CARDIOVASCULAR PREVENTIVE ACTIVITIES AND ITS ASSOCIATED FACTORS AMONG FEMALE NURSES IN UNIVERSITI SAINS MALAYSIA HOSPITAL

DR NIK SITI FATIMAH BINTI MOHAMED

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ABBREVIATIONS

ACS	acute coronary syndrome
AHA	American Heart Association
ASCVD	atherosclerotic cardiovascular disease
BMI	body mass index
CAD	coronary artery disease
CVD	cardiovascular disease
GBD	Global Burden Disease
GPAQ	Global Physical Activity Questionnaire
HDL	high density lipoprotein
IHD	ischemic heart disease
JNC 7	Joint National Committee 7
LDL	low density lipoprotein
MDG	Malaysian dietary guideline

MET	metabolic equivalent
MI	myocardiac infarct
MyNCDS-1	Malaysia Non-communicable Disease Surveillance-1
NCD	non-communicable disease
NHMS	National Health Morbidity Survey
STEMI	ST elevation myocardiac infarct
USPSTF	United States Preventive Services Task Force
WHO	World Health Organization

ABSTRAK

Aktiviti pencegahan kardiovaskular dan faktor-faktor berkaitan dalam kalangan jururawat wanita di Hospital Universiti Sains Malaysia

Pengenalan: Ianya di terima bahawa jururawat boleh menjadi contoh komuniti dalam pendidikan kesihatan bagi mengurangkan risiko penyakit kardiovaskular. Akan tetapi, jururawat yang mengamalkan aktiviti-aktiviti pencegahan kardiovaskular yang bagus sahaja berkemungkinan untuk mempromosi faedah aktiviti-aktiviti yang sihat. Pada pengetahuan kami, kajian yang menjelaskan aspek penting aktiviti pencegahan kardiovaskular di kalangan kakitangan kesihatan terutamanya jururawat masih lagi kurang. Maka, kajian pemerhatian ini bertujuan untuk menentukan kelaziman aktiviti-aktiviti pencegahan kardiovaskular yang bagus serta faktor-faktor berkaitan dalam kalangan jururawat wanita di Hospital USM.

Objektif: Untuk menentukan kelaziman aktiviti pencegahan kardiovaskular yang bagus dan faktor-faktor berkaitan dalam kalangan jururawat wanita di Hospital USM.

Kaedah: Ini merupakan kajian keratan rentas yang dijalankan daripada 1 Jun 2015 sehingga 31 Ogos 2015. Persampelan universal digunakan dalam kalangan kesemua jururawat berdaftar dan mereka yang memenuhi kriteria penerimaan dan pengecualian. Hanya 215 daripada 1140 jururawat memenuhi kriteria penerimaan dan bersetuju untuk kajian ini. Walau bagaimanapun, tiga daripada mereka enggan untuk menjawab soalselidik dan ini menjadikan kadar respon adalah 98% (n=212). Jururawat diminta menjawab satu set soalselidik dengan sendiri. Hanya mereka yang mengamalkan lapan aktiviti pencegahan dikira sebagai mempunyai amalan yang bagus.

Keputusan: Secara keseluruhan, aktiviti pencegahan kardiovaskular yang baik dalam kalangan jururawat adalah 14.2% (95% CI: 9.50, 18.90). Analisis multivariat mendedahkan amalan pencegahan kardiovaskular yang bagus dikaitkan secara signifikan dengan jabatan tempat bekerja. Berbanding dengan jururawat di jabatan pembedahan, jururawat dari jabatan berasaskan perubatan mempunyai 0.2 selisih dalam mengamalkan aktiviti pencegahan kardiovaskular yang baik (nilai-p = 0.015; 95% CI = 0.08, 0.76) dan jururawat antara jabatan mempunyai 0.3 selisih dalam mengamalkan aktiviti pencegahan kardiovaskular yang baik (nilai-p = 0.010; 95% CI = 0.13, 0.76). Tiada perkaitan antara faktor-faktor sosiodemografi (umur, status perkahwinan dan pendidikan), dan faktor perubatan (sejarah keluarga yang mempunyai penyakit kardiovaskular dan tanggapan status kesihatan) dengan amalan pencegahan kardiovaskular dalam kalangan jururawat wanita dalam kedua-dua regresi mudah dan logistik pelbagai.

Kesimpulan: Kelaziman jururawat dengan aktiviti pencegahan kardiovaskular yang bagus adalah rendah di Hospital USM. Jururawat dari jabatan antara jabatan dan jabatan berasaskan perubatan mempunyai kebarangkalian yang rendah untuk melaksanakan aktiviti pencegahan kardiovaskular yang bagus. Penemuan ini mengesahkan keperluan untuk penyelidikan seterusnya untuk menentukan kemungkinan halangan untuk mengamalkan aktiviti pencegahan ini. Usaha lanjut untuk memberi pendidikan kepada kesemua jururawat mengenai kepentingan aktiviti pencegahan ini dan pengurangan faktor risiko penyakit kardiovaskular perlu dibangunkan dan dijalankan.

