PREVALENCE OF CLUSTERING OF LIFESTYLE CARDIOVASCULAR RISKS AND ITS ASSOCIATION WITH CARDIOVASCULAR SCREENING ACTIVITIES AMONG APPARENTLY HEALTHY GOVERNMENT SERVANTS IN 'WISMA PERSEKUTUAN' KUALA TERENGGANU, TERENGGANU

by

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ABSTRAK

Pengenalan: Penyakit kardiovaskular adalah penyebab utama kematian dan kecacatan di kalangan lelaki dan wanita dalam hampir semua negara, termasuk Malaysia dan dijangka kekal punca utama kematian sehingga 2030. Risiko kardiovaskular dalam gaya hidup seperti tabiat pemakanan, kurang aktiviti fizikal dan merokok dianggap faktor risiko asas untuk penyakit kardiovaskular. Beberapa kajian di negara-negara maju telah mendapati bahawa faktor-faktor risiko gaya hidup berlaku dalam kombinasi dengan satu sama lain dan tidak diedarkan secara rawak di seluruh populasi.

Metodologi: Kajian keratan rentas ini telah dijalankan dari bulan Jun hingga Ogos 2013 untuk menentukan prevalens risiko gaya hidup, kelompok risiko gaya hidup, dan pemeriksaan yang optimum; untuk menentukan kaitan kelompok gaya hidup berisiko dengan aktiviti pemeriksaan kardiovaskular di kalangan kakitangan kerajaan di Kuala Terengganu, Malaysia. Satu soal selidik yang terdiri daripada satu borang laporan kes, boring kajian Aktiviti Fizikal Antarabangsa Questionnaire (IPAQ) dan komponen pemakanan langkah WHO telah digunakan sebagai alat. Soal selidik telah diedarkan kepada 121 kakitangan kerajaan yang berumur ≥20 tahun tanpa sebarang penyakit kardiovaskular ditubuhkan. Pemeriksaan kardiovaskular untuk sejarah tekanan darah, glukosa darah, lipid serum dan pengukuran BMI dilakukan untuk setiap peserta.

Penemuan: Kadar tindak balas kajian adalah 90.9% (110 121). Prevalen merokok, gaya hidup tidak aktif serta pemakanan yang tidak sihat adalah masing-masing 20%, 50% dan 87%. Prevalen adalah lebih dalam kumpulan sosio-ekonomi yang rendah. Kelaziman kelompok gaya hidup risiko kardiovaskular adalah 57%. Prevalen pemeriksaan kardiovaskular optimum bagi umur adalah 49%. Kelompok risiko gaya hidup nyata yang berkaitan dengan pemeriksaan yang tidak optimum ($p = 0.004$). Faktor-faktor penting lain

yang berkaitan dengan pemeriksaan tidak optimum ialah jantina perempuan, umur dan lawatan terakhir untuk pengamal perubatan yang lebih daripada satu tahun.

Kesimpulan: Langkah-langkah yang perlu dilakukan untuk menggalakkan pemakanan sihat yang mampu dimiliki dan aktiviti gaya hidup sihat. Promosi gaya hidup sihat perlu dilakukan melalui tindakan bersinergi sektor penjagaan asas kesihatan awam dan dan penekanan perlu dibuat di peringkat penjagaan primer untuk melindungi mereka yang mempunyai pelbagai risiko kardiovaskular dalam gaya hidup untuk mengoptimumkan pencegahan penyakit kardiovaskular.

ABSTRACT

Introduction: Cardiovascular diseases are the leading cause of death and disability among men and women in nearly all nations, including Malaysia and are projected to remain the single leading cause of death up to 2030. Lifestyle cardiovascular risks such as dietary habits, physical inactivity and smoking are considered fundamental risk factors for cardiovascular disease. Some studies in developed countries have found that lifestyle risk factors occur in combination with each other and are not randomly distributed across populations.

Methodology: This cross-sectional study was done from June to August 2013 to determine the prevalence of lifestyle risks, clustering of lifestyle risks, and optimal screening; to determine the association of clustering of lifestyle risks with cardiovascular screening activities among government servants in Kuala Terengganu, Malaysia. A questionnaire which consisted of a case report form, International Physical Activity Questionnaire (IPAQ) and the dietary component of WHO STEPs were used as tools. The questionnaires were distributed to 121 government servants aged ≥20 years without any established cardiovascular disease. Cardiovascular screening for a history of blood pressure, blood glucose, serum lipids and BMI measurement were done for each participant.

Findings: The study response rate was 90.9% (110 of 121). Prevalence of smoking, physical inactivity and unhealthy diet were 20%, 50% and 87% respectively. Prevalence was more in the lower socio-economic group. The prevalence of clustering of lifestyle cardiovascular risks was 57%. The prevalence of optimal cardiovascular screening for age

was 49%. Clustering of lifestyle risks was significantly associated with non-optimal screening (p=0.004). Other significant factors associated with non-optimal screening were female gender, age and last visit to medical practitioner more than one year.

Conclusion: Measures needed to be done to promote affordable healthier diet and healthy lifestyle activities. Promotion of healthy lifestyle behaviors should be done via synergistic action of public health and primary care sectors and emphasis should be made at primary care level to screen those with multiple lifestyle cardiovascular risks in order to optimize cardiovascular disease prevention.

CHAPTER 1
INTRODUCTION

Cardiovascular diseases are the leading cause of death and disability among men and women in nearly all nations, and are projected to remain the single leading cause of death up to 2030(1). According to the ICD 10 classification, cardiovascular disease (CVD) comprises the disease of the heart and blood vessels within the body and is usually related to atherosclerosis. In Malaysia, it is found that the disease of the circulatory system is the leading cause of mortality in Ministry Of Heath hospitals in 2013, causing 24.7% of deaths(2)

Identification of persons at higher or lower risk for cardiovascular events is important to facilitate effective use of resources and interventions to reduce disease burden among individuals and in society(3). Each of the established risk factors for cardiovascular disease; age, gender, dyslipidemia, hypertension, diabetes mellitus, and smoking; have been highlighted as useful for prediction of risk. Integration of these factors into risk scores, for example the Framingham Risk Score, provides quantification of risk of developing coronary heart disease(4). In the prevention of cardiovascular disease, prevention and control of cardiovascular disease risks is of utmost importance. However, besides focusing on established cardiovascular risks, the lifestyle cardiovascular risks should be tackled in order to optimize the prevention of cardiovascular disease. Established risks for cardiovascular disease such as dyslipidaemia, hypertension and diabetes are strongly influenced by lifestyle cardiovascular risks such as dietary habits, physical inactivity, smoking, and adiposity(3). These lifestyle cardiovascular risks also affect novel pathways of risk such as inflammation or oxidative stress, endothelial function, thrombosis or coagulation, and arrhythmia and other intermediary pathways (for example psychological stress)(5).

Studies have shown that pharmacological treatment of blood pressure, blood lipids, and glucose levels only incompletely treats the adverse consequences of unhealthy lifestyle habits. Patients with drug-treated hypertension, high cholesterol, or diabetes mellitus are often still at

higher risk for cardiovascular events than individuals who do not have these unhealthy lifestyle habits(6). A population based prospective cohort showed that the incidence of myocardial infarction decreases with the number of positive behaviors in both healthy men and in those with hypertension and hyperlipidemia(7). Even at ages 70 to 75 years, the unhealthy lifestyle behaviors which are smoking, having a low-quality diet, and being physically inactive were singly related to an increased mortality risk (hazard ratios ranged from 1.2 to 2.1). The risk of death was further increased for all combinations of two unhealthy lifestyle behaviors. Finally, men and women with all three unhealthy lifestyle behaviors had a three- to fourfold increase in mortality risk(8). These results underscore the importance of a healthy lifestyle, including multiple lifestyle factors, and the maintenance of it with advancing age. Furthermore, modest alterations of these lifestyle risk factors are achievable and have substantial effects on cardiovascular risk. Thus, basic lifestyle habits should be considered fundamental risk factors for cardiovascular disease(3).

All these facts show how important it is to address the issue of lifestyle cardiovascular risks in patients. Health promotion in particular for a healthy lifestyle and wellness has been the focus of the Ministry of Health Malaysia since the year 2000. At the same time, emphasis has been given on screening of the cardiovascular risk to assess a person's individual risk of developing a cardiovascular event in the future. It is important that the group with cardiovascular risks be screened, implying that all the efforts of health promotion results in advocating a healthy lifestyle in those with lifestyle cardiovascular risks. Knowing the local prevalence of lifestyle cardiovascular risks, and factors associated with cardiovascular screening activities would therefore empower us in addressing the cardiovascular disease epidemic.

CHAPTER 2

LITERATURE REVIEW

2.1 Lifestyle cardiovascular risk

Evidence from research has demonstrated that a number risk factors significantly increase the risk of developing cardiovascular events(9). Risk factors are defined as any attributes, characteristics and exposure which increase the likelihood of developing a chronic non-communicable disease(10). A multi-centre case control study of 52 countries noted that optimization of nine easily measured and potentially modifiable risk factors could potentially result in a 90% reduction in the risk of an initial acute myocardial infarction. According to this report, these are smoking, abnormal lipids, hypertension, diabetes mellitus, obesity, unhealthy diet, physical inactivity, excessive alcohol consumption and psychosocial stress(11). Most persons in the general population have one or more risk factors for CVD(12).

