Clustering of Lifestyle Cardiovascular Risk Factors Among Healthy Government Servants in Kuala Terengganu: Who And What to Target

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Abstract

Cardiovascular disease is the leading cause of death and disability among men and women in nearly all nations, including Malaysia. Lifestyle cardiovascular risk factors such as dietary habits, physical inactivity and smoking are considered fundamental risk factors for cardiovascular disease. Previous studies showed that the clustering of cardiovascular risk factors significantly increase the risk of developing cardiovascular events. Surveillance of these key modifiable risk factors, including its clustering and study of factors associated is needed to monitor the magnitude of the problem and effects of our interventions. This study aimed to determine the prevalence and factors associated with clustering of lifestyle cardiovascular risk factors among government servants in Kuala Terengganu, Malaysia. This was a cross-sectional study conducted between June and September 2013 among 121 government servants, selected using simple random sampling from all servants asymptomatic of cardiovascular disease at a multi-department government center in the capital of Terengganu. A questionnaire, which consisted of socio-demographic data, International Physical Activity Questionnaire (IPAQ) and the dietary component of WHO STEPs, were used as the research tools. Clustering of lifestyle cardiovascular risk was defined as the presence of two or more of the lifestyle risk factors. Prevalence of clustering of lifestyle risks in this study was 57% (95% CI: 0.47, 0.67). Respondents with income less than RM3, 000 was significantly associated with clustering of lifestyle cardiovascular risks (p=0.032, OR 2.57, CI: 1.08, 6.07). This study provides evidence of clustering of lifestyle risks in the local asymptomatic healthy subjects. Therefore, comprehensive lifestyle interventions may be an effective strategy for controlling CVD risk factors, especially among those with low socioeconomic status where affordable interventions should be suggested. A more effective approach should be identified to promote affordable healthier diet and healthy lifestyle activities.

Keywords: Clustering; Lifestyle; Cardiovascular Risk Factors; low socioeconomic status.

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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 classifications, 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 Health hospitals, causing 23.3% of deaths [2].

Identification of persons at higher or lower risk for cardiovascular events is important to facilitate the 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 dyslipidemia, hypertension and diabetes are strongly influenced by lifestyle cardiovascular risks such as dietary habits, physical inactivity, smoking, and adiposity [3]. These lifestyles 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, 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 behaviours in both healthy men and in those with hypertension and hyperlipidemia [7]. Even at ages 70 to 75 years, the unhealthy lifestyle behaviours that are smoking, having a low-quality diet, and being physically inactive were singly related to an increased mortality risk for cardiovascular disease [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. Previous research has also shown that men in heavy physical work have less evidence of myocardial ischaemia compared to less physically demanding work such as office work [9]. Therefore, government servants who are based in the office are vulnerable towards cardiovascular disease. Doing a research on a target group such as this will facilitate any intervention if needed. Moreover, health promotion, in particular, for a healthy lifestyle and wellness has been the focus of the Ministry of Health Malaysia since the year 2000. Despite these efforts, the prevalence of lifestyle cardiovascular risk factors such as smoking remains high [10]. Surveillance of these risk factors and their associated factors among a vulnerable group is crucial to implement effective intervention which will lead to reduction of morbidity and mortality from cardiovascular diseases. Thus, this study was done to determine the prevalence of clustering of lifestyle cardiovascular risks among government servants in Kuala Terengganu, Malaysia and determine the significant factors associated with it.

Methodology

This cross-sectional study was conducted between June and September 2013 after obtaining approval from the Human Research Ethics Committee Universiti Sains Malaysia on 27th December 2012. The objectives of the study are (i) to determine the prevalence of clustering of lifestyle cardiovascular risks among government servants in Kuala Terengganu, Malaysia and (ii) determine the significant factors associated with clustering of lifestyle cardiovascular risks among government servants in Kuala Terengganu, Malaysia.

Inclusion criteria were government servants working at the Federal Complex (Wisma Persekutuan), Kuala Terengganu who are 20 years old and above. Those who had any diagnosis of cardiovascular disease, hypertension, diabetes or dyslipidaemia were excluded from the study. The Federal Complex building had 30 government departments with approximately 866 staff. The directors of the respective departments were approached for permission to carry out the study within their premises and were briefed regarding the study. A list of the staff from each department was obtained and they were screened for the exclusion and inclusion criteria via a health checklist distributed and recollected in envelopes. Those who fulfilled the inclusion and exclusion criteria were put in a master-list. Simple random sampling was applied using a computer for the selection of 121 samples, which was then traced back to the master-list. The sample size was
calculated based on the biggest sample size for each objective with power of 0.80.

Afterwards, during multiple visits to the various departments from June to August 2013, those who have been selected were given consent form and a self-administered questionnaire. The questionnaires were then collected either on the spot or later according to the convenience of each subject.

The self-administered questionnaire includes three research tools as follows:

i. Case Report Form  
ii. International Physical Activity Questionnaire (IPAQ)  
iii. Dietary Component of ‘WHO STEPwise approach to chronic disease risk factor surveillance (STEPS)’

Case Report Form

Case Report Form requires response on socio-demographic data, which consist of age, gender, gross income, level of education, race and marital status; and smoking status.

Smoking section requires data on smoking: current smoking (any smoking for the past 30 days), stopped smoking and never smoked.

International Physical Activity Questionnaire (IPAQ)

IPAQ was integrated into the questionnaire to assess the physical activity level of the subjects. IPAQ short form 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). It has been validated in Malay and demonstrated good reliability and validity for the evaluation of physical activity among this Malay population. The ICC scores revealed moderate to good correlations (ICC = 0.54-0.92; P < .001) on items categorized by intensities and domains and a kappa (κ) of 0.73 for total activity. Validity results from a 7 day physical activity log were statistically significant (P < .001) across intensities and domains ($p = 0.67-0.98$) [11].

IPAQ assesses physical activity undertaken across a comprehensive set of domains including leisure time physical activity, domestic and gardening (yard) activities, work-related physical activity and transport-related physical activity.

Respondents were considered as having physical inactivity if the pattern of activity is less than ‘moderate’. 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.

Subjects who had moderate and high pattern of activity are considered as physically active.

Dietary Component of ‘WHO STEPwise approach to chronic disease risk factor surveillance (STEPS)’

For the assessment of healthy diet, the dietary component of WHO STEPS was inserted into the questionnaire. WHO has outlined an instrument called STEPSwise approach to chronic disease risk factor surveillance (STEPS) which includes assessment of physical activity, smoking and diet. Only the dietary component is taken from the instrument, which assesses the intake of servings of fruits and/or vegetables per day. Healthy diet is defined as five or more servings on an average day as being stated in the STEPS user manual [12]. It was based on the consensus among WHO Member States on a diet indicator regarding monitoring of the prevalence of persons aged 18+ years consuming less than five total servings (400 grams) of fruit and vegetables per day [13]. A higher consumption of fruit and vegetables is associated with a lower risk of all-cause mortality, particularly cardiovascular mortality. There was a threshold around five servings of fruit and vegetables a day, after which the risk of all-cause mortality did not reduce further [14]. A list of sizes of a serving according to the type of fruits and vegetables was attached with the questionnaire.

Clustering of lifestyle cardiovascular risk factors was defined as having more than one of the lifestyle risks, and subjects were then classified as having or not having clustering of lifestyle risk factors.

Data Analysis

All the data from the completed questionnaires were entered into IBM SPSS Statistics 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics was done using means and standard deviations for continuous data and frequencies (n) and percentages (%) for categorical data. Simple and Multiple Logistic Regression was used to determine the associated factors of clustering of lifestyle risk factors. Dependent variable was clustering of lifestyle cardiovascular risk factors and independent variables analysed were age, gender, income, marital status and education status.

Results

A total of 121 government servants were selected from various government departments in this study. However, 110 have responded making the response rate 90.9%.

Figure 1 shows that the majority of government servants had clustering of lifestyle risk factors (57%, 95% CI: 0.47, 0.67). Table 1 shows the percentage of respondents according to the number of lifestyle risk factors. The highest percentage of respondents had 2 risk factors (46.4%). Socio-demographic characteristics of
respondents are shown in Table 2. Mean age of respondents was 38.9. There were more females (53.7%) and married respondents (90%). Majority were from the lower income group with income less than RM3000 (71.8%) but had a lower education of minimum finished high school (61.8%). Table 2 also shows the prevalence of clustering of lifestyle risk according to the socio-demographic characteristics.

Simple logistic regression analysis showed that socio-economic status was the only significant factor associated with clustering of lifestyle risk. Other variables with p value less than 0.25, which is marital status, and clinically important variables that are age and education level were also included in multiple logistic regressions. The final model for clustering of lifestyle risks is shown in Table 3.

Application of backward logistic regression listed two variables which are socio-economic status and marital status. However, only marital status was not significant as the p was more than 0.05 and the CI included one. Therefore, socio-economic status was the only socio-demographic factor associated with clustering of lifestyle risk. It showed that lower socio-economic status (income of less than RM 3000) has 2.57 times the odds to have clustering of lifestyle cardiovascular risk factors.

Discussion

Socio-demographic characteristics of respondents

This study was done in a government servants’ population who mostly work in the administrative office. The location of this study was at the Federal Complex building which places 30 government departments as the operational centre for the district for each department. Research has previously shown that men in heavy physical work have less evidence of myocardial ischaemia compared to less physically demanding work such as office work [9], which can be inferred to the study population. Doing a research on a target group such as this will facilitate any intervention if needed.

Majority of respondents were women with a percentage of 53.7%. All the respondents were Malays. Most of them are married (90%). Although the staff of respective departments ranges from the low ranking to high ranking, the majority of the respondents were from the lower-income group (71.8%). This is appropriate, as it is usual for each department to have more supporting staff from the lower-income group and few of the highest income as they are at the top of the administrative hierarchy. This also explains the education status of 62.9% of respondents being high school educated while tertiary education in 38.1%. (Table 2).

Clustering of lifestyle risks

This study showed the evidence of clustering of cardiovascular lifestyle risks among the asymptomatic government servants. This is still evident despite multiple efforts nationwide by the Health Ministry to promote healthy lifestyle and reduce the cardiovascular risks in the community [15]. Previous evidence shows that cardiovascular risks tend to be clustered in certain individuals [16, 17]. 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 [17]. A study in the United States has found that the prevalence of high cholesterol levels increased with the number of coronary heart disease risk factors among young adults [18]. Lifestyle risks such as physical inactivity and unhealthy diet also have been linked to increased risk of various established cardiovascular risk factors. It also contribute to the clustering of cardiovascular risks factors as this is shown to be increased among those with clustering of lifestyle risks factors [19].

Previous studies have shown that lifestyle cardiovascular risks also tend to cluster among adult subjects [20], as being shown in our study. 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) also found a majority of the English population have multiple lifestyle risk factors[21], while similar survey analysis in the United States showed that 52% of the survey participants had two or more risk behaviours[22].

This study found that only 8% of respondents had no lifestyle risk factors and 34.5% had one risk factor (Table 1). A total of 10.9% has 3 lifestyle risks. This is lower than previous studies; a study in the Netherlands in 2002 found 20% of subjects having three lifestyle risks [16] , while a study in Spain found 14% of the subjects had three to four unhealthy behaviours [24].

In this study, clustering of lifestyle is significantly more in the lower socioeconomic group. It is also more prevalent in married people, female gender and older age, although not significant statistically. The results had some similarity with an English adult population study, where clustering was found at both ends of the lifestyle spectrum and was more pronounced for women than for men, and overall more in lower social class households, singles, and people who are economically inactive [23]. The reason for the observation that risk behaviours are most prevalent in disadvantaged sectors of the population was understood to be due to shared social determinants such as poverty, chronic stress and adverse environment; which give rise to clustering of unhealthy behaviours in the population [24]. However, other studies reviewing the multiple health risk behaviours showed that the clustering of health risk behaviours increase with age [25], which is not a significant factor in this study.

The public health promotion and primary care efforts has been done in Malaysia to reduce the cardiovascular risk factors in the population. For example, one of such programmes is the nation-wide Non-communicable Disease (NCD) Prevention 1Malaysia programme (NCDP-1M) launched in late 2010 by the Ministry of Health Malaysia. The NCDP-1M is the main programme under Prevention and Promotion Strategy of the National Strategic Plan for Non-Communicable Diseases (NSP-NCD) 2010-2014 which also engages the community as a partner in non-communicable disease (NCD) management. Under this strategy, NCD Teams were
established at the district levels to initiate, facilitate and monitor community-based interventions [15]. Such programmes should be strengthened, and interventions targeted at multiple lifestyle should be emphasized.

Affordable interventions should be emphasized as the prevalence of all the lifestyle risks is found to be more among lower socioeconomic status group. For example, monetary factors may be used and emphasized as a potential motivating factor to those with smoking habit to quit smoking. This includes pamphlets and creative charts emphasizing on amount of money that can be saved by quit smoking, and other health promotion activities. This requires synergistic involvement of the public health and primary care sectors. Other than the public health and primary care sectors, this effort should involve policymakers as well, for example in making fruits and vegetables more affordable and promoting free activities such as aerobics or yoga at public parks.

Study Limitations

This study has a few limitations. First, the cross-sectional nature of this study did not allow a causal relationship to be established. Secondly, as questionnaires are used in the study, under reporting or over reporting of data on lifestyles especially diet and physical activity are always a possibility. However, previous studies have found the possibility to be within acceptable limits and are reduced by using a validated questionnaire. Although dichotomization of risk factors allowed easy statistical analysis, it might have implications to the study findings and limit generalization. Moreover, the study was done in a heavily Malay dominated area and occupation where all the respondents are of Malay ethnicity, which may limit generalization to other races. This study also had a minimum sample size and only sampled government servants working at the Federal Complex in Kuala Terengganu due to the difficulties in sampling the whole government servants’ population, which are scattered in the area. It may not be a true representative of all government servants in Kuala Terengganu, although may be used as an indicator for the target population mentioned.

Conclusion

This study provides evidence of clustering of lifestyle risks in the local asymptomatic healthy subjects especially in those with low socioeconomic status. Therefore, comprehensive lifestyle interventions may be an effective strategy for controlling CVD risk factors, with a focus in those with low socioeconomic status. Affordable interventions should be suggested within the limits of the target group who are of the lower socio-economic group to ensure reduction of these cardiovascular risk factors thus lowering the incidence, morbidity and mortality of cardiovascular diseases.

Conflict of Interest

The authors would like to declare that there was no conflict of interest with regards to this study. The study did not receive any source of funding.

Acknowledgement

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References

10. World Health Organization (WHO). Global Adult Tobacco Survey Malaysia Fact Sheet


Table and Figure

Figure 1. Percentage of respondents with clustering of lifestyle risks

Table 1. Prevalence of each lifestyle risk factors and cumulative lifestyle cardiovascular risk factors among respondents

<table>
<thead>
<tr>
<th>Lifestyle Risk Factors</th>
<th>n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>22 (20)</td>
</tr>
<tr>
<td>Unhealthy diet</td>
<td>55 (50)</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>90 (87)</td>
</tr>
<tr>
<td>0 risk</td>
<td>9 (0.1)</td>
</tr>
<tr>
<td>1 risk</td>
<td>38 (34.5)</td>
</tr>
<tr>
<td>2 risks</td>
<td>51 (46.4)</td>
</tr>
<tr>
<td>3 risks</td>
<td>12 (10.9)</td>
</tr>
<tr>
<td>Variable</td>
<td>Total</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>51 (46.3%)</td>
</tr>
<tr>
<td>Female</td>
<td>59 (53.7%)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>38.95 (10.13)*</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
</tr>
<tr>
<td>RM 3000 or more</td>
<td>28 (26.2%)</td>
</tr>
<tr>
<td>less than RM 3000</td>
<td>79 (73.8%)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>99 (90%)</td>
</tr>
<tr>
<td>Single/ widowed</td>
<td>11 (10%)</td>
</tr>
<tr>
<td><strong>Highest education</strong></td>
<td></td>
</tr>
<tr>
<td>Post-high school</td>
<td>42 (38.1%)</td>
</tr>
<tr>
<td>High school</td>
<td>68 (61.9%)</td>
</tr>
</tbody>
</table>

* = mean (SD)