ABSTRACT

Cardiovascular preventive activities and its associated factors among female nurses in Universiti Sains Malaysia Hospital

Introduction: It is well-accepted that nurses can be the community's role model in health education on cardiovascular disease risks reduction. Nevertheless, only nurses with good cardiovascular preventive activities practices may promote the benefits of healthy activities. Lack of study to our knowledge has addressed the important aspect of cardiovascular preventive activities among health care workers particularly nurses. Hence, this observational study was aimed to focus on prevalence of good cardiovascular preventive activities and its associated factors among female nurses in USM Hospital.

Objective: To determine the prevalence of good cardiovascular preventive activities and its associated factors among female nurses in USM Hospital.

Methodology: This is a cross-sectional study conducted from 1st June 2015 till 31st August 2015. Universal sampling was used among all registered nurses. Those who fulfilled the inclusion and exclusion criteria were included in the study. Only 215 of 1140 nurses fulfilled the criteria and were agreed for this study. However, 3 out of 215 were refused to answer the questionnaire, which makes the response rate of 98% (n=212). The nurses were requested to answer a set of self-guided questionnaire. Only those who practiced all 8 of the preventive activities were considered as having a good practice.

Results: The overall good cardiovascular preventive activities among nurses were 14.2% (95% CI: 9.50, 18.90). The multivariate analysis revealed good cardiovascular

preventive activities was significantly associated with the department of working. Compared with nurses in surgical department, nurses from medical-based department had 0.2 odds of practicing good cardiovascular preventive activities (p-value = 0.015; 95% CI = 0.08, 0.76) and intradepartmental nurses had 0.3 odds of practicing good cardiovascular preventive activities (p-value = 0.010; 95% CI = 0.13, 0.76). There was no association between other sociodemographic factors (age, marital status, and education), work-related factors (shift work) and medical factors (family history of cardiovascular disease and perception of health status) with good cardiovascular preventive activities among female nurses both by simple and multiple logistic regressions.

Conclusion: Prevalence of female nurses with good cardiovascular preventive activities was low in USM Hospital. Nurses from intradepartment and medical-based department had less likelihood to practice good cardiovascular preventive activities. This finding confirms the need for further research to determine the possible barriers for practicing these screening activities. Further effort to educate all the nurses on the importance of these screening activities and reduction of cardiovascular disease risk factors need to be developed and implemented.

CHAPTER 1: INTRODUCTION

Atherosclerotic cardiovascular disease (ASCVD), especially coronary artery disease (CAD) remains the main cause for premature deaths worldwide. Cardiovascular disease (CVD) affects both men and women in Europe with all deaths occurred before 75 years old, and 42% and 38% of all deaths were attributable to CVD in women and in men respectively (1). Globally, low and middle income countries have higher prevalence of CVD and 80% of global burden of CVD occurs in that countries. The higher prevalence of cardiovascular risk factors, lacking in the prevention programmes, and the fact that they have less access to effective healthcare services like early screening of the disease, have contributed to increase prevalence of CVD (2).

CVD remain to be the leading cause of death among women worldwide. In United States, it accounting for one in every three women death (3). In Malaysia, women comprised of 49.7% from the general population. Their life expectancy has reached 77.4 years old in 2015 which is increased by 0.8 years from 2010 (4). As a result, cardiovascular disease among Malaysian women not only the most common cause of morbidity and mortality but also rising in trend. As the age increased, women tend to have higher prevalence of CVD risks compared to men (5). Physiological changes that occur among premenopausal and menopausal women also further increase the risks (6). The emerging of non-traditional risk factors such as hypertensive pregnancy disorders and gestational diabetes mellitus that are unique to women further contribute to worsening outcome of CVD in women (3). However, the well-known risk factors for CVD like hypertension, elevated cholesterol, diabetes, obesity, poor diet, smoking and physical inactivity (7) still confer an important impact on women (8). As

majority are modifiable risk factors, early screening and health education on modification of all these factors is the key to CVD prevention among women.

Many health recommendations and clinical guidelines had highlighted the significance of healthy activities and managing the modifiable risk factors as the strategy to prevention of CVD in women (1, 9, 10). Malaysian guideline had proposed that all women above the age of 40 years should have regular CVD risks screening and know their own CVD risk (9). The general recommendation for prevention of CVD in women are eat five or more fruits or vegetables per day, physically active, non-smoking, avoiding alcohol intake, had yearly blood pressure, blood cholesterol and blood sugar checked and BMI assesstment (1, 9, 10).

Health education by nurses is one of the suggested approaches in order to promote lifestyle modifications (11). Study had shown professional nurses can play a role in this health education toward CVD risk reduction (12). However, to do this effectively, they must personally engage in healthy lifestyle consistent with cardiovascular preventive activities (13). An earlier study had found that professional nurses still have a lower prevalence of cardiovascular preventive activities despite they are knowledgeable (12).

A cross-sectional study had shown an association between sociodemographic characteristics with preventive activities among general population (14). However, literature evaluating associated factors for the nurse's cardiovascular activities is still lacking. Despite increasing trend of morbidity and mortality of CVD among Malaysian women (6) and the potential for nurses to provide education toward CVD risk reduction

(15), no published study reported on cardiovascular preventive activities and its associated factors among nurses in Malaysia.

Thus the objectives of this study are to determine the prevalence of cardiovascular preventive activities and identify its associated factors among female nurses in Hospital Universiti Sains Malaysia (USM).

1.1 Justification of the study

Cardiovascular disease has becoming a major public health issues in Malaysia. About 36% of all deaths were attributable to CVD for all ages and both sexes. CVD deaths were two and half times more common than all cancers combined among Malaysian women (16). More women are aware that heart disease is leading cause of death. However, it is not known whether this awareness has led to a better engagement in healthy lifestyle and enhancement of the preventive activities might lower their CVD risk. Hence, it is important to investigate their screening activities in order to create health education programs which are tailored to their needs.

It is well-accepted that nurses with personal lifestyle consistent with good cardiovascular preventive activities are role model for community in health education toward CVD risks reduction. They often have direct contact with the patients and their families, therefore nurses have greater cpportunity to educate on CVD risks reduction. However, lack of study to our knowledge has demonstrated the important aspect of cardiovascular preventive activities among health care workers particularly nurses. There also no prior study that has addressed any association between sociodemographic, work and medical factors with cardiovascular preventive activities among nurses. Thus

the result obtained from this study could provide epidemiological data on cardiovascular preventive activities among female nurses in USM Hospital.

CHAPTER 2: LITERATURE REVIEW

2.1 CVD globally

CVD is a chronic disorder developing insidiously throughout life and usually progressing to an advance stage by the time symptoms occur (1). A majority of CVD is due to atherosclerosis. The well known atherosclerotic CVD are ischaemic heart disease (IHD), cerebrovascular disease or stroke, hypertensive heart disease, peripheral vascular disease and atherosclerotic aortic aneurysm (9). CVD is now a leading cause of death worldwide. Globally, there were more than 54 million deaths reported by Global Burden of Disease (GBD) 2013 study and about 32% of these deaths or 17 million were contributed by CVD (17). The biggest contributors for all CVD deaths were either due to heart attack or stroke (18). For American, about 2,200 die each day due to CVD, an average of one death every 40 seconds. CVD caused more deaths than other non-communicable diseases (NCD) like all form of cancer and chronic lower respiratory disease combined (19). In Europe, CVD caused more than four million of deaths each year which is equal to 45% of all deaths. The number of deaths from IHD and stroke were 1.8 million and 1.0 million respectively (20).

For Asian, the data obtained from World Health Organization (WHO) database reported Central Asian countries had the highest age-adjusted mortality from CVD, followed by West Asian, South Asian and South-East Asian countries. The mortality and morbidity rate for stroke were greater than CAD compared with Western countries. Most of the Asian countries, except for Japan, Kuwait and Singapore, had two to five folds higher age-adjusted mortality from stroke. The annual age-adjusted mortality from stroke was 82-215 per 100,000 for Asian countries and 26-46 per 100,000 for Western countries (21). For Malaysia, data obtained from WHO NCD country profile 2014

estimated 73% of total deaths attributable to NCD. Compared to other NCD like cancers, chronic respiratory diseases and diabetes, CVD contributed 36% of all deaths for all ages and both sex (16). IHD remain the main cause of death for the past 10 years, from 2005 to 2014. For all states in Malaysia except Kedah, Pahang, Sabah and Wilayah Persekutuan Putrajaya, IHD ranked as first cause of death in 2014. An estimated 35% of all deaths occurred in individuals below 60 years old, which are mainly our working population (22).

2.2 Epidemiology of CVD in women

CVD is a critical health issue worldwide not only in men but also women. In Europe, the number of CVD deaths was greater in women (2.2 million) compared to men (1.8 million). With regard to CAD, similar numbers of women and men dying from it, however a higher numbers of women died due to stroke compared to other CVDs (20). In developed countries like United States, more women died due to CVD each year compared to men. Data obtained from 2006 CVD mortality had reported CVD claimed lives of women approximately one death per minute, or 432 707 deaths in 2006 (19). For Asian women, CVD is becoming their public health issues. There are high rates of CAD deaths in Indian and Central Asian women; rates are low in East and South East Asia. For South Eastern Asian women, Thai women had the lowest and Singaporean women had the highest age-standardized death rates for acute myocardial infarction (4.4 and 33.1 per 100,000 person years for Thai and Singaporean women, respectively) and other IHD (7.4 and 29.9 per 100,000 person years for Thai and Singaporean women, respectively) (23).

In Malaysia, CVD remains a main cause of death in women. Clinical Practice Guideline for CVD prevention in women 2008, reported that CVD death among Malaysian women in 2006 was 26.1% , which increased 0.7% from 2005 (6). Data by the Department of Statistics Malaysia regarding abridged life tables at Malaysia level for 2012 -2015, showed many women have achieved their life expectancy more than 75 years, about 15 years after they estimated to be menopause (4). Therefore, the CVD mortality and morbidity are expected to increase further in Malaysian women. The Malaysian National Cardiovascular Disease-Acute Coronary Syndrome (NCVD-ACS) registy reported no gender difference in the inpatient mortality in all spectrum of acute coronary syndrome (ACS) but women had almost twice in the inpatient mortality following ST elevation myocardiac infarct (STEMI) when compared with men (15.0% vs. 8.1%, respectively, p-value less than 0.0001) (5). The age-standardized death rated among women due to cardiovascular disease was two and half times more common than all cancers combined in Malaysia from 2000 to 2012 (16).

Men and women often share similar risk factors for CVD. Factors like diet, smoking and level of physical will influence the body weight, blood pressure, blood cholesterol and blood sugar level, in which collectively contribute to the development of CVD (8). Similar literature had mentioned that some risk factors were more important in women for increasing risk of developing CVD like high blood triglyceride levels and low high-density lipoprotein cholesterol (HDL) (8). Elderly female hypertensive and young female smoker are at higher risk of developing CVD (6). It showed that major modifiable risk factors still have a significant impact on CVD in women (8). From Malaysian NCVD-ACS registry, more than 90% had at least one cardiovascular risk factor, and many of these are modifiable risk factors (24).

Women with diabetis mellitus have three fold higher risk of fatal CAD compared with non diabetic women (3). The latest National Health and Morbidity Survey (NHMS) 2015 reported an increased trend of overall prevalence of diabetes (17.5%) and undiagnosed diabetes (9.2%) among population age > 18 years old. For known diabetes, female (9.1%) had significantly higher prevalence compared to male (7.6%) (22).

The impact of obesity on the development of CAD in women was greater than men. As reported by Framingham Heart Study, women with obesity had 64% risk of CVD compared with 46% in men (3). The prevalence of obesity has increased in the Asian population, with Thailand showing one of the highest prevalence of overweight and obesity in Western Pacific Region (25). In Malaysia, there has been marked increase in the prevalence of overweight and obesity from 1996 till 2006 with women reported being higher prevalence than men (6). This prevalence was according to the international definition of obesity and overweight. The WHO Expert Consultation Meeting has revised the definition of Asian population (26). The Asia Pacific uses different cut-off point i.e. overweight as >23 to <25 kg/m2 and obesity as BMI > 25 kg/m2. The reason for the lower cut-off point is due to Asian populations has a higher CVD risk at lower BMI (25).

In women, dyslipidaemia has the highest population attributable risk (PAR) compared to other CVD risk factors (3). Apart from that, there are few non-traditional ASCVD risk factors include preterm delivery, hypertensive pregnancy disorders, gestational diabetes mellitus, breast cancer treatments, autoimmune disease and depression. These factors are now emerging and unique to women (3). Women with CVD especially myocardiac infarct (MI) and stroke have poorer prognosis than men.

The mortality rate was higher in women after one year of MI. Similarly, women most likely to have higher mortality and morbidity post stroke. More women died following stroke or if survived, they have poorer long term outcome and poor quality of life (9).

2.3 Cardiovascular preventive activities

Prevention of CVD by controlling modifiable risk factors is of utmost importance and ideally, it should be started since pregnancy till end of life. Prevention can be classified as primary and secondary prevention. Primary prevention is focused on those at high risk of developing a first cardiovascular event with the attention to modify the risk factors like smoking, elevated blood pressure, diabetes or dyslipidaemia. Secondary prevention typically targeted those with established any type of CVD. For those with mild to moderate risk factor, the prevention of CVD is still limited despite it can result in significance benefits (1).

After the launched of the European Heart Health Charter in 2007, majority of the Europian Union member states defined the activities of people who tend to stay healthy as no use of tobacco, adequate physical activity at least 30 minutes for five times a week, healthy eating habit, no overweight (27), blood pressure below 140/90 mmHg, blood cholesterol below 5 mmol/L, normal glucose metabolism and avoiding excessive stress (1). Reeve and Rafferty (2005) had mentioned four characteristics as indicators for a healthy lifestyle which were non-smoking, healthy weight, fruit and vegetable consumption, and regular physical activity. The four healthy lifestyle characteristic were summed to get an index for a healthy lifestyle, range from zero to four. Those with all four healthy lifestyle characteristics were defined as single healthy lifestyle indicator. The overall prevalence for healthy lifestyle indicator was 3% for adults in United States (28). Coronado *et al.* (2008) had described five heart disease

prevention practices among immigrant Viatnamese women. The practices were daily intake of fruits and vegetables, physical activity, smoking status, recent blood pressure and blood cholesterol checked. Similar study reported 18% of Viatnamese women consumed five or more fruits and vegetables daily and 31% reported being physically active. About 1.5% of Viatnamese women were current smoker. Majority of the participants had obtained blood pressure checked in the past two years and blood cholesterol checked within five years accounting for 90% and 82% respectively (14).

2.4 Cardiovascular preventive activities guideline

Many public health recommendations and clinical guidelines had emphasized the importance of healthy lifestyles and managing the modifiable risk factors (10) as the key to prevention of CVD (6, 8, 10). The ideal way to know about own cardiovascular risk factors is through a screening test during health care visits. This regular cardiovascular screening test is needed and recommended in order to detect abnormal risk factors at the early stage (29). It will act as an alarm for individuals to modify their unhealthy lifestyle. As CVD death among Malaysian women is increasing in trend, our local guideline had recommended that all women age above 40 years old should have regular CVD risks screening and their risks stratified to high risk, at risk or optimal risk (6).

For diet and physical activity, Malaysian Dietary Guideline 2010 had recommended that adult should consume at least five serving of fruit and vegetables every day and be physically active every day (30). For physical activity, the guideline specifies that adult should either be active every day in as many way as they can, engaged at least 30 minutes of modest intensity physical activity on at least 5-6 days a week (10, 11, 31), participate in activity that increase flexibility, strength and endurance

of the muscle as frequent as two to three times a week or adult should limit their physical inactivity and sedentary habits (30).

For blood pressure assessment in adult, the evidence is still lacking to recommend an optimal interval for screening. However, The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommends screening every two years for normotensive group and screening every year for pre-hypertensive group (32). The American Heart Association (AHA) had proposed similar recommendation beginning at age 20 for hypertension screening (10). Similarly, Malaysia clinical practice guideline on Management of Hypertension, fourth edition had recommended annual assessment if initial blood pressure measurement was normal (33).

For fasting blood cholesterol testing including major blood lipid fractions, i.e., total cholesterol, low density lipoprotein (LDL) cholesterol, high density lipoprotein (HDL) cholesterol, and triglyceride, our clinical practice guideline on dyslipidemia, fourth edition had proposed adult age more than 40 years should have their blood cholesterol tested (34). Screening should be done yearly if the level is normal. However, National Cholesterol education Programme Expert Panel had recommended blood cholesterol check every five years (10). The AHA guidelines had suggested blood sugar check at least every three years after the age of 45 years old (10). However, Malaysia's guideline had proposed early screening test beginning the age of 40 years old. For those above 40 years old, capillary blood sugar should be checked annually even though without any risk factors (35).

Tobacco smoking is well accepted as the most preventable cause of death in the United States (10). Smoking carried significant CVD risk to both men and women. It can modify individual lipid and lipoprotein profile, promote inflammation and thrombosis and increased oxidative stress. As a result, smoking caused premenopausal women tend to lose their natural protection toward atherosclerotic vascular disease (6). Furthermore, the risk of CVD is elevated in women even with minimal tobacco usage. Many guidelines has recommended for smoking assessment in every doctor visits and include 'no smoking' as part of their healthy lifestyle indicators (1).

Excess body weight is an independent risk factor for CVD and leads to other risk factors like hypertension, dyslipidemia and diabetes (10). Many guidelines recommended BMI assessment at every healthcare visits (10, 34). Women are advised to maintain their BMI between 18.5 to 23 kg/m2 in order to lower their CVD risk (6). As part of strategy for prevention of obesity-Malaysia, alcohol drinking should be avoided. Regular consumption of alcohol is not recommended because of its high-calorie content. Alcohol provides 7 kcal per gram, which is less than that provided by fat (9 kcal per gram) but more than that contributed by either carbohydrates (4 kcal per gram) or protein (4 kcal per gram). However, the guideline did mention that if someone wants to drink alcoholic beverages, do so in moderate amount (not more than one drink for women and two drinks for men daily) (36).

The consumption of alcohol can have beneficial or harmful effects, depending on the amount consumed, age, and other characteristics of the person consuming the alcohol. Alcohol consumption may have beneficial effects when consumed injudicious amount (37). A prospective cohort study has shown that moderate alcohol consumption is associated with a lower risk of CVD particularly CAD among middle aged Chinese

men (38). Berger *et al.* (1999) had evaluated the effect of light to moderate alcohol intake on the risk of total stroke, ischaemic stroke and hemorrhagic stroke. The study reported 21% reductions in the risk of total stroke and 23% reduction in ischemic stroke among the men who had one or more drinks a week. No significance association was reported between alcohol consumption and hemorrhagic stroke (39). The harmful effect of alcohol consumption is associated with heavy intake. There are increased in public health dangers such as alcoholism, uncontrolled hypertension, obesity, stroke, congestive heart failure, breast cancer, suicide and accident with heavy alcohol intake (6). Given all these potential risks, AHA caution healthy individuals not to start drinking if they do not already drink alcohol (37). The recommendation to use alcohol in moderate amount is best determined in consultation with the individual's primary care physician.

2.5 Role of nurses in CVD prevention

NCD risk factors such as physical inactivity and comorbidities like obesity have been widely reported among healthcare workers in countries like United Kingdom, Bahrain and South Africa (40-42). There are few studies have been reported on healthy lifestyle among nurses (12, 40). Wu et al. (2011) had assessed cardiovascular preventive activities among nurses in China. The personal lifestyle behaviours consistent with defined CVD risk reduction standard included in their study were exercise more than three times a week, limit saturated fat, limit cholesterol, blood pressure check within last two years and blood lipid checked within last five years. The study reported that 5% of the nurses had exercised as recommended. About half of nurses reported limiting saturated fat and cholesterol intake in their diets and only 29% of the nurses had their blood lipid checked within five years (12). The same study suggested nurses with

personal lifestyle consistent with defined CVD risk reduction standards could provide a role model for patients. Blake *et al.* (2013) investigated health behaviours in pre-registered nurses in University of Nottingham. That study used self-report measures of health behaviours. The study reported that 47% were not physically active, 73% did not eat the recommended five portions of fruit and vegetables per day, 40% reported binge drinking and 17% were smokers (40).

Many researchers had addressed the important role of nurses in CVD prevention. They play a major role in CVD prevention, health promotion and education (12, 15, 40). Nurses are in the good position as a model of healthy lifestyle consistent with CVD reduction risks because they acquired knowledge and expertise in regard to cardiovascular risk factors modification while working (15). They often have direct contact with the patients and therefore have the opportunity to influenced changes in lifestyle. However, due to lack of healthy practice in their personal lifestyle, most of the nurses are not well prepared to play a role in health education and counseling patients with or at risk of CVD (15). Similarly, McDowell *et al.* (1997) had reported that nurses with poor health behaviours may be less likely to promote advice about the benefits of regular exercise, diet, reduce drinking and non-smoking (13). Cardiovascular risk study among Northeast Ohio nurses demonstrated that participants had lower CVD risk profile compared to general population. Based on the Framinghan risk score, 63% of the participants were classified as having low CVD risk profile. About 96% of the nurses were non smoker. It is possible that nurses who had learned about the health risk of smoking while working, who observed the catastrophic effects of smoking among patients and who educate their patient on the benefit of quitting smoking have decided to avoid smoking habit. This makes the nurses as a superb model for avoidance of negative lifestyle habit (15).

2.6 Factors associated with cardiovascular preventive activities

Many researchers have addressed the factors associated with practice on health-related behaviors among the general population. One study showed that age was associated with smoking prevalence, recent blood pressure check, being physically active and fruits and vegetable consumption in both univariate and multivariate analysis. Smoking is associated with younger age group whereby blood pressure check, fruit consumption and physical activity associated with older age group. Women age more than 35 years old had consumed more fruits and vegetable compared to younger age group. Those aged 65 to 79 having greater likelihood of having had recent blood pressure checked than those aged less than 35. Age also significantly associated with being physically active. Those aged 50 to 64 and 65 to 79 had twice and six times respectively, greater odds of being physically active compared to those aged less than 35 (14). Study among adults in United States reported that non-smoking status showed increasing prevalence with age (28). Another study among healthcare workers in Nicosia general hospital found age younger than 34 years old was associated with increased odds of being current smoker (43).

The marital status is associated with few cardiovascular preventive activities in general population. Those who married were less likely to smoke compared to never being married (14). Similarly, Zinonos *et al.* (2016) found an association between unmarried with current smoker among healthcare professional in Nicosia general hospital (43). Marital status was also associated with recent blood pressure and blood cholesterol check in both unadjusted and adjusted model. Those who were currently married and previously married showed higher odds of recent blood pressure check and blood cholesterol screening compared to unmarried. The currently married women had

two times higher odds of having had recent blood cholesterol checked compared to unmarried (14).

The prevalence of healthy lifestyle increased with education status and income. Reeve and Rafferty (2005) found increasing prevalence of non-smoking and healthy weight with education. Those with higher education status were less likely to smoke and had healthy weight. The age-standardized prevalence for healthy lifestyle indicator was 1.9% among high school graduate and 5% among college students (28). Coronado *et al.* (2008) reported that those with 12^{th} grade education or higher were less like to smoke compared to those with lower education status (14). Similarly, non-smoking found to have positive trend with household income among adults in United States (28). However, no significance association found between household incomes and all five heart disease prevention practice among Viatnamese women in United States (14).

A cross-sectional study among Vietnamese immigrants demonstrated that duration of staying in the United States did have a significant association with blood cholesterol screening and tobacco use. Those who migrated longer have higher odds of recent testing and tobacco use than those who recently migrated (14). The literature on how the effect of duration of working for nurses or health care workers on their cardiovascular preventive activities is still lacking.

Data obtained from Nurses Worklife and Health Study 1994 demonstrated that psychiatric nurses have higher smoking prevalence than nurses working in administration, emergency rooms, medical care, critical care, and gerontology unit in United States. Whereby, oncology and administrative nurses were twice at higher risk to involve in alcohol drinking (44). Another cross-sectional study on smoking prevalence

among health care professional employed in University Clinical Centre Sarajevo also found higher smoking prevalence among those working in a stressful unit such as surgery and emergency (45). These demonstrated that the work department had influence on nurses' cardiovascular preventive activities.

The majority of our health care workers in particular hospital nurses had involved in rotating shift work. Knutsson and Nilsson (1998) reported that night-shift workers among female nurses in United States were more likely to smoke. The prevalence of current smoker among nurses with more than 15 years of shift work was 25% compared with non shift nurses (17%) (46). A systematic review on the associations between shift work and people's modifiable lifestyle factors (diet, physical activity and smoking) reported that shift workers were more likely to be smokers or smoke more and to have a poorer diet when compared with day workers (45, 47). Thus, shift work has negative impacts on worker's daily life and further lead to poorer health outcome like smoking, obesity and inactivity.

Those who perceived excellent health reported the highest prevalence of healthy lifestyle. A cross-sectional study had found nurses who reported good health status was more likely to practice recommended physical exercise (62%). However, no differences were found in regard to smoking status, alcohol consumption and BMI (48). McFall *et al*. (2009) in their study reported health care student who reported better personal health do have a positive attitude toward the prevention of cardiovascular disease. However, the study did not assess the association between personal health and the practice of cardiovascular preventive activities (49).

A local unpublished study had demonstrated a significant association between family history of CVD and optimal cardiovascular screening activities among school teachers (50). Another previous cross-sectional study showed that no association between family history and a current amount of regular physical activity among four general practice attendees in Sydney West area. However, similar study found that those with a strong family history of premature CVD had smoked more pack-years compared with those with an average family history (51). The explanation for this association, possibly due to shared family practices, behaviors and familial clustering of coronary risk factors such as smoking, sedentary behavior, and obesity (52).

2.7 Conceptual Framework

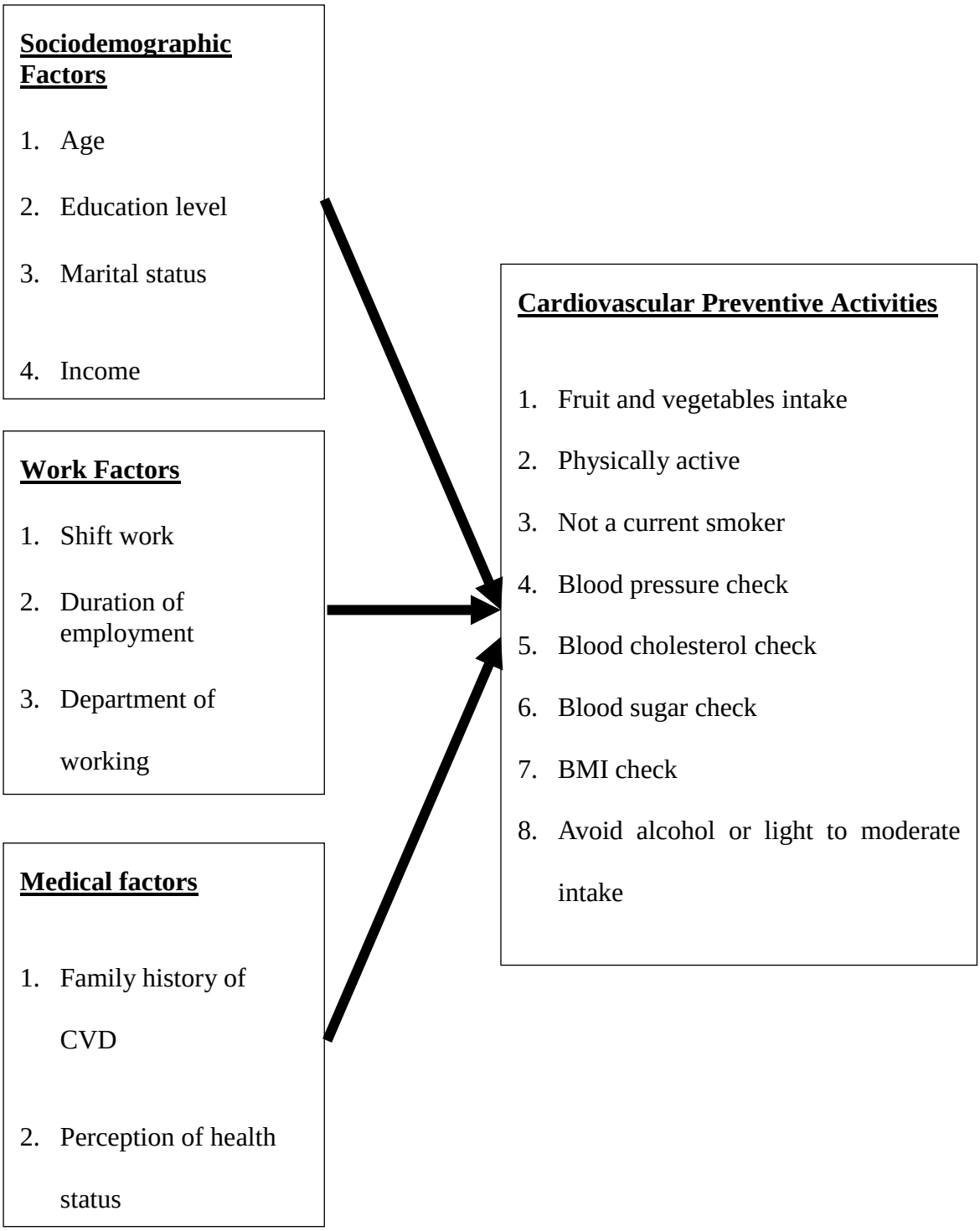

Figure 1 The conceptual framework of cardiovascular preventive activities among female nurses

CHAPTER 3: OBJECTIVES

3.1 General objective

To study the cardiovascular preventive activities and its associated factors among female nurses in USM Hospital

3.2 Specific objectives

1) To determine the prevalence of good cardiovascular preventive activities among female nurses in USM Hospital

2) To identify the associated factors for the good cardiovascular preventive activities among female nurses in USM Hospital

3.3 Research hypotheses

1) Sociodemographic factors (age, marital status and education), work-related factors (shift work and department of employment) and medical factors (family history of CVD and perception of health status) are significantly associated with good cardiovascular preventive activities among female nurses in USM Hospital

3.4 Study operational definitions

Good cardiovascular preventive activities are defined as completed eight screening activities which are:

1. Five or more servings per day of fruit and vegetable (14, 30)

2. Physically active is defined as activities achieving a minimum of at least 600 MET min/week (53)

3. Not a current smoker (those who never smokes at all or ex-smoker) (53, 54)

4. Blood pressure check in the past one year (33)

5. Blood cholesterol check in the past one year (34)

6. Blood sugar check in the past one year (35)

7. BMI check within the last one year (34)

8. Avoid alcohol or light to moderate alcohol intake (36, 37)

CHAPTER 4: METHODOLOGY

4.1 Study setting

This study was conducted at Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan. USM Hospital is a renowned teaching hospital and reference centre in Kelantan and East Coast. As a teaching hospital, USM Hospital provides teaching and also research facilities in all fields include medical science, dentistry and general health. As a tertiary referral centre, this hospital also provides services in medical, dentistry and general health. It has multidisciplinary departments. This study involved all the departments in this hospital include their outpatient clinics.

4.2 Study design

This is a cross-sectional study.

4.3 Study period

Period of data collection for this study was from 1st June 2015 till 31st August 2015.

4.4 Reference population

All female nurses in USM Hospital

4.5 Source population

All registered female nurses in USM Hospital from January 2014 till 1st June 2015

4.6 Study population

The study sample was all the registered female nurses in USM Hospital who fulfilled the inclusion and exclusion criteria.

4.7 Inclusion criteria

1. Currently working registered female nurses in USM Hospital

Registered professional nurses is defined as graduate nurses, assistant nurses, midwives and community nurses who are registered with the Nursing Board Malaysia and Midwives Board Malaysia respectively in accordance with the Nurses Act, 1950 and Midwives Act, 1966 (55).

2. Age more than 40 years old

4.8 Exclusion criteria

1. Nurses on long-term leave

Long term leave is defined as any type of leave more than two weeks during the study period including sick leave, maternity leave or study leave.

2. Administrative nurses

Administrative nurses are referred to all nurses who work at the nursing department, medical record department or any kind of labs.

3. Nurses with hypertension, diabetes, hypercholesterolemia, peripheral vascular disease, cerebrovascular disease and ischaemic heart disease (IHD).

4.9 Sampling method

The list of female nurses was obtained from the hospital nursing registry. For sampling purpose, universal sampling is used where all registered nurses who fulfilled the inclusion and exclusion criteria were included in the study.

4.10 Sample size calculation

4.10.1 Sample size for objective 1

The largest sample size was obtained from sample size calculation to determine the proportion of cardiovascular preventive activities among nurses used single proportion formula. With the value of standard normal distribution of 1.96, the precision of 0.06, the percentage of nurses with cardiovascular preventive activities of 78.1% (56), the minimum sample size was 183 and after considering 20% non-response rate, the calculated sample size was 220.

4.10.2 Sample size for objective 2

The sample size for comparing two proportions using the Power and Sample size calculation (PS) was used for categorical variables. The calculation of sample size as follows:

$\alpha = 0.05$

Power = 0.8

$P_0 = 0.3$ (proportion of shift work nurses among poor cardiovascular preventive activities) (45)