kismis	1 sudu makan

APPENDIX 2 : Ethical approval letter USM (HREC)



Jawatankuasa Etika Penyelidikan Manusia USM (JEPeM)
Human Research Ethics Committee USM (HREC)

Universiti Sains Malaysia
Kampus Kesihatan,
16150 Kubang Kerian,
Kelantan. Malaysia.
T: 609 – 767 3000 samb. 4554/4562
F: 609 – 767 4511
E: jepem@usm.my
www.jepem.hk.usm.my

2nd August 2016

Dr. Nor Khairi Deris
Department of Family Medicine
School of Medical Sciences
Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan.

JEPeM Code : USM/JEPeM/16040152
Protocol Title : The Prevalence of Prehypertension among Smokers Attending Klinik Kesihatan Bandar Kota Bharu and Its Associated Factors.

Dear Dr.,

We wish to inform you that your study protocol has been reviewed and is hereby granted approval for implementation by the Jawatankuasa Etika Penyelidikan Manusia Universiti Sains Malaysia (JEPeM-USM). Your study has been assigned study protocol code **USM/JEPeM/16040152**, which should be used for all communication to the JEPeM-USM related to this study. This ethical clearance is valid from **2nd August 2016** until **1st August 2017.**

Study Site: Klinik Kesihatan Bandar Kota Bharu (KKBKB).

The following researchers also involve in this study:
1. Dr. Nani Draman
2. Dr. Azlina Ishak

The following documents have been approved for use in the study.
1. Research Proposal

In addition to the abovementioned documents, the following technical document was included in the review on which this approval was based:
1. Participant Information Sheet and Consent Form (English version)
2. Participant Information Sheet and Consent Form (Malay version)
3. Questionnaires – Malay version

Attached document is the list of members of JEPeM-USM present during the full board meeting reviewing your protocol.

While the study is in progress, we request you to submit to us the following documents:
1. Application for renewal of ethical approval 60 days before the expiration date of this approval through submission of **JEPeM-USM FORM 3(B) 2015: Continuing Review Application Form.** Subsequently this need to be done yearly as long as the research goes on.
2. Any changes in the protocol, especially those that may adversely affect the safety of the participants during the conduct of the trial including changes in personnel, must be submitted or reported using **JEPeM-USM FORM 3(A) 2015: Study Protocol Amendment Submission Form.**
3. Revisions in the informed consent form using the **JEPeM-USM FORM 3(A) 2015: Study Protocol Amendment Submission Form.**
4. Reports of adverse events including from other study sites (national, international) using the **JEPeM-USM FORM 3(G) 2014: Adverse Events Report.**

5. Notice of early termination of the study and reasons for such using **JEPeM-USM FORM 3(E) 2015.**
6. Any event which may have ethical significance.
7. Any information which is needed by the JEPeM-USM to do ongoing review.
8. Notice of time of completion of the study using **JEPeM-USM FORM 3(C) 2014: Final Report Form.**

Please note that forms may be downloaded from the JEPeM-USM website: **www.jepem.kk.usm.my**

Jawatankuasa Etika Penyelidikan (Manusia), JEPeM-USM is in compliance with the Declaration of Helsinki, International Conference on Harmonization (ICH) Guidelines, Good Clinical Practice (GCP)

Standards, Council for International Organizations of Medical Sciences (CIOMS) Guidelines, World Health Organization (WHO) Standards and Operational Guidance for Ethics Review of Health-Related Research and Surveying and Evaluating Ethical Review Practices, EC/IRB Standard Operating Procedures (SOPs), and Local Regulations and Standards in Ethical Review.

Thank you.

"ENSURING A SUSTAINABLE TOMORROW"

Very truly yours,

PROF. DR. HANS AMIN VAN ROSTENBERGHE
Chairperson
Jawatankuasa Etika Penyelidikan (Manusia) JEPeM
Universiti Sains Malaysia

Jawatankuasa Etika Penyelidikan Manusia USM (JEPeM)
Human Research Ethics Committee USM (HREC)

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Date of meeting : 11th May 2016
Venue : Meeting Room, Centre for Research Initiatives, Clinical and Health Sciences, USM Kampus Kesihatan.
Time : 9.00 a.m – 2.30 p.m
Meeting No : 335

Members of Committee of the Jawatankuasa Etika Penyelidikan (Manusia), JEPeM Universiti Sains Malaysia who reviewed the protocol/documents are as follows:

Member (Title and Name)		Occupation (Designation)	Male/ Female (M/F)	Tick (✓) if present when above items, were reviewed
Chairperson : Professor Dr. Hans Amin Van Rostenberghe		Chairperson of Jawatankuasa Etika Penyelidikan (Manusia), JEPeM USM	M	✓ (Chairperson)
Secretary: Mr. Mohd Bazlan Hafidz Mukrim		Research Officer	M	✓
Members :				
1.	Dr. Azlan Husin	Lecturer, School of Medical Sciences	M	✓
2.	Mr. Harry Mulder	Community Representative	M	✓
3.	Dr. Haslina Taib	Lecturer, School of Dental Sciences	F	✓
4.	Mr. Hj. Ismail Hassan	Community Representative	M	✓
5.	Associate Professor Dr. Lee Yeong Yeh	Lecturer, School of Medical Sciences	M	✓
6.	Professor Dr. Nik Hazlina Nik Hussain	Lecturer, School of Medical Sciences	F	✓
7.	Associate Professor Oleksandr Krasilshchikov	Lecturer, School of Health Sciences	M	✓
8.	Dr. Soon Lean Keng	Lecturer, School of Health Sciences	F	✓
9.	Mrs. Zawiah Abu Bakar	Community Representative	F	✓
10.	Professor Dr. Zeehaida Mohamed	Lecturer, School of Medical Sciences	F	✓

Jawatankuasa Etika Penyelidikan (Manusia), JEPeM-USM is in compliance with the Declaration of Helsinki, International Conference on Harmonization (ICH) Guidelines, Good Clinical Practice (GCP) Standards, Council for International Organizations of Medical Sciences (CIOMS) Guidelines, World Health Organization (WHO) Standards and Operational Guidance for Ethics Review of Health-Related Research and Surveying and Evaluating Ethical Review Practices, EC/IRB Standard Operating Procedures (SOPs), and Local Regulations and Standards in Ethical Review.

PROFESSOR DR. HANS AMIN VAN ROSTENBERGHE
Chairperson
Jawatankuasa Etika Penyelidikan (Manusia), JEPeM
Universiti Sains Malaysia

APPENDIX 3 : Ethical approval letter MREC

JAWATANKUASA ETIKA & PENYELIDIKAN PERUBATAN
(Medical Research & Ethics Committee)
KEMENTERIAN KESIHATAN MALAYSIA
d/a Institut Pengurusan Kesihatan
Jalan Rumah Sakit, Bangsar
59000 Kuala Lumpur

Tel.: 03-2287 4032/2282 0491/2282 9085
03-2282 9082/2282 1402/2282 1449
Faks: 03-2282 0015

Ruj.Kami:(5)KKM/NIHSEC/ P17-394
Tarikh : 20-Mac-2017

DR NOR KHAIRI BT DERIS
KLINIK KESIHATAN BANDAR KOTA BHARU

Dato'/ Tuan/ Puan,

SURAT KELULUSAN ETIKA:

NMRR-16-2589-33491 (IIR)
THE PREVALENCE OF PREHYPERTENSION AMONG SMOKERS ATTENDING KLINIK KESIHATAN BANDAR KOTA BHARU AND ITS ASSOCIATED FACTORS

Lokasi Kajian:
KLINIK KESIHATAN BANDAR KOTA BHARU

Dengan hormatnya perkara di atas adalah dirujuk.

2. Jawatankuasa Etika & Penyelidikan Perubatan (JEPP), Kementerian Kesihatan Malaysia (KKM) tiada halangan, dari segi etika, ke atas pelaksanaan kajian tersebut. JEPP mengambil maklum bahawa kajian tersebut hanya melibatkan pengumpulan data melalui:

i. **Borang kaji selidik**

3. Segala rekod dan data subjek adalah **SULIT** dan hanya digunakan untuk tujuan kajian ini dan semua isu serta prosedur mengenai *data confidentiality* mesti dipatuhi.

4. Kebenaran daripada Pegawai Kesihatan Daerah / Pengarah Hospital dan Ketua-Ketua Jabatan atau pegawai yang bertanggungjawab disetiap lokasi kajian di mana kajian akan dijalankan mesti diperolehi sebelum kajian dijalankan. Dato'/ Dr / Tuan / Puan perlu akur dan mematuhi keputusan tersebut. Sila rujuk kepada garis panduan Institut Kesihatan Negara mengenai penyelidikan di Institusi dan fasiliti Kementerian Kesihatan Malaysia (Pindaan 01/2015) serta lampiran *Appendix 5* untuk templet surat memohon kebenaran tersebut.

5. Adalah dimaklumkan bahawa kelulusan ini adalah sah sehingga **19-Mac-2018**. Tuan / Puan perlu menghantar dokumen-dokumen seperti berikut selepas mendapat kelulusan etika. Borang-borang berkaitan boleh dimuat turun daripada laman web Jawatakuasa Etika & Penyelidikan Perubatan (JEPP) (http://www.nih.gov.my/mrec).

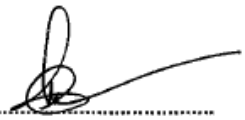
i. ***Continuing Review Form*** selewat-lewatnya dalam tempoh 1 bulan (30 hari) sebelum tamat tempoh kelulusan ini bagi memperbaharui kelulusan etika.
ii. ***Study Final Report*** pada penghujung kajian.
iii. Mendapat kelulusan etika sekiranya terdapat pindaan ke atas sebarang dokumen kajian/ lokasi kajian/ penyelidik.

6. Sila ambil maklum bahawa sebarang urusan surat-menyurat berkaitan dengan penyelidikan ini haruslah dinyatakan nombor rujukan surat ini untuk melicinkan urusan yang berkaitan.

Sekian terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,



.....
DATO' DR CHANG KIAN MENG
Pengerusi
Jawatankuasa Etika & Penyelidikan Perubatan
Kementerian Kesihatan Malaysia

s.k: HRRC Hospital Perempuan Zainab II

APPENDIX 4: Patient's consent form

UNIVERSITI SAINS MALAYSIA

ATTACHMENT B

RESEARCH INFORMATION

Research Title:	Prevalence of prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu and its associated factor
Researcher's Name:	Dr Nor Khairi Binti Deris (MMC: 41765) Dr Nani Draman (MMC: 35488) Dr Azlina Ishak (MMC: 37546)

INTRODUCTION

You are invited to take part voluntarily in a research study on prevalence of prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu and its associated factor. Prehypertension is defined as systolic blood pressure (SBP) of 120 to 139 mmHg or a diastolic blood pressure (DBP) of 80 – 89 mmHg in adults 18 years and older. People with prehypertension are at increased risk for progression to hypertension. Both prehypertension and hypertension are risk factors for cardiovascular disease, stroke and heart attack. Before agreeing to participate in this study, it is important that you read and understand this research information form. Please take time to read and understand the information carefully. If you decide to participate, you will receive a copy of this form to keep for your records.Your participation in this study will take about 15 minutes. Up to 339 respondents will be participating in this study.

PURPOSE OF THE STUDY

This study is conducted to determine the proportion of prehypertension among smokers whom attended Klinik Kesihatan BandarKota Bharu and to identify certain associated factors affecting the blood pressure.

QUALIFICATION TO PARTICIPATE

The doctor in charge of this study or any research assistant has discussed with you the requirements for participation in this study. It is important that you are completely truthful with the doctor and staff about you health history. You should not participate in this study if you do not meet all the qualifications.

The requirements to be in this study are:

- Age more than 18 years

You **cannot** participate in this study if:

- You are known of or currently treated for chronic diseases such as diabetes mellitus, hypertension, heart disease, renal impairment and stroke

- Suffered from psychiatric illness
- Pregnant

STUDY PROCEDURES

If you have agreed to participate in this study, you are required to sign the consent form.Then, you will be asked to fill up one form of questionnaire consisting of sociodemographic details, diet,physical activity, alcohol consumption and nicotine dependence level. After answering the questionnaire, you will be measured for BP,weight, height and waist circumference. The blood pressure will be taken 2 times during that time with each measurement will be 1 minute apart. Immediately after that you will be informed the findings gathered from the questionnaire and physical examination. If any abnormal finding noted from this study you will be referred for further management . Then, your participation in this study is complete.

RISKS

There is no foreseeable risk or harm in participation of this study.

PARTICIPATION IN THE STUDY

Your taking part in this study is entirely voluntary. You may refuse to take part in the study or you may stop participation in the study at anytime, without a penalty or loss of benefits to which you are otherwise entitled.

POSSIBLE BENEFITS [Benefit to Individual, Community, University]

From this study,you will know about your health status if not known before and early intervention can be done to reduce the risk noted from the questionnaire and physical examination from this study. We hope that the outcome and information regarding this research will be beneficial to future patients.

QUESTIONS

If you have any question about this study or your rights, please contact;

Dr Nor Khairi Binti Deris (MMC: 41765)
Jabatan Perubatan Keluarga
Universiti Sains Malaysia
USM Kampus Kesihatan
Tel no : 017-9810028

If you have any questions regarding the Ethical Approval or any issue / problem related to this study, please contact;

Mr. Mohd Bazlan Hafidz Mukrim
Secretary of Human Research Ethics Committee USM
Centre for Research Initiatives, Clinical & Health Sciences
USM Health Campus
Tel. No. : 09-767 2354 / 09-767 2362
Email : bazlan@usm.my/jepem@usm.my

CONFIDENTIALITY

Your medical information will be kept confidential by the study doctor and staff and will not be made publicly available unless disclosure is required by law.

Data obtained from this study that does not identify you individually will be published for knowledge purposes.

Your original medical records may be reviewed by the researcher, the Ethical Review Board for this study, and regulatory authorities for the purpose of verifying clinical trial procedures and/or data. Your medical information may be held and processed on a computer.

By signing this consent form, you authorize the record review, information storage and data transfer described above.

SIGNATURES

To be entered into the study, you or a legal representative must sign and data the signature page **[ATTACHMENT S or ATTACHMENT P]**

ATTACHMENT S

Patient/Subject Information and Consent Form
(Signature Page)

Research Title: Prevalence of prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu and its associated factor

Researcher's Name : Dr Nor Khairi Binti Deris (MMC: 41765)
Dr Nani Draman (MMC: 35488)
Dr Azlina Ishak (MMC: 37546)

To become a part this study, you or your legal representative must sign this page. By signing this page, I am confirming the following:

- I have read all of the information in this Patient Information and Consent Form **including any information regarding the risk in this study** and I have had time to think about it.
- All of my questions have been answered to my satisfaction.
- I voluntarily agree to be part of this research study, to follow the study procedures, and to provide necessary information to the doctor, nurses, or other staff members, as requested.
- I may freely choose to stop being a part of this study at anytime.
- I have received a copy of this Patient Information and Consent Form to keep for myself.

_____ _____

Patient Name (Print or type) **Patient Initials** and **Number**

_____ _____

Patient I.C No. (New) **Patient I.C** No. (Old)

_____ _____

Signature of Patient or Legal Representative **Date** (dd/MM/yy)

(Add time if applicable)

Name of Individual
Conducting Consent Discussion (Print or Type)

Signature of Individual
Conducting Consent Discussion

Date (dd/MM/yy)

Name & Signature of Witness

Date
(dd/MM/yy)

Note: i) All subject/patients who are involved in this study will not be covered by insurance.

ATTACHMENT P

Patient's Material Publication Consent Form
Signature Page

Research Title: Prevalence of prehypertension among smokers attending Klinik Kesihatan Bandar Kota Bharu and its associated factor

Researcher's Name: Dr Nor Khairi Deris (MMC: 41765)
Dr Nani Draman (MMC: 35488)
Dr Azlina Ishak (MMC: 37546)

To become a part this study, you or your legal representative must sign this page.
By signing this page, I am confirming the following:

- I understood that my name will not appear on the materials published and there has been efforts to make sure that the privacy of my name is kept confidential although the confidentiality is not completely guaranteed due to unexpected circumstances.
- I have read the materials or general description of what the material contains and reviewed all photographs and figures in which I am included that could be published.
- I have been offered the opportunity to read the manuscript and to see all materials in which I am included, but have waived my right to do so.
- All the published materials will be shared among the medical practitioners, scientists and journalist world wide.
- The materials will also be used in local publications, book publications and accessed by many local and international doctors world wide.
- I hereby agree and allow the materials to be used in other publications required by other publishers with these conditions:
- The materials will not be used as advertisement purposes nor as packaging materials.
- The materials will not be used out of contex – i.e.: Sample pictures will not be used in an article which is unrelated subject to the picture.

_____ _____

Patient Name (Print or type) **Patient Initials** or **Number**

_____ _____ _____

Patient I.C No. Patient's Signature **Date** (dd/MM/yy)

_____ _____

Name and Signature of Individual **Date** (dd/MM/yy)
Conducting Consent Discussion

Note: i) All subject/patients who are involved in this study will not be covered by insurance

UNIVERSITI SAINS MALAYSIA

LAMPIRAN A

MAKLUMAT KAJIAN

Tajuk Kajian : Prevalen prahipertensi dan faktor berkaitan prahipertensi di kalangan perokok yang hadir ke Klinik Kesihatan Bandar Kota Bharu

Nama Penyelidik: Dr Nor Khairi Binti Deris (MMC: 41765)
Dr Nani Draman (MMC: 35488)
Dr Azlina Ishak (MMC: 37546)

PENGENALAN

Anda dipelawa untuk menyertai secara sukarela dalam satu kajian penyelidikan mengenai prevalen prehipertensi dan faktor berkaitan prehipertensi di kalangan perokok yang hadir ke Klinik Kesihatan Kota Bharu. Prehipertensi adalah satu keadaan di mana tekanan darah sistolik pada kadar 120 – 139mHg dan tekanan darah diastolik pada kadar 80 – 89mmHg di kalangan orang dewasa yang berumur 18 tahun dan ke atas. Mereka yang mengalami prehipertensi menghadapi risiko yang tinggi untuk mengidap penyakit hipertensi. Kedua-dua prehipertensi dan hipertensi adalah faktor risiko untuk penyakit kardiovaskular, angin ahmar dan serangan jantung. Sebelum anda bersetuju untuk menyertai kajian penyelidikan ini, adalah penting anda membaca dan memahami borang ini. Sekiranya anda menyertai kajian ini, anda akan menerima satu salinan borang ini untuk disimpan sebagai rekod anda.

Penyertaan anda di dalam kajian ini adalah dijangka mengambil masa selama 15 minit. Seramai 339 pesakit akan menyertai kajian ini.

TUJUAN KAJIAN

Tujuan kajian ini adalah untuk menentukan bilangan pesakit prehipertensi di kalangan perokok yang datang ke Klinik Kesihatan Bandar Kota Bharu yang dianggap sihat serta mengenalpasti faktor-faktor tertentu yang mempengaruhi tekanan darah.

KELAYAKAN PENYERTAAN

Adalah penting anda memberi maklumat tentang diri anda dan menjawab soalan dalam soal selidik dengan jujur. Anda tidak seharusnya menyertai kajian ini sekiranya anda tidak memenuhi semua syarat kelayakan.

Individu yang menyertai kajian ini adalah memenuhi kriteria berikut :

- Berumur lebih daripada 18 tahun

Anda **tidak boleh** menyertai kajian ini sekiranya :

- Anda mengidap atau sedang dirawat untuk penyakit kronik seperti darah tinggi, kencing manis, penyakit jantung, kegagalan buah pinggang dan angin ahmar.
- Anda sedang mengandung
- Mengalami masalah psikiatri

PROSEDUR-PROSEDUR KAJIAN

Sekiranya anda bersetuju menyertai kajian ini, anda akan diminta untuk menandatangani surat kebenaran untuk menyertai kajian ini. Kemudian anda dikehendaki mengisi satu borang soal jawab yang mengandungi soalan berkaitan latar belakang sosio demografik anda, diet, aktiviti fizikal, pengambilan alkohol dan tahap ketagihan nikotin. Selepas selesai menjawab soalan, anda akan diukur untuk tekanan darah,berat,tinggi dan lilit pinggang dan tekanan darah. Bacaan tekanan darah anda akan di ambil sebanyak dua kali dalam selang 1 minit. Selepas selesai pemeriksaan,penyelidik akan memberitahu penemuan yang diperolehi dari kajian ini.Sekiranya terdapat penemuan yang tidak normal, anda akan dirujuk untuk tindakan seterusnya dan penyertaan anda dalam kajian ini selesai.

RISIKO

Tidak ada sebarang risiko yang terlibat dalam kajian ini.

PENYERTAAN DALAM KAJIAN

Penyertaan anda dalam kajian ini adalah secara sukarela. Anda berhak menolak untuk menyertai kajian ini tanpa sebarang hukuman atau kehilangan manfaat yang sepatutnya anda perolehi.

MANFAAT YANG MUNGKIN [Manfaat terhadap Individu, Masyarakat, Universiti]

Penyertaan anda dalam kajian ini adalah secara sukarela. Melalui kajian ini, anda dapat mengetahui status kesihatan anda dan intervensi awal dapat dilakukan untuk mengurangkan faktor risiko**.**Selain itu,penyertaan anda dalam kajian ini akan membantu kami untuk memahami dengan lebih lanjut tentang kaitan prehipertensi di kalangan perokok dan maklumat tersebut dapat digunakan untuk merawat pesakit lain kemudian hari.

PERSOALAN

Sekiranya anda mempunyai sebarang soalan mengenai prosedur kajian ini atau hak-hak anda, sila hubungi;

Dr Nor Khairi Binti Deris (MMC: 41765)
Jabatan Perubatan Keluarga
Universiti Sains Malaysia
USM Kampus Kesihatan
No Tel :017-9810028

Sekiranya anda mempunyai sebarang soalan berkaitan kelulusan Etika atau sebarang pertanyaan dan masalah berkaitan kajian ini, sila hubungi;

En. Mohd Bazlan Hafidz Mukrim
Setiausaha Jawatankuasa Etika Penyelidikan (Manusia) USM
Pusat Inisiatif Penyelidikan -Sains Klinikal & Kesihatan
USM Kampus Kesihatan.
No. Tel: 09-767 2354 / 09-767 2362
Email : bazlan@usm.my/jepem@usm.my

KERAHSIAAN

Maklumat perubatan anda akan dirahsiakan oleh doktor dan kakitangan kajian. Ianya tidak akan dedahkan secara umum melainkan jika ia dikehendaki oleh undang-undang.

Data yang diperolehi dari kajian yang tidak mengenalpasti anda secara perseorangan mungkin akan diterbitkan untuk tujuan memberi pengetahuan baru.

Rekod perubatan anda yang asal mungkin akan dilihat oleh pihak penyelidik, Lembaga Etika kajian ini dan pihak berkuasa regulatori untuk tujuan mengesahkan prosedur dan/atau data kajian klinikal. Maklumat perubatan anda mungkin akan disimpan dalam komputer dan diproses dengannya.

Dengan menandatangani borang persetujuan ini, anda membenarkan penelitian rekod, penyimpanan maklumat dan pemindahan data seperti yang dihuraikan di atas.

TANDATANGAN

Untuk dimasukkan ke dalam kajian ini, anda atau wakil sah anda mesti menandatangani serta mencatatkan tarikh halaman tandatangan (Borang Keizinan Pesakit di **LAMPIRAN S** dan **LAMPIRAN P**).

LAMPIRAN S

Borang Keizinan Pesakit/ Subjek
(Halaman Tandatangan)

Tajuk Kajian: Prevalen prahipertensi dan faktor berkaitan prahipertensi di kalangan perokok yang hadir ke Klinik Kesihatan Bandar Kota Bharu

Nama Penyelidik: Dr Nor Khairi Deris (MMC: 41765)
Dr Nani Draman (MMC: 35488)
Dr Azlina Ishak (MMC:37546)

Untuk menyertai kajian ini, anda atau wakil sah anda mesti menandatangani mukasurat ini. Dengan menandatangani mukasurat ini, saya mengesahkan yang berikut:

- Saya telah membaca semua maklumat dalam Borang Maklumat dan Keizinan Pesakit ini **termasuk apa-apa maklumat berkaitan risiko yang ada dalam kajian** dan saya telah pun diberi masa yang mencukupi untuk mempertimbangkan maklumat tersebut.
- Semua soalan-soalan saya telah dijawab dengan memuaskan.
- Saya, secara sukarela, bersetuju menyertai kajian penyelidikan ini, mematuhi segala prosedur kajian dan memberi maklumat yang diperlukan kepada doktor, para jururawat dan juga kakitangan lain yang berkaitan apabila diminta.
- Saya boleh menamatkan penyertaan saya dalam kajian ini pada bila-bila masa.
- Saya telah pun menerima satu salinan Borang Maklumat dan Keizinan Pesakit untuk simpanan peribadi saya.

Nama Pesakit (Dicetak atau Ditaip)	**Nama Singkatan & No. Pesakit**
No. Kad Pengenalan Pesakit (Baru)	**No. K/P** (Lama)

Tandatangan Pesakit atau Wakil Sah	**Tarikh** (dd/MM/yy) (Masa jika perlu)
Nama & Tandatangan Individu yang Mengendalikan Perbincangan Keizinan (Dicetak atau Ditaip)	**Tarikh** (dd/MM/yy)
Nama Saksi dan Tandatangan	**Tarikh** (dd/MM/yy)

Nota: i) Semua subjek/pesakit yang mengambil bahagian dalam projek penyelidikan ini tidak dilindungi insuran.

Borang Keizinan bagi Penerbitan Bahan yang berkaitan dengan Pesakit/ Subjek
(Halaman Tandatangan)

Tajuk Kajian ***:*** Prevalen prahipertensi dan faktor berkaitan prahipertensi di kalangan perokok yang hadir ke Klinik Kesihatan Bandar Kota Bharu

Nama Penyelidik ***:*** Dr Nor Khairi Deris (MMC: 41765)
Dr Nani Draman (MMC: 35488)
Dr Azlina Ishak (MMC:37546)

Untuk menyertai kajian ini, anda atau wakil sah anda mesti menandatangani mukasurat ini.

Dengan menandatangani mukasurat ini, saya memahami yang berikut:

- Bahan yang akan diterbitkan tanpa dilampirkan dengan nama saya dan setiap percubaan yang akan dibuat untuk memastikan ketanpanamaan saya. Saya memahami, walaubagaimanapun, ketanpanamaan yang sempurna tidak dapat dijamin. Kemungkinan sesiapa yang menjaga saya di hospital atau saudara dapat mengenali saya.
- Bahan yang akan diterbitkan dalam penerbitan mingguan/bulanan/dwibulanan/suku tahunan/dwi tahunan merupakan satu penyebaran yang luas dan tersebar ke seluruh dunia. Kebanyakan penerbitan ini akan tersebar kepada doktor-doktor dan juga bukan doktor termasuk ahli sains dan ahli jurnal.
- Bahan tersebut juga akan dilampirkan pada laman web jurnal di seluruh dunia. Sesetengah laman web ini bebas dikunjungi oleh semua orang.
- Bahan tersebut juga akan digunakan sebagai penerbitan tempatan dan disampaikan oleh ramai doktor dan ahli sains di seluruh dunia.
- Bahan tersebut juga akan digunakan sebagai penerbitan buku oleh penerbit jurnal.
- Bahan tersebut tidak akan digunakan untuk pengiklanan ataupun bahan untuk membungkus.

Saya juga memberi keizinan bahawa bahan tersebut boleh digunakan sebagai penerbitan lain yang diminta oleh penerbit dengan kriteria berikut:

- Bahan tersebut tidak akan digunakan untuk pengiklanan atau bahan untuk membungkus.
- Bahan tersebut tidak akan digunakan di luar konteks – contohnya: Gambar tidak akan digunakan untuk menggambarkan sesuatu artikel yang tidak berkaitan dengan subjek dalam foto tersebut.

Nama Pesakit (Dicetak atau Ditaip) **Nama Singkatan** atau **No. Pesakit**

No. Kad Pengenalan Pesakit	T/tangan Pesakit	**Tarikh** (dd/MM/yy)

Nama & Tandatangan Individu yang Mengendalikan Perbincangan Keizinan (Dicetak atau Ditaip)	**Tarikh** (dd/MM/yy)

Nota: i) Semua subjek/pesakit yang mengambil bahagian dalam projek penyelidikan ini tidak dilindungi insuran.