Lifestyle risk factors such as dietary habits, physical inactivity, smoking, and adiposity, strongly influence the established cardiovascular risk factors and also affect novel pathways of risk such as inflammation or oxidative stress, endothelial function, thrombosis or coagulation, and arrhythmia(3). Even at ages 70 to 75 years, the unhealthy lifestyle behaviors smoking, having a low-quality diet, and being physically inactive were singly related to an increased mortality risk (hazard ratios ranged from 1.2 to 2.1). The risk of death was further increased for all combinations of two unhealthy lifestyle behaviors. Finally, men and women with all three unhealthy lifestyle behaviors had a three- to fourfold increase in mortality risk(8). These results

underscore the importance of a healthy lifestyle, including multiple lifestyle factors, and the maintenance of it with advancing age.

Modest alterations of lifestyle risk factors have powerful effects on cardiovascular risk. A population based prospective 11 years cohort which was followed up until 2009 showed that a combination of 5 low-risk behaviours which consist of a healthy diet, moderate alcohol consumption, no smoking, being physically active, and having a healthy weight may prevent 4 of 5 myocardial infarction in the population. The study also found that the incidence of myocardial infarction decreases with the number of positive behaviors in both healthy men and in those with hypertension and hyperlipidemia(7).

2.1.1 Physical inactivity

Physical inactivity has an important role in contributing to non-communicable diseases in Malaysia. The prevalence of physical inactivity was 35.2% as reported in the fourth Malaysian National Health and Morbidity Survey 2011. Prevalence was more among women, older age group, and higher socioeconomic group(13). Physical inactivity along with other major risk factor is a significant global burden for CVD. Many literatures have suggested that physical activity will reduce risk for CVD. Physical inactivity constitute an independent target for intervention(14, 15).

Benefits of physical activity are remarkable. Strong evidence demonstrates that, compared to less active persons, more active men and women have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer, and depression(16). Physical activity raises high-density lipoprotein cholesterol, lowers low-density lipoprotein cholesterol and triglycerides, lowers

blood pressure, improves fasting and postprandial glucose-insulin homeostasis, induces and maintains weight loss, improves psychological well-being, and likely lowers inflammation, improves endothelial function, and facilitates smoking cessation. Moreover, physical activity and fitness are associated with 30% to 50% lower risk of cardiovascular events(17). In a study investigating vigorous exercise in leisure time, present in 125 (25%) of the men, and these as a group had significantly fewer electrocardiographic abnormalities (changes compatible with myocardial ischaemia, ectopic beats, and sinus tachycardia) than the men not reporting vigorous exercise ($P<0.02$)(18). Great benefit can be achieved with modest activity, for example 30 minutes of brisk walking on most days(17). Thirty minutes of regular moderate intensity physical activity preferably all days of the week can limit health risk for chronic disease including coronary heart disease and diabetes(19).

2.1.2 Smoking

Smoking is an established cause of a plethora of diseases and is responsible for 50% of all avoidable deaths in smokers, half of these due to CVD. Smoking is associated with increased risk of all types of cardiovascular diseases and coronary heart diseases, ischaemic stroke, peripheral arterial disease, and abdominal aortic aneurysm. According to estimations from SCORE, 10-year fatal cardiovascular risk is approximately doubled in smokers (20). Smoking nearly doubles the risk of stroke. The incidence of coronory heart disease is twice as high in smokers compared to non-smokers(21). National prevalence of smoking had increased from

21.5% in 2006 to 23.1% in 2011. In the 2011 survey, 43.9% of men smoked, while 1% of women smoked. Among those who ever smoked, only 9.5% succeeded in quitting (13, 22).

The harmful effects of smoking and the tremendous benefits of smoking prevention and cessation are well established(5). Quitting smoking produces remarkable benefit by reducing total mortality by approximately one third(23). Declines in smoking have substantially reduced cardiovascular events in some populations, but many individuals continue to smoke and smoking and smoking-related deaths are increasing in many subgroups and regions(24).

In a review paper, LaCroix and Omenn stated that the overall risk of death among former smokers approaches that of persons who have never smoked after 15 to 20 years of abstinence(25). Other studies have indicated that mortality among former smokers approaches the level of never smokers after a smoking cessation time of 10 to 20 year(26).

2.1.3 Unhealthy Diet

Dietary habits also powerfully affect cardiovascular risk, either through an effect on risk factors such as serum cholesterol, blood pressure, body weight, and diabetes, or through an effect independent of these risk factors(3).

There is growing interest in dietary patterns for prevention of cardiovascular disease, of which the Mediterranean diet is the most studied(27). As compared with the diets in northern Europe and the United States, the Mediterranean diet at base line contained less meat and fewer dairy products but more olive oil, fish, fruits, vegetables, and alcohol. A substantial increase in the consumption of vegetables and fruit in Finland starting in the early 1970s contributed to the decline in mortality from CHD(28).

Low intake of fruits and vegetables of less than 5 servings a day has been associated with increased cardiovascular risk(29). At the national level, 92.5% (16.4 million) of adults 18 years and above consumed less than 5 servings of fruits and vegetables per day(30). In a local study of university students, most students consume fruits (male: 65.6%, female: 58.3%) and vegetables (male: 45.6%, female: 44.5%) in 1 to 4 times a week. The study also found that 33.3% of male students and 29.1% of female students consume fast food several times a week(31). Another local study among employees in a local university found that 92.1% participants consumed less than 5 servings of fruits and vegetables per day(32).

In randomized trials, dietary habits affect both established and many other intermediary risk factors. Modest consumption of oily fish (1 to 2 servings per week) reduces CHD death by 36%, with 17% reduction in total mortality in randomized controlled trials of fish oil in higher-risk populations(33). Prospective studies indicate consistent and substantial reductions in cardiovascular risk related to lower trans fat consumption and consumption of fruits and vegetables(29).

For many lifestyle habits, the impact on health of a single behavioral change is substantial. In combination, changes in lifestyle habits produce even greater benefits. This is particularly proven in dietary changes. In a secondary prevention trial, advice to consume a Mediterranean-type diet (vegetables, fruits, fish, chicken, grains, canola margarine) reduced risk of myocardial infarction or cardiac death by 72% over a 4-year follow-up(34). In another trial, modest lifestyle recommendations such as advice to consume a healthy low-calorie diet and be moderately active reduced incidence of diabetes mellitus by 58% compared with placebo and by 39% compared with metformin. Although both lifestyle and metformin lowered glucose levels thus lessening the nominal diagnosis of diabetes mellitus, only the lifestyle intervention

improved multiple other established cardiovascular risk factors related to physical inactivity, adiposity, and poor dietary habits(35).

On the basis of population-wide benefits and minimization of adverse drug effects, changes in lifestyle may be most important for primary prevention. However, many lifestyle habits (both good and bad) may confer similar relative effects for secondary prevention(34). All lifestyle recommendations do not affect cardiovascular risk equally because of lower efficacy of the specific chosen recommendations (for example decreasing total fat intake)(33), ineffective mode of delivery, or competing environmental or societal factors.

2.2 Clustering of lifestyle risks

2.2.1 Evidence of Clustering

Some studies have found that lifestyle risk factors occur in combination with each other and are not randomly distributed across populations. A study examining the English adult population and the clustering of four major lifestyle risk factors (smoking, heavy drinking, lack of fruit and vegetables consumption, and lack of physical activity) found a majority of the English population have multiple lifestyle risk factors at the same time. Clustering was found at both ends of the lifestyle spectrum and was more pronounced for women than for men. Overall, multiple risk factors were more prevalent among men, lower social class households, singles, and people who are economically inactive, and are less prevalent among home owners and older age groups(36).

2.2.1Impact of clustering of unhealthy lifestyle

The single and combined effects of three healthy lifestyle behaviors; nonsmoking, being physically active, and having a high-quality diet; on survival were investigated among older people in the SENECA Study, an European longitudinal study. For both men and women, an increasing number of unhealthy lifestyle behaviors appeared to be related to a higher mortality rate. More women than men (23 percent versus 12 percent) had a healthy lifestyle, including nonsmoking, a moderate or high activity level, and a high-quality diet. Because of the low number of smokers in the female group, only 22 women (3 percent) had three unhealthy lifestyle behaviors. Approximately 75 percent of men and women had one or two unhealthy lifestyle behaviors. The single lifestyle factors and the lifestyle score were related to mortality. Even at ages 70 to 75 years, the unhealthy lifestyle behaviors smoking, having a low-quality diet, and being physically inactive were singly related to an increased mortality risk (hazard ratios ranged from 1.2 to 2.1). The risk of death was further increased for all combinations of two unhealthy lifestyle behaviors. Finally, men and women with all three unhealthy lifestyle behaviors had a three to fourfold increase in mortality risk. These results underscore the importance of a healthy lifestyle, including multiple lifestyle factors, and the maintenance of it with advancing age(8).

2.3 Assessment of lifestyle cardiovascular risk

Assessment of lifestyle behaviours in particularly smoking, diet and physical inactivity mostly differ between studies.

Even assessment of smoking in the national health and morbidity survey changed with newer surveys. In NHMS III, current smokers were those who smoked at least once in 30 days, while ex-smokers were those who did not smoke for the past month but smoked more than 100 cigarettes in their lifetime.

The SENECA Study used a lifestyle score which was calculated by adding the scores of the lifestyle factors physical activity, dietary quality, and smoking habits (8), while some others considered them separately. In the SENECA Study, former smokers were split into two groups with smoking cessation times of ≤15 years and >15 years. The following two smoking groups were composed: 1) current smokers and persons who had stopped smoking ≤15 years previously, designated “smokers”; and 2) never smokers and persons who had stopped smoking more than 15 years previously, designated “nonsmokers”(8). The assessment of diet is characterized by a 3-day estimated food record and a frequency checklist of foods, based on the meal pattern of each particular country. Portion sizes were based on standard portion sizes and/or were checked by weighing. Foods were coded and analyzed for nutrient composition at each participating center separately; using country-specific food composition tables Food intake data were arranged into food groups according to the EUROCODE classification system. Dietary quality was measured in one variable, Mediterranean diet score, a measure of how well dietary intake approximates the typical Mediterranean diet. The sex-specific median intake values of the food items were used as cutoff points. If the subject’s intake was comparable to the Mediterranean diet, the food item was coded 1, and if not it was coded 0. Physical activity was measured with a physical activity score including household, sport, and leisure-time components. For classification of physical activity, sex-specific tertiles (low, intermediate, and high physical activity) were composed.

In another study in diabetic sufferer in Spain, subjects were classified as sedentary if they acknowledged engaging in no leisure time or physical activity; tobacco use was categorized as current smokers and non/ex-smokers and answering “no” to the question, “Are you on a diet now,” was considered an unhealthy lifestyle behavior(37).

A cross-sectional study examining the relationship between the clustering of behavioural risk factors and compliance with clinical preventive practices defined smokers as persons who had smoked more than 100 cigarettes over their lifetimes and were currently smoking; unbalanced diet was defined as consumption of fewer than 2 portions of fruit, juices or vegetables in the preceding 24 h. Leisure-time sedentariness as the absence of moderate or more intense activity a minimum of 3 times per week for 30 min each time. Leisure time physical activity was calculated in METs on the basis of the frequency and duration of sports and leisure activities in the preceding 2 weeks. Moderate physical activity was taken as being equal or superior to 3 METs . Others have used physical inactivity during leisure time as well(37).

WHO has outlined an instrument called STEPwise approach to chronic disease risk factor surveillance (WHO Steps) which includes assessment of physical activity, smoking and diet. Assessment of physical activity comprises of physical activity during work, travel and leisure activity(38, 39).

WHO Steps uses the question of intake of servings of fruits and/or vegetables per day for dietary assessment with the best is five or more servings, which have been used in other studies as well(38). A local study on prevalence of major cardiovascular risk factors among employees of Engineering Campus, Universiti Sains Malaysia in Penang which used a simplified version of the 'WHO Stepwise approach to surveillance of non-communicable disease risk factors' used this question to assess the diet of the respondents .

International Physical Activity Questionnaire is an instrument designed primarily for population surveillance of physical activity among adults. It has been developed and tested for use in adults (age range of 15-69 years) and validated in Malay. IPAQ assesses physical activity undertaken across a comprehensive set of domains including:

a. leisure time physical activity

b. domestic and gardening (yard) activities

c. work-related physical activity

d. transport-related physical activity;

The pattern of activity to be classified as ‘moderate’ is either of the following criteria:

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(39).

2.4 Screening of cardiovascular disease

Screening is defined as systematic application of a test to identify individual at sufficient risk of a specific disorder to benefit from further investigation or direct preventive action, among people who have not sought medical attention because of symptoms of that disorder(40).

Both the control of behavioral or lifestyle risk factors and secondary prevention activities have been shown to reduce mortality and morbidity from chronic disease, in particular cardiovascular disease.

The health vision of Malaysian Health care system focuses on wellness, which is a state before disease start or set-in. Cardiovascular screening program is one of the program launched by the MOH under the NCD control program. This program which started in 1999 screens people who are 35 and above and those high risk according to the Ministry of Health guidelines(41).

Many guidelines recommended that cardiovascular risk assessment be conducted at least every five years among adults aged 40 and older(42). According to the 2010 ACCF/AHA Guideline for assessment of cardiovascular risk in asymptomatic adults, the evidence with regard to global risk scores is most appropriate for individuals from 40 years of age. It is important to note that there are limited data from Framingham and other long-term observational studies on 10-year risk in young adults; consequently, it is difficult to estimate 10-year risk in young adults. However, to direct attention to the lifetime significance of coronary risk factors in younger adults, the writing committee of the 2010 ACCF/AHA Guideline considered measurement of a global risk score possibly worthwhile even in persons as young as age 20. Therefore they recommend most regular cardiovascular screening tests begin at 20 years old.

Most health authorities that recommend screening and risk assessments for CVD does not define what is the optimal for CVD screening in primary care. There was systematic review done comparing various guidelines for CVD screening but no consensus was found on target population, treatment and screening test(43). Noraza et al have defined respondent who underwent five screening activities as those who underwent optimal screening activities (Blood pressure measurement, blood cholesterol measurement, blood sugar measurement, smoking assessment and BMI measurement). These are based on recommendation from the following guidelines:

Table 1: Recommendation from Prominent Guidelines -updated from Noraza et al(41)

Parameter for CVD Prevention	**Joint British Societies (2005)** [44]	**SIGN (2007)**	**European Society of Cardiology**	**American Heart Association**

			(2012[9])	**(2002,2007)[45, 46]**
Blood pressure measurement	√	√	√	√
Blood cholesterol measurement	√	√	√	√
Blood sugar measurement	√	√	√	√
BMI measurement	√	√	√	√
Smoking Assessment	√	√	√	√

2.4.1 Screening for hypertension

Evidence from studies support blood pressure screening of adult as the treatment of hypertension may reduce the blood pressure level and lower the incidence of cardiovascular event (stroke, myocardial infarction and heart failure)(42). Malaysian clinical practice guideline for hypertension recommended that blood pressure should be measured at every clinical encounter for adult age 18 and above. The screening interval is base on blood pressure measurement of the patient. For those with blood pressure less than 130/85 mmHg follow up recommended is within 1 year(47).

2.4.2 Screening for dyslipidaemia

Malaysian clinical practice guideline recommended all adult age 20 years should be screen for a complete fasting lipid profile (TC, LDL-C, HDL-C, TG)(48). The American Association of

Clinical Endocrinologists (AACE) recommends that all adults 20 years of age for dyslipidemia every 5 years as part of a global risk assessment(49). USPSTF states that an optimal screening interval is uncertain, but every five years is reasonable for low-risk women, with more frequent intervals for those who have borderline values or CVD risk factors.

2.4.3 Screening for diabetes mellitus

The Malaysian clinical practice guideline for diabetes recommends those with one or more risk factors or age more than 30 should have annual screening(50). Based on recommendation from American Diabetic Association (ADA), screening for type 2 diabetes mellitus should begin at age 45 (younger for women at higher risk), and if normal, should be repeated every 3 years.

2.4.4 Screening for tobacco use

Malaysian Clinical Practice Guideline on treatment of tobacco has recommended all patient should be asked if they used tobacco and should have their tobacco used status documented on a regular basis(51). Evidence has shown that the tobacco assessments significantly increases rates of clinician intervention(51). Clinicians screens for tobacco use and provide smoking cessation interventions(52). Brief screening and counseling interventions (3 minutes or less) have proven to increase quit rates among smokers(51, 52).

2.4.5 Screening for obesity

All women should be screened for obesity using the body mass index (BMI)—body weight in kilograms divided by the height in meters squared [kg/m^2]—at least every 2 years(53).

The USPSTF recommended clinicians screen all adults for obesity and offer or refer obese patients to intensive, multicomponent behavioral interventions(54). BMI should be used to classify overweight and obesity and to estimate relative risk for disease compared to normal weight. Overweight is defined as BMI > 23kg/m. Obesity is associated with many other diseases and it warrant recognition by health care providers(19). The measurement can be used as a reference point in monitoring the patient when weight management is introduced.

2.4.6 Screening for physical inactivity

Clinicians should encourage all of their patients to engage in an appropriate exercise regime. Thirty minutes of regular moderate intensity physical activity preferably all days of the week can limit health risk for chronic disease including coronary heart and diabetes(19). Women should accumulate a minimum of 30 minutes of moderate-intensity physical activity on most, and preferably all, days of the week. (55). General advice on cardiovascular health would be for modest exercise, such as brisk walking for a total of at least 150 mins per week(56).

2.4.7 Screening for dietary habits

It is recommended that at every visit to the clinic the health provider should assess regarding diet which includes types and amount of fat eaten, food group eaten and use of nutritional supplement(55). Low intake of fruits and vegetables of less than 5 servings a day has been associated with increased cardiovascular risk(29). Therefore WHO Steps has used the question of intake of servings of fruits and/or vegetables per day for dietary assessment with the best is five or more servings, which have been used in other studies as well(38).

2.5 Association between lifestyle and screening

In developed countries, clustering of behavioural risk factors has been found to be associated with greater non-compliance with recommendations for both blood pressure and cholesterolaemia testing, and for cytology and mammography screening(37). In a cross-sectional study in Spain involving a sample of 16043 persons, a positive dose–response association was observed between the number of behavioural risk factors which were tobacco smoking, hazardous alcohol drinking, leisure-time sedentariness and unbalanced diet; and non-compliance of recommendations for blood-pressure and cholesterol testing, and for cytology and mammography screening. Compared to subjects with no behavioural risk factors, those with all four risk factors showed a higher frequency of non-compliance of blood pressure and cholesterolaemia assessment, both in men and women. This indicates the close relationship between major clinical and public health challenges for the control of chronic diseases.

This relationship constitutes an argument for more effective coordination of clinical-service and public-health efforts in view of the greater difficulty of recruiting persons with unhealthy lifestyles for population-screening programmes. An example of coordination of efforts might be the role of clinical services motivating patients to participate in such programmes through opportunistic counselling during clinical encounters that arise for other reasons. It also shows that clinical preventive services are provided neither equitably nor efficiently, since subjects at highest risk are less likely to receive them(57). It is also found that this happens not only in the general population, but adherence to recommended clinical preventive services is found to be under desirable levels in the higher risk group; diabetic sufferers(37). Even in

developed countries, these preventive services are may be provided neither equitably nor efficiently, since subjects with unhealthier lifestyles are less likely to receive them.

2.6 Behavioural modification

It is often argued that strategies emphasizing lifestyle behaviors may be less effective or impractical compared with drug-based approaches. Such beliefs, together with powerful financial incentives for drug development, encourage polypharmaceutical strategies that target established and novel risk factors(3).

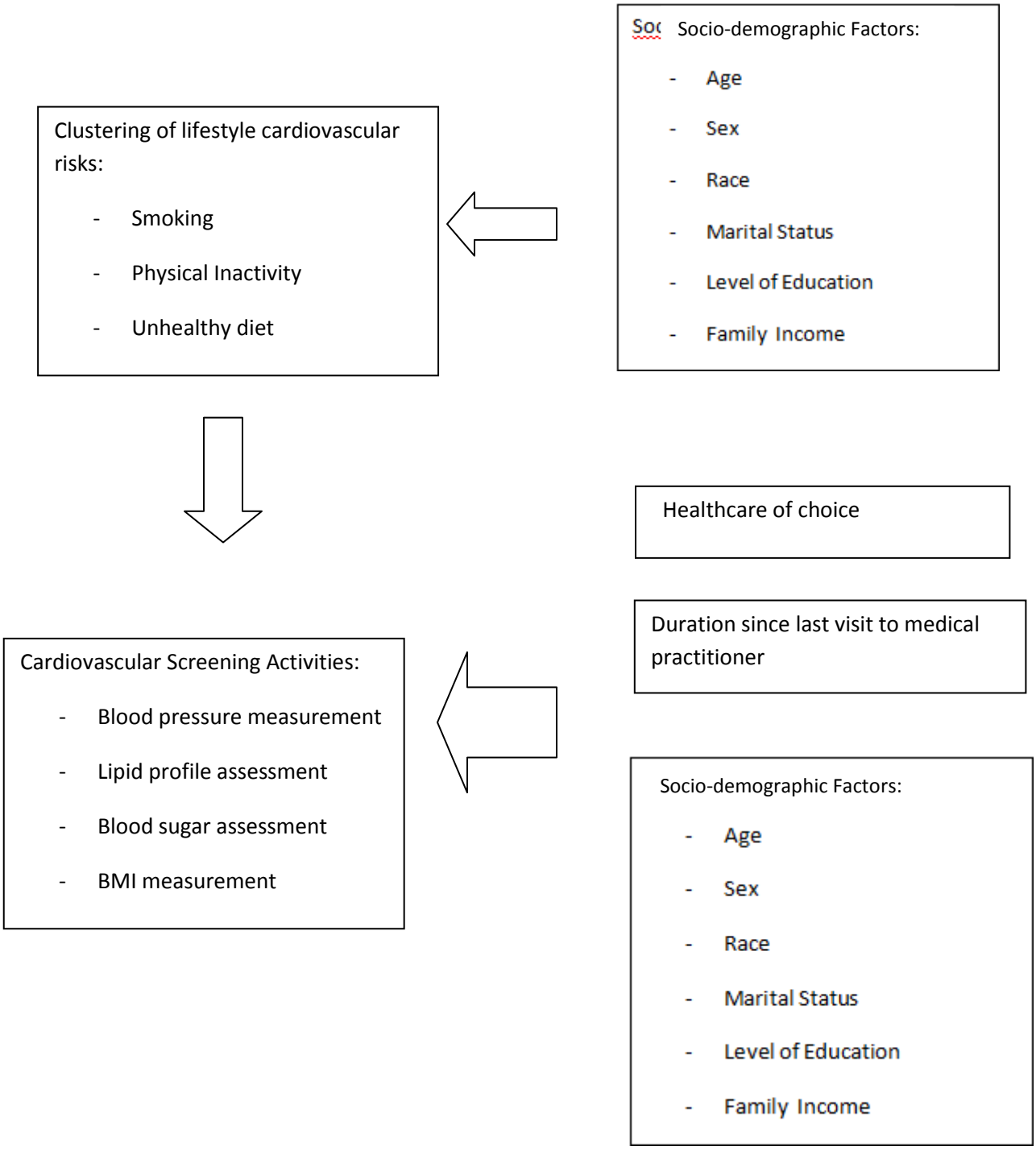
However, considerable evidence demonstrates that lifestyle behaviors can be changed. For decades, cigarette and food companies have altered our behavior with great aplomb. Emphasizing behavioral research, they have perfected methods for behavior modification and directed our lifestyle choices and habits highly effectively. Although public health programs and expertise to promote healthy lifestyles lag far behind those of industry, even basic campaigns can have a significant impact. Major gaps remain, but strategies to lessen smoking in the United States have been effective, reducing per capita tobacco use by nearly two thirds since the 1950s(3, 58). This shows that population-wide behavioral changes are clearly achievable.

Community-based trials have been variably successful at changing lifestyle habits and additional research is needed to determine optimal strategies for behavior change. Nevertheless, several randomized controlled trials have demonstrated that individual-targeted programs can modify lifestyle behaviors and improve a wide range of intermediary cardiovascular risk factors(3).

A study in Austria on cardiovascular (CVD) prevention showed that approximately 66.3% of men and 70.5% of women had engaged in active CVD prevention during the previous

12 months. The primary reasons for taking preventive action are health reasons and wanted to live longer. A gender-specific trend could be discerned in that men were significantly more likely than women to answer that they wanted to live longer, that they practiced prevention because their healthcare provider told them to, and because they already had symptoms of CVD (59). Although most adults engaged in prevention for their children and/or partner, more women than men considered their families to be a greater motivational factor for taking preventive action. Women were also significantly more likely than men to change their lifestyle to include a healthier diet(59).

2.7 Conceptual framework



2.8 Rationale of Study

Cardiovascular diseases (CVD), type 2 diabetes mellitus, and adiposity produce tremendous burdens of deaths, lost quality of life, and economic disruption globally. Most of these conditions and their sequelae are preventable or occur at unnecessarily young ages and are largely caused by suboptimal lifestyle habits, in particular, poor diet, physical inactivity, and use of tobacco(58).

Surveillance of these key modifiable risk factors is needed to monitor the magnitude of the problem and to study the effects of interventions(60). Besides that, clustering of cardiovascular risks is also important to be determined as it significantly increase the risk of developing cardiovascular events (61). There are evidence that cardiovascular risks tend to be clustered in certain individuals(62, 63). In turn, individuals with clustering of these risks are shown to be more likely to develop cardiovascular events, compared to those with only one risk(63). Lifestyle risks such as physical inactivity and unhealthy diet also have been linked to increased risk of various established cardiovascular risk factors and may contribute to the clustering of cardiovascular risks(64). Previous studies shown that lifestyle risks also tend to cluster among adult subjects(65). Data regarding the clustering of lifestyle risks from developing countries such as Malaysia are extremely limited.

Moreover, the Ministry of Health has focused on wellness program since the year 2000 and has invested a lot of time, effort and money for the cardiovascular prevention; both in health promotion and screening. **It's high time to see the effects of our efforts on the lifestyle and screening habits of the local population** which can help us in focusing our intervention to combat the rise of cardiovascular disease. Population-wide behavioral changes are achievable,

and therefore should be the core target of our intervention. Clustering of lifestyle risks, if found in the local population, would be a trigger for multiple target intervention. Identifying this group with clustering of lifestyle risk as a high risk group and knowing the group's tendency for screening activities would help in our clinical daily practice to make a difference in our patients' lives as an effort on our part for them to live without suffering from avoidable cardiovascular disease.

CHAPTER 3

OBJECTIVES

3.1 General Objective

To determine the prevalence of clustering of lifestyle cardiovascular risks and its association with non-optimal cardiovascular screening among apparently healthy government servants in Kuala Terengganu.

3.2 Specific objectives

i. To determine the prevalence of lifestyle cardiovascular risks apparently healthy government servants in 'Wisma Persekutuan' Kuala Terengganu.

ii. To determine the prevalence of clustering of the lifestyle risks apparently healthy government servants in 'Wisma Persekutuan' Kuala Terengganu.

iii. To determine the prevalence of optimal cardiovascular screening activities apparently healthy government servants in 'Wisma Persekutuan' Kuala Terengganu.

iv. To determine the associated factors for non-optimal cardiovascular screening activities apparently healthy government servants in 'Wisma Persekutuan' Kuala Terengganu.

3.3 Research hypothesis.

i. There is significant clustering of lifestyle cardiovascular risks among apparently healthy government servants in Kuala Terengganu.

ii. There is significant association between clustering of lifestyle cardiovascular risks and non-optimal cardiovascular screening activities among apparently healthy government servants in Kuala Terengganu.

3.4 Operational definitions

i. Lifestyle cardiovascular risks (lifestyle risks) is defined as physical inactivity, smoking and unhealthy diet.

- unhealthy diet is defined as intake of fruits and vegetables less than 5 portions per day.

- smoking is defined as any smoking in the past 30 days

ii. Clustering of lifestyle cardiovascular risks is defined as presence of more than one lifestyle cardiovascular risks.

iii. Optimal cardiovascular screening activities are screening activities done based on age and the national risk appropriate recommendation for each cardiovascular risk factors which include all of the following:

- blood lipids at 20 years and above at least once in the last five years

- blood glucose at 30 years and above (or earlier with risk factors) yearly

- blood pressure 18 and above at least once in the last one year

- obesity as Body Mass Index (BMI) measurement at least once in the last two years

iv. Low socioeconomic status is defined as income of less than RM3000 (taken from the eligibility of receiving 'Bantuan Rakyat 1 Malaysia' (BRIM) currently is income<RM3000)