The ten-year cardiovascular disease risk prediction among primary healthcare workers using the office-based globorisk tool: A cross-sectional study

Zazarida Zakiman, MD[1], Aimi Nadira Mat Ruzlin, PhD[1], Xin Wee Chen, DrPH[1], Rosnawati Muhamad Robat, DrPH[2]

[1]Department of Public Health Medicine, Faculty of Medicine, Universiti Teknologi MARA, Selangor, Malaysia, [2]Occupational and Safety Unit, Selangor State Health Department, Ministry of Health, Selangor, Malaysia

ABSTRACT

Introduction: Cardiovascular diseases (CVDs) remain to be the leading cause of premature mortality worldwide, and healthcare workers (HCWs) are potentially at risk for developing CVDs. Office-based Globorisk is a ten-year risk prediction tool for CVDs risk scores. This present study aims to determine the prevalence of CVDs risk and risk factors associated with moderate-high CVDs risk among primary HCWs in government health clinics in Selangor.

Materials and Methods: A cross-sectional study was conducted on 543 HCWs from the KOSPEN WOW ("Komuniti Sihat Pembina Negara" or "Healthy Community Builds the Nation-Wellness of Workers") database in three district health offices (DHOs) under the Selangor State Health Department in Malaysia. To estimate the office-based Globorisk model, factors such as age, sex, current smoking status, systolic blood pressure (SBP), and body mass index (BMI) were included. Data analysis employed were Pearson chi-square test, Fisher's exact test, Welch's t-test and binary logistic regression.

Results: Among 543 participants, 453 (83.4%) were female, 439 (80.8%) were Malay with mean (SD) age of 44.4 (4.38). Majority of moderate-high CVDs risk identified among primary HCWs was male with 26 (86.7%), Malay with 25 (83.3%), and non-clinical group with 17 (56.7%). The prevalence of low CVDs risk was 94.5% (95% CI: 92.2–96.2) and 5.5% (95% CI: 3.8–7.8) for the moderate-high risk category. Factors associated with moderate-high CVDs risk were job category with non-clinical group (95% CI: 1.43, 6.85), elevated blood glucose (95% CI: 3.25, 19.41) and anxiety symptom (95% CI: 1.46, 13.86).

Conclusion: The KOSPEN WOW platform is effective for screening and guiding implementation of intervention programmes to prevent CVDs.

KEYWORDS:
Cardiovascular disease risk, primary healthcare workers, office-based Globorisk, KOSPEN WOW

INTRODUCTION

Cardiovascular diseases (CVDs) are a group of heart and blood vessel disorders, including coronary heart disease, cerebrovascular disease, rheumatic heart disease, peripheral arterial disease, and congenital heart disease.[1] CVDs remain to be the leading cause of premature mortality worldwide, resulting in over 20 million deaths and more than 400 million disability-adjusted life-years (DALYs) lost in 2021.[2] In Malaysia, cardiovascular and circulatory diseases, including ischemic heart disease (17.7%) and cerebrovascular disease or stroke (8.0%), were the primary causes of years of life lost (YLL).[3]

Healthcare workers (HCWs) are potentially at risk of developing CVDs[4] due to high prevalence of CVDs risk factors. Studies among HCWs reported that 45.6% of primary HCWs practiced sedentary lifestyle[5], 54.2 % were overweight and obese[6], 46.7% had high blood glucose[4], and 72.7% were smokers.[4] HCWs were also more susceptible to psychological problems such as depression[7] and stress[8] which contributes to an increase of CVDs risk. In addition, a prior study also indicated that the prevalence of CVDs risk among HCWs in a tertiary healthcare facility in Kuala Lumpur was significant, with 30.8% of the HCWs classified as having a moderate and high ten-year CVDs risk.[4]

The Ministry of Health Malaysia (MOH) established the KOSPEN WOW ("Komuniti Sihat Pembina Negara" or "Healthy Community Builds the Nation Wellness of Workers"), a comprehensive workplace health intervention programme aimed at reducing the burden of Non-Communicable Diseases (NCDs) such as CVDs and related risk factors among employees.[9] There is a total of eight components in the KOSPEN WOW programme including health screening as one of the scopes, which is a good initiative to be able to detect CVDs risk in the early stages.[9] HCWs in government health clinics, whether clinical or non-clinical, will undergo general health screenings at least once a year through this scope in the KOSPEN WOW programme.[9] The Occupational Safety and Health (OSH) Unit is responsible for ensuring the HCWs undergo health screenings, including anthropometric measurements, blood pressure, waist circumference, capillary glucose level, alcohol

This article was accepted: 06 December 2024
Corresponding Author: Aimi Nadira Mat Ruzlin
Email: aiminadira@uitm.edu.my

and smoking status, as well as psychological screening in terms of stress, depression and anxiety.[9] The other seven components of KOSPEN WOW intervention activities, such as healthy eating, non-smoking practice, active living, weight management, healthy mind, healthy workplace, as well as prevention and reducing harmful use of alcohol are applied based on the risk detected from the health screenings.[9]

Globorisk tool, including office-based and laboratory-based calculators, is effective for calculating CVDs risk.[11] The office-based Globorisk tool is useful when there is limited resources for blood testing.[12] Comparative studies between Globorisk and other CVDs risk tools showed that the Globorisk had good agreement with WHO risk scores[13] and moderate agreement with Framingham Risk Score.[14] Globorisk had low sensitivity (27.5%[15] and 21.9%[16]) and high specificity (89.0[15] and 94.2%[16]) indicating that it is still a useful tool in CVDs risk screening.

According to WHO, an estimated 80% of CVDs is preventable and ideally CVDs risk among HCWs were expected to be low due to their adequate knowledge of CVDs risk prevention.[17] However, despite their adequate knowledge and awareness of health, HCWs had a high prevalence of moderate and high ten-year CVDs risk[4], including risk factors such as practicing a sedentary lifestyle[5], being overweight or obese[6], having high blood glucose[4], and smoking.[4] High prevalence of CVDs and its risk factors may cause low quality of life[18], disrupt the quality of services, and leads to life-threatening complications.[3] Majority of the CVDs risk studies in Malaysia were conducted at tertiary settings,[4] and there were limited studies focusing on the primary HCWs. This study would also investigate psychological distress among HCWs and its association with CVDs risk, which has not been previously studied. The objectives of this study were to determine the prevalence of CVDs risk and risk factors associated with moderate-high CVDs risk among primary HCWs in government health clinics in Selangor, Malaysia.

MATERIALS AND METHODS

Study Design

This etiological research used a cross-sectional study design to determine the prevalence of CVDs risk and risk factors associated with moderate-high CVDs risk among primary HCWs in Selangor, Malaysia. This study was conducted by obtaining secondary data from the KOSPEN WOW database under the Selangor State Health Department, Malaysia.

Location and Study Population

This study was conducted by randomly selecting three DHOs out of nine DHOs in Selangor State, Malaysia. The secondary data was extracted from the selected DHOs, Petaling, Hulu Langat and Kuala Selangor. The study population was primary HCWs working in government health clinics who fulfilled the inclusion and exclusion criteria. The inclusion criteria were: i) HCWs aged ≥ 40 years old (requirement from office-based Globorisk calculator); ii) must have undergone KOSPEN WOW general health and mental health screening from 1 January 2023 to 31 May 2024. Meanwhile, the exclusion criteria were: i) HCWs with incomplete data needed for office-based Globorisk calculator; ii) known history of CVDs and; iii) workers who were not employed under the Ministry of Health, Malaysia such as cleaner or security guard.

Sample size

Sample size was estimated by using Open Source Epidemiologic Statistics for Public Health (OpenEpi) software for a single population proportion. The estimated primary HCWs population in Selangor is 7000. Based on a previous study by Che Muhammad et al, 2022, the prevalence of high CVDs risk among the population using Globorisk was 48.9%, and by taking the confidence interval of 95%, power of 80%, and 5% absolute precision, the estimated sample size required was 365. An additional 20% was included to the final sample size estimation to compensate any incomplete data, hence the minimum sample size required in this study was 438 subjects.

Universal sampling method was applied by including all sample from Petaling, Hulu Langat and Kuala Selangor DHOs who fulfilled the inclusion and exclusion criteria.

Data Collection

The collection of secondary data from KOSPEN WOW database was conducted at the Occupational Safety and Health (OSH) unit of the Selangor State Health Department, as well as from the Petaling, Hulu Langat, and Kuala Selangor DHOs.

Study Variables

The study's outcome, CVDs risk by definition, was a ten-year risk prediction for CVDs among primary HCWs working at government health clinics in Selangor. The CVDs risk scores were calculated using the office-based Globorisk tool and then categorized into low and moderate-high risk.[18] A score less than 10% indicated low risk, and more than 10% indicated moderate-high risk prediction to develop CVDs in a ten-year period.[19] The data required for office-based Globorisk calculator included height (cm), weight (kg), gender, age ≥40 years old , smoking status (yes or no), and systolic blood pressure for the CVDs risk calculation.

The independent variables were divided into three groups: sociodemographic factors, such as ethnicity, job category, and family history of CVDs; lifestyle-related behaviours, such as alcohol consumption; and health-related factors, including a known case of diabetes mellitus (DM), hypertension (HPT), high cholesterol, waist circumference (WC), capillary blood glucose level, and psychological assessment. The psychological assessments were conducted by utilizing validated Whooley questionnaires for depression and the General Anxiety Disorder-2 (GAD-2) questionnaire for anxiety screening.

Data Management

Secondary data without identifiers from the KOSPEN WOW database were obtained from the data owner at the OSH Unit in Petaling, Hulu Langat and Kuala Selangor DHOs. The data was compiled into a Microsoft Excel Open XML Spreadsheet (xlsx) format. The process of data cleaning and checking missing data was conducted. Listwise deletion was used for missing data required for Globorisk calculator. The

Table I: Characteristics of primary HCWs in Selangor according to CVDs risk outcomes

Variables	CVDs risk			p-value
	Low (n=513) n (%)	Moderate-high (n=30) n (%)	Total (n=543) n (%)	
Sociodemographic factors				
Age (years)[a]	44.2 (4.14)	49.1 (5.62)	44.4 (4.38)	<0.001[d]
40-44	337 (65.7)	5 (16.7)	342 (63.0)	
45-49	118 (23.0)	10 (33.3)	128 (23.6)	
50-54	40 (7.8)	6 (20.0)	46 (8.5)	
55-59	18 (3.5)	9 (30.0)	27 (5.0)	
Gender				
Female	449 (87.5)	4 (13.3)	453 (83.4)	<0.001[c]
Male	64 (12.5)	26 (86.7)	90 (16.6)	
Ethnicity				
Malay	414 (80.7)	25 (83.3)	439 (80.8)	0.722[b]
Non-Malay	99 (19.3)	5 (16.7%)	104 (19.2)	
Job category				
Clinical	374 (72.9)	13 (43.3)	387 (71.3)	<0.001[b]
Non-clinical	139 (27.1)	17 (56.7)	156 (28.7)	
Family history of CVDs				
No	469 (91.4)	28 (93.3)	497 (91.5)	
Yes	44 (8.6)	2 (6.7)	46 (8.5)	1.000[c]
Lifestyle-related behavior				
Smoking				
No	504 (98.2)	18 (60.0)	522 (96.1)	<0.001[c]
Yes	9 (1.8)	12 (40.0)	21 (3.9)	
Alcohol consumption				
No	459 (89.5)	26 (86.7)	485 (89.3)	0.549[c]
Yes	54 (10.5)	4 (13.3)	58 (10.7)	
Health-related factors				
Height (m)[a]	1.58 (0.07)	1.67 (0.10)	1.59 (0.08)	<0.001[d]
Weight (kg)[a]	69.7 (14.27)	84.8 (18.86)	70.6 (14.94)	<0.001[d]
BMI (kg/m^2)[a]	27.9 (5.35)	30.2 (4.60)	28.0 (5.33)	0.01[d]
Normal	157 (30.8)	3 (10.0)	160 (29.7)	0.033[b]
Overweight	199 (39.1)	13 (43.3)	212 (39.3)	
Obesity	153 (30.1)	14 (46.7)	167 (31.0)	
Waist circumference (cm)				
Malea	88.2 (12.69)	100.7 (17.77)	91.8 (15.32)	<0.003[d]
Femalea	87.8 (12.23)	93.1 (9.65)	87.8 (12.21)	0.351[d]
Elevated waist circumference				
Yes	360 (70.2)	21 (70.0)	381 (70.2)	0.984[b]
No	153 (29.8)	9 (30.0)	162 (29.8)	
Blood glucose (mg/d)[a]	5.4 (1.01)	7.5 (3.93)	5.5 (1.43)	<0.005[d]
Elevated blood glucose				
No	363 (70.8)	7 (23.3)	370 (68.1)	<0.001[b]
Yes	150 (29.2)	23 (76.7)	173 (31.9)	
Blood pressure (mmHg)				
SBP[a]	119.9 (10.56)	136.9 (15.42)	120.8 (11.54)	<0.001[d]
DBP[a]	75.4 (11.26)	78.1 (22.93)	76.1 (10.29)	0.616[d]
Elevated BP				
Yes	307 (59.8)	28 (93.3)	335 (61.7)	<0.001[b]
No	206 (40.2)	2 (6.7)	208 (38.3)	
Known case of DM				
No	473 (92.2)	22 (73.3)	495 (91.2)	0.003[c]
Yes	40 (7.8)	8 (26.7)	48 (8.8)	
Known case of HPT				
No	440 (85.8)	21 (70.0)	461 (84.9)	0.032[c]
Yes	73 (14.2)	9 (30.0)	82 (15.1)	
Known case of high cholesterol				
No	478 (93.2)	24 (80.0)	502 (92.4)	0.019[c]
Yes	35 (6.8)	6 (20.0)	41 (7.6)	
Depression				
No	458 (89.3)	25 (83.3)	483 (89.0)	0.361[c]
Yes	55 (10.7)	5 (16.7)	60 (11.0)	
Anxiety				
No	483 (94.2)	25 (83.3)	508 (93.6)	0.036[c]
Yes	30 (5.8)	5 (14.3)	35 (6.4)	

Abbreviation: SD = standard deviation, CVDs = cardiovascular disease, DM = diabetes mellitus, HPT = hypertension
[a]Mean (SD), [b]Chi-square Test, [c]Fisher's Exact Test, [d]Welch's t-test

Table II: Factors associated with moderate-high CVDs risk among primary HCWs in Selangor (n=543)

Variables	Simple logistic regression			
	B (SE)	Wald (df)	Crude OR (95% CI)	p-value
Sociodemographic factors				
Ethinicity				
Malay	0.18 (0.50)	0.13 (1)	1.2 (0.45, 3.20)	0.722
Non-Malay			1	
Job category				
Non-clinical	1.26 (0.38)	10.87 (1)	3.52 (1.67, 7.43)	<0.001
Clinical			1	
Family history of CVDs				
No	0.27 (0.749)	0.13 (1)	1.31 (0.30, 5.70)	0.716
Yes			1	
Lifestyle-related behavior				
Alcohol consumption				
Yes	0.27 (0.56)	0.23 (1)	1.31 (0.44, 3.89)	0.629
No			1	
Health-related factors				
Elevated WC				
Yes	0.48 (0.47)	1.07 (1)	1.62 (0.65, 4.05)	0.3
No			1	
Elevated blood glucose				
Yes	2.07 (0.44)	21.96 (1)	7.95 (3.34, 18.93)	<0.001
No			1	
Known case of DM				
Yes	1.459 (0.44)	10.77 (1)	4.3 (1.8, 10.28)	0.001
No			1	
Known case of HPT				
Yes	0.95 (0.42)	5.16 (1)	2.59 (1.14, 5.86)	0.023
No			1	
Known case of high cholesterol				
Yes	1.23 (0.49)	6.31 (1)	3.41 (1.31, 8.9)	0.012
No			1	
Depression				
Yes	0.51 (0.51)	1.00 (1)	1.67 (0.61, 4.53)	0.317
No			1	
Anxiety				
Yes	1.17 (0.53)	5.00 (1)	3.22 (1.15, 9.01)	0.026
No			1	

Abbreviation: B = Beta, SE = standard error, df = degree of freedom, OR = odd ratio, CI = confidence interval, CVDs = cardiovascular disease, WC = waist circumference, DM = diabetes mellitus, HPT = hypertension

Statistical test = Simple logistic regression, statistical significant = p-value <0.05

Table III: Factors associated with moderate-high CVDs risk among primary HCW in Selangor (n=543)

Variables	B(SE)	Wald (df)	Adj. OR (95% CI)	p-value
Sociodemographic factors				
Job category				
Non-clinical	1.14 (0.399)	8.174 (1)	3.13 (1.43, 6.85)	0.004
Clinical			1	
Elevated blood glucose				
Yes	2.07 (0.46)	20.67 (1)	7.94 (3.25, 19.41)	<0.001
No			1	
Anxiety				
Yes	1.50 (0.57)	6.88 (1)	4.50 (1.46, 13.86)	0.009
No				

Abbreviation: B = Beta, SE = standard error, df = degree of freedom, Adj.= Adjusted, OR = odd ratio CI = confidence interval,
Hosmer and Lemeshow test: 0.626, No interaction or multicollinearity
Statistical test = Multiple logistic regression, Statistical significant = p-value <0.05
*Refer Table II for significant variables selected into the multiple logistic regression model.

final sample (n=543) were transferred and analysed using Statistical Package for the Social Sciences (SPSS) software version 29.0 IBM SPSS Inc..

To safeguard the privacy and confidentiality of the subjects, the researcher received data from the data owner without any identifier such as name, NRIC number, telephone number or home address. Identification running number for example "1, 2, 3…" were used to identify the subjects. The data received were safely kept in a password-protected computer, and only the research team members were able to access the data.

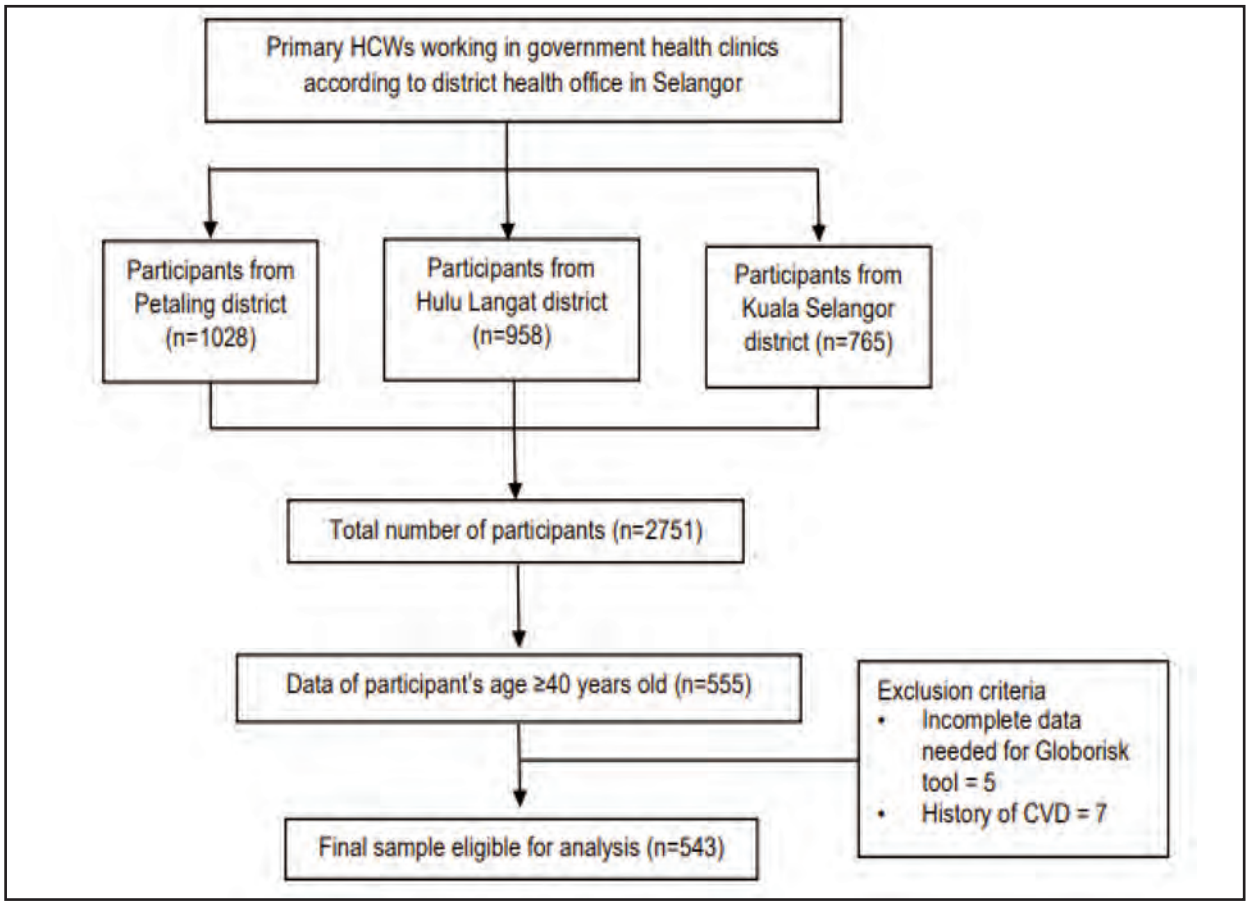

Fig. 1: Flow diagram of participants selection

Statistical Analysis

Descriptive and inferential statistics analysis were conducted using IBM Statistical Package for the Social Sciences (SPSS) Inc. version 29.0. Descriptive statistics analysis was used to describe the prevalence and characteristics of CVDs risk among the study participants. The characteristics of primary HCWs according to CVDs risk were presented as proportions in frequency and percentages (%) for categorical variables. On the other hand, continous variables were presented as mean with standard deviation (SD).

Inferential statistