ORIGINAL ARTICLE

Lifestyle factors associated with cardiovascular risk among healthcare workers from the tertiary hospitals in Sarawak

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Kuan PX, Chan WK, Chua PF, et al. Lifestyle factors associated with cardiovascular risk among healthcare workers from the tertiary hospitals in Sarawak. *Malays Fam Physician.* 2020;15(1);15–22.

Keywords:
cardiovascular disease; risk; lifestyle; anthropometric

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Abstract

Introduction: A cross-sectional study is used to evaluate the lifestyle factors associated with cardiovascular disease (CVD) risk among healthcare workers in tertiary hospitals in Sarawak, Malaysia.
Methods: A questionnaire-based survey using the Simple Lifestyle Indicator Questionnaire (SLIQ) was administered to, and anthropometric measurements were collected from, 494 healthcare workers.
Results: The mean age of the subjects was 32.4±8.4, with a range of 19 to 59 years. The subjects were from the allied health (45.5%), management and professional (25.1%) and executive (29.4%) fields. Overall, 47.4% of the subjects were of normal weight, 30.2% were overweight, 17.2% were obese and 5.2% were underweight. The mean number of working hours per week for the subjects was 47.6±14.0 with the highest working hours found among the management and professional group, followed by the executive and allied health groups. Overall, 39.7% of the healthcare workers worked office hours, 36.6% worked within the shift system, 20.9% worked office hours and were on-call and the remaining 2.8% worked a mixture of office hours and shifts. Based on the SLIQ score, 58.1% were classified as at intermediate risk for CVD, 38.5% were in the healthy category and 3.4% were in the unhealthy category. Factors associated with a healthier lifestyle were being female (Odds Ratio [OR]= 12.1; CI= 3.2- 46.4), professional (mean score= 6.70), in the allied health group (mean score=7.33) and in the normal BMI group (OR= 9.3, CI= 1.8- 47.0).
Conclusion: In our study, healthcare workers had an intermediate risk of developing CVD in the future. Thus, there is a need to intervene in the lifestyle factors contributing to CVD.

Introduction

Cardiovascular disease (CVD) occurs when coronary arteries are clogged by plaque or atheroma in a process known as atherosclerosis.[1] CVD affects millions of lives across the world and is one of the leading causes of morbidity and mortality.[1] It was responsible for almost 30.0% of all reported mortality in the United Kingdom (UK) in 2011.[1] A significant reduction (40.0%) in mortality rates for individuals under 75 years old was reported in 2010 compared to 2001 due to the prevention and treatment of CVD over the past decade.[1] In Australia, CVD was the single leading cause of mortality and involved in more than 21,500 lives in the year 2011.[2] In Russia, a high prevalence of CVD risk factors were noted, especially among the working age population.[3] The extremely high mortality rates from CVD were associated with psychosocial factors, alcohol abuse, smoking, dietary choices, hypertension, physical inactivity, obesity and hyperlipidaemia.[3] The standard mortality rate from CVD in Russia was reported to be two to three times higher than those of other developed countries.[3] The increase in the adoption of the Western diet and sedentary lifestyles have caused the incidences of obesity to mushroom.[3]

In Taiwan, overweight and obese BMIs were independently associated with a higher prevalence of CVD risk factors.[4] Non-medical workers had the highest prevalence of obesity (21.9%).[4] Meanwhile, medical technicians were found to have the highest prevalence of all other risk factors for developing CVD.[4] This study suggested that the association of BMI (overweight or obese) with CVD risk factors was dependent on two other factors (gender and age).[4] Female healthcare workers who were overweight or obese had a higher prevalence of CVD risk factors compare to the same BMI groups of male healthcare workers.[4] Overweight females in the younger age group were found to have significantly higher levels of CVD risk factors. In addition, for this group, age had less effect on the relationship between BMIs in the overweight or obese range and CVD risk factors.[4]

It has been reported that shift workers have

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less healthy lifestyles than non-shift workers.[5] The factors involved include poor dietary intake, being more prone to smoke and being predisposed to an unhealthy BMI, i.e., being overweight.[5] The majority of healthcare workers who were working in the shift system in Australia were nurses.[5] Long working hours were found to increase the risk of developing acute myocardial infarction (AMI) in a case control-study of workplaces in Japan.[6] Several studies since 1958 have suggested that the longer the duration of working hours, the higher the risk of CVD. Overtime work may be related to an increased risk of developing AMI. A twofold increase in risk was reported for working more than 60 hours per week as compared to 40 hours and below.[7]

There are multiple risk factors that contribute to the development of CVD.[8] Modifiable risk factors include smoking; hyperlipidemia; hypertension; diabetes mellitus; being physically inactive, overweight or obese; depression and social isolation.[8] As for the non-modifiable risk factors, generally, males have a higher propensity as compared to females in middle age, but post-menopausal hormonal changes predispose females to higher risks subsequently.[8] Five cardiovascular risk factors involving lifestyle issues had been identified, namely, physical activity, diet, smoking, alcohol consumption and stress.[8] Physical activity and diet modification play an important role in reducing CVD by improving long-term health, weight management, lowering high blood pressure and reducing blood glucose and cholesterol levels.[8] It is recommended that moderate-intensity physical activity, which is defined as brisk walking, be performed for at least 30 minutes for three times a week.[8] The Simple Lifestyle Indicator Questionnaire (SLIQ) was chosen for this study to determine the associations of modifiable cardiovascular disease risk factors with CVD based on relevant scores, as it is an easy tool to use.

A study in Malaysia by Hazmi et al. showed that 42% of 330 selected healthcare workers had at least one medical condition, such as dyslipidemia (30.8%), hypertension (14.3%) or diabetes mellitus (10.4%).[9] Biochemical profiles were measured in this study, resulting in a mean fasting blood glucose of 5.8mmol/L±2.4 and elevated fasting total cholesterol of 5.5mmol/L±1.0.9 The mean systolic and diastolic blood pressures were 121.5±14.0 mmHg and 76.5±9.7 mmHg, respectively.[9] In another study by Mohd Ghazali et al., the majority (68.4%) of healthcare workers had at least three CVD risk factors, with hypercholesterolemia and obesity being the most common.[10] The most common lifestyle risk factors were dietary intake (72.8%) and physical inactivity (41.3%).[10]

A study among 108 subjects consisting of physicians, nurses and medical school faculty members showed a mean body mass index (BMI) of 24.67 (standard deviation, SD=3.77).[11] More than a quarter (39.8%) were overweight or obese.[11] Only 19.4% out of 108 subjects reported exercising more than twice a week. More than half of the respondents (55.0%) did not consume vegetables, and 11.0% only occasionally consumed fruits.[11] More than half of them had severe or moderate life-related and work-related stress levels, which were reported by 61.1% and 63.9% of the respondents, respectively.[11] Only 1.8% were smokers, and underlying risk factors for CVD based on medical conditions were also reported (2.8% with a history of hypertension, 1.9% with a history of diabetes mellitus and 7.4% with hyperlipidemia).[11] It was also discovered that the emphasis on the control of CVD risk factors was lower among the physicians compared to the nurses and faculty members.[11]

Our study was conducted among healthcare workers from the two tertiary hospitals in Sarawak in order to identify the lifestyle factors associated with the risk of CVD in this group. They are the front-liners in providing healthcare services; thus, identifying the risk factors for CVD among them is very crucial.

Methods

Study Setting

The government medical healthcare services in Sarawak, Malaysia are provided through 23 hospitals. Most of them are located in the district. Out of the 23 hospitals, there are only two tertiary hospitals, which are Sarawak General Hospital (SGH) and Sarawak Heart Centre (SHC). There are three district hospitals with specialist services (i.e., Sibu, Miri and Bintulu Hospitals), sixteen district hospitals without specialist services (mainly in rural areas) and two special institutions (i.e., Sentosa and Rajah Charles Brooke Memorial Hospitals) in Sarawak.

Study Design

This was a cross-sectional study involving healthcare workers in tertiary hospitals in Sarawak, Malaysia. As of March 2016,

there were 4504 healthcare workers at SGH and 676 at SHC.

Ethical Approval

Permission to conduct the study was obtained from both hospital directors. Ethical clearance was obtained as well from MREC of Ministry of Health, Malaysia (Ref: (05) KKM/NIHSEC/P16-1293)).

Sample Size Calculation

The sample size was calculated by using the sample size calculator for a prevalence study12 with a 95% confidence level and an expected prevalence of CVD in the population of 30.0%. From this calculation, the minimum number of respondents was 434 healthcare workers (anticipating about 30% with redundant or missing data).

Data Collection

The participant information sheet was explained, and written consent was obtained from each subject. The SLIQ was used as the assessment tool. Each subject was required to complete a set of self-administered questionnaires which took about ten to fifteen minutes to complete. All subjects were prohibited from engaging in any form of discussion or conversation during the session in order to maintain an unbiased environment. Anthropometric measurements were collected by using a standardized digital weighing scale. Our study used a non-probability sampling method to obtain the subjects.

Basic Demographic Data

Details such as age, gender, marital status, underlying chronic medical conditions (e.g., diabetes mellitus, hypertension and dyslipidemia), education level, occupation, work patterns and working hours were obtained from the subjects.

Anthropometric Measurements

All of our subjects were measured for their height (in meters) and weight (in kilograms) while bare-foot and in light clothing via a standardized Secca Digital Medical Scale. BMI was calculated based on the formula of weight in kilograms divided by the square of the height in meters (kg/m2). The readings were then classified into the categories shown in **Table 1** below.[13]

Table 1: The International Classification of adults as underweight, overweight or obese according to the Body Mass Index (BMI)

Classification	BMI (kg/m2)
Underweight	<18.50
Normal range	18.50-24.99
Overweight	≥25.00
Obese	≥30.00

Simple Lifestyle Indicator Questionnaire (SLIQ)

The SLIQ was adapted and modified from Godwin M et al.[8] The SLIQ is comprised of five different lifestyle components, i.e., diet, physical activity, alcohol, smoking and stress. The diet and physical activity components have three questions each. Alcohol, smoking and life stress components have one question each. Every component is assigned a category score of 0, 1 or 2. Questions on diet are scored from 0 to 5, then classified into a Diet Category Score (0= score 0 to 5, 1= score 6 to 10 and 2= score 11 to 15). Questions on exercise are scored from 0 to 12, summed up to obtain the Activity Raw Score and then classified into an Activity Category Score (a score of 0 for light exercise only, a score of 1 for any moderate activity and a score of 2 for any vigorous activity). Questions on alcohol intake are categorized into three groups based on the units of alcohol intake (score 0= alcohol score 14 and above, score 1= alcohol score 8 to 13 and score 2= alcohol score 0 to 7). The question on smoking habits is classified into three category scores (score 0 for current smoker, score 1 for ex-smoker and score 2 for non-smoker). Finally, the question on life stress uses a rating from level 1 (not at all stressful) to 6 (very stressful) then is categorized into category scores 0 (life stress 1 or 2), 1 (life stress 3 or 4) and 2 (life stress 5 or 6). All of the five component scores are then summed up to provide a final SLIQ score, ranging from 0 to 10 (0 = very unhealthy, 10= very healthy). The scores are then categorized into three groups as follows (**Table 2**):

Table 2: Categories of SLIQ Scores

SLIQ Score	Category
0 to 4	Unhealthy
5 to 7	Intermediate
8 to 10	Healthy

Validation of Instruments

Content validity for the questionnaire in its English version was assessed by content experts that consisted of medical officers and a medical specialist specialists. After evaluation, all items were considered valid and no amendments regarding the items were made. Next, face validity was checked using five healthcare workers. Face validity is used to make sure that respondents understand every item. Doubts or difficulties when answering the items were noted.

The questionnaire was then modified to fit the local setting. The questionnaire only require minimal amendments after face validity, such as removing "curling" from the list of physical activities, as this activity is not available in our local setting. The minimal amendments were transmitted to the original author. There was no change to the cut-off point in the scoring, as only minimal modifications were made.

A pilot study consisting of 30 respondents was then carried out. Items on diet and physical activity were amenable to assessment for internal consistency via Cronbach's alpha (α). t Cronbach's alpha was 0.653 for diet and 0.611 for physical activity. No translation of the questionnaire into the Malay language was made since all the respondents were professional staff working in hospital and corresponded in English in the workplace.

Data Analysis

All of the data were analyzed by using the Statistical Package for Social Sciences (SPSS) Version 16.0. ANOVA was used for the comparison of SLIQ scores in the three staff categories.

Multivariate logistic regression using the enter method (without stepwise analysis) was used to study the relationship between SLIQ score (dependent variable) and BMI (independent variable). Statistical significance was set at p-value<0.05.

Results

A total of 499 healthcare workers were eligible for this study. However, only 494 participated; hence, the response rate was 99.0%. **Table 3** shows the sociodemographic characteristics of the study population. This study showed that 71.3% of the respondents were females. More than half were married (57.7%), and the majority of the respondents had a tertiary education (80.0%). About half were allied health workers (45.5%), and the remaining were almost equally from the management and professional groups. The majority of healthcare workers worked office hours (n=196) and in shifts (n=181).

The mean number of working hours was 47.6±14.0 a week, with highest working hours attributed to the management and professional group, followed by the executive and allied health groups. The data (not shown in table) for working hours for doctors ranged from 40 to 160 hours per week. The mean scores for SLIQ for the allied health and professional groups were 7.33 and 6.70, respectively.

Our study showed that almost half of the healthcare workers were overweight to obese (47.4%). Further data showed that 5.3% of these workers identified as having underlying hypertension, dyslipidemia and/or diabetes mellitus.

In **Table 4**, a comparison of the SLIQ category scores is seen, with more than half (58.1%) of the healthcare workers classified as having an intermediate risk for CVD. The unhealthy category covered 3.4% of the workers.

Our study discovered that the factors associated with a healthier lifestyle were being female (Odds Ratio [OR]= 12.1; CI= 3.2-46.4), professional (mean score= 6.70), in the allied health group (mean score= 7.33) and associated with the normal BMI group (OR= 9.3, CI= 1.8- 47.0). Marital status may have an association with a healthier lifestyle since married subjects reported a higher odds ratio in comparison with the other category (i.e., divorced). However, although the odds ratio was considered high (Odds Ratio [OR]= 11.3; CI= 0.9 - 147.4), the p-value was not significant (p=0.064) (seen in **Table 5**).

Table 3: Study Population Demographics

Variable	Category	Mean (SD)	n (%)
Age		32.4 (8.4)	
Gender	Male		142 (28.7)
	Female		352 (71.3)
Marital Status	Single		202 (40.9)
	Married		285 (57.7)
	Other		7 (1.4)
Education Level	Primary and Secondary		99 (20.0)
	Tertiary		395 (80.0)
Occupation Type	Management and Professional		124 (25.1)
	Executive		145 (29.4)
	Allied Health		225 (45.5)
Working Hours		47.6(14.0)	
Working Pattern	Office Hours		196 (39.7)
	Shift System		181 (36.6)
	Office Hours and On-Call		103 (20.9)
	Other		14 (2.8)
BMI	Underweight		26 (5.2)
	Normal		234 (47.4)
	Overweight		149 (30.2)
	Obese		85 (17.2)
Medical Illness	Cardiac Risk (e.g., diabetes mellitus, hypertension and/or dyslipidemia)		26 (5.3)
	Non-Cardiac Risk		36 (7.3)
	None		432 (87.4)

Table 4: SLIQ Category Scores

SLIQ Score	Category
0 to 4	Unhealthy
5 to 7	Intermediate
8 to 10	Healthy

Table 5: Associations with a Healthier Lifestyle: A Multivariate Analysis Using Logistic Regression

Factor		OR	95% CI	p-value
Constant Demographic				0.108
age		1.0	1.0,1.1	0.297
gender	male	Reference group		
	female	12.1	3.2, 46.4	<0.001
marital status	single	6.9	0.5, 101.6	0.165
	married	11.3	0.9, 147.4	0.064
	others	Reference group		
education level	primary & secondary	1.1	0.2, 5.1	0.886
	tertiary	Reference group		
occupation type	professional	6.3	1.2, 32.6	0.029
	allied health	12	1.9, 76.5	0.009
	executive	Reference group		

Table 5: Associations with a Healthier Lifestyle: A Multivariate Analysis Using Logistic Regression

Factor		OR	95% CI	p-value
Clinical				
BMI	underweight	1.3	0.1, 17.0	0.845
	normal	9.3	1.8, 47.0	0.007
	overweight	2.3	0.6, 8.7	0.210
	obese	Reference group		
Factor Clinical				
Medical illness	cardiac risk	0.7	0.0, 11.6	0.823
	non-cardiac risk	2.4	0.2, 24.1	0.457
	none	Reference group		

Discussion

In our study, we found that more than a quarter (47.4%) of the healthcare workers were either overweight or obese. These findings are similar to those in a study by Monir et al.[11] High BMI is an independent contributor to the risk of developing CVD.4 We then further explored the other modifiable risk factors for CVD based on the SLIQ scores. More than half (58.1%) of the workers were classified as being at intermediate risk for CVD, and 3.4% were classified as unhealthy. As for a comparison of BMI groups, the normal BMI group had healthier lifestyles with a high OR and significant p-value. Based on this finding, it is important to promote healthy lifestyles among the unhealthy BMI groups.[11]

As for the non-modifiable risk factors, female healthcare workers were found to have a lower risk of developing CVD, as shown by a high OR and significant p-value.[8] This finding was different from that of the Taiwanese study.[4] The possible reason is the difference in the marital status of our female healthcare workers, as the majority of them were married. Marital status may have an association with a healthier lifestyle when positive communications among the married couples and family members play an important role in promoting healthy lifestyle behaviours.[14] Looking into the underlying cardiac risk factors, only 5.3% of the healthcare workers had underlying diabetes, hypertension and/or dyslipidemia, which is similar to the rate found in the study of physicians, nurses and faculty members.[11] However, the result seen in our study is lower than that in the study by Hazmi et al., in which almost half of the participants had at least one medical condition.[9] Genetic factors may play an important role in determining the inheritance of these diseases in our study population, and this aspect needs to be explored further. These underlying medical conditions were the modifiable risk factors for developing CVD and thus need to be controlled well in order to reduce the risk of developing cardiac complications.[8]

Our healthcare workers worked more than 50 hours per week, on average. Long working hours reduce resting periods and increase stress to the heart, predisposing these workers to an increased risk of developing AMI, as shown in the previous study.[6,7] Among the different professions, our fellow doctors' working hours ranged from 40 to 160 hours per week. Doctors who worked more than 60 hours a week had twofold increased risk for developing AMI.[7] Longer working hours among this professional group was due the on-call system that was practiced by certain hospital departments.

When comparing job scope, generally, both the professional and allied health groups were healthier compared to the executive group (as shown by significant p-values). Our study found that the medical technicians and nurses had the highest chances of developing CVD. This result is similar to that of the Taiwanese study[4] as well as results reported by Zhao and Turner.[5] The nurses in our tertiary hospitals were mainly working in shifts. Some of the nurses tended to practice unhealthy lifestyles by, for example, consuming fast food and indulging in excessive caffeine intake when doing overnight shifts. These practices will lead to the nurses becoming overweight and obese, which then predisposes them to developing CVD.

Overall, our study showed that the healthcare workers in tertiary centers had both modifiable and non-modifiable risks for developing CVD. We evaluated their risks based on a simple screening tool, i.e., the SLIQ, and

measurements of their BMIs. Further research needs to be conducted to the biochemical measurements and genetic components further to better determine the cardiovascular risk factors.

Conclusion

Our findings showed that being male, having a high BMI, having an unhealthy lifestyle (based on the SLIQ), working long hours and working pattern contribute to the intermediate risks for developing CVD. The SLIQ is an easy screening tool for the detection of modifiable CVD risk factors. There is a need to intervene by promoting and improving current national health education programs in order to lessen the burden of CVD in our healthcare settings.

Limitations

This was a cross-sectional study, which limited our ability to monitor the possibility of progression in developing CVD in the future. Due to constraints in sample recruitment, non-probability sampling was applied. A large sample was collected to ensure that the sample was representative of \the targeted population. Although the sample did not cover all healthcare workers in Malaysia, the study's results can be generalized to all healthcare workers in Malaysia due to the large sample size. A previous study found that when the sample size reaches at least 300, the statistics resulting from the sample are likely the same as the parameters in that particular population.[15]

Acknowledgments

We would like to thank the Director General of Health Malaysia for his permission to publish this article. We would also like to thank the Medical Research and Ethics Committee (MREC) and the hospital directors for the permission to conduct research in both hospitals. Further, we would like to thank MRG for its support in providing us with a research grant. Special thanks to Professor Marshall Godwin for his permission to use the SLIQ in this research. We would also like to thank our research nurses Marwan Bin Mahlil, Esther Anak Jaming, Fiona Lyn Anak Joseph Tau, Natasya Marliana Bt Abdul Malik and Imelda Jana for their help with data collection.

Funding

This study was funded by a research grant from the Malaysia Research Grant (MRG) for research materials (Project code: MRG-MOH-2016-01067).

Ethical Approval

This research was approved by the Medical Research and Ethics Committee (MREC) of Ministry of Health, Malaysia via Ref: (05) KKM/NIHSEC/P16-1293).

Conflicts of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

How does this paper make a difference to general practice?

- Creates an awareness of the prevalence of unhealthy body mass index (BMI) among healthcare workers.
- Enables the usage of the Simple Lifestyle Indicator Questionnaire (SLIQ) to determine the association of modifiable cardiovascular disease risk factors with cardiovascular lifestyle risk factors among healthcare workers.
- Validation of the use of the SLIQ in a local setting.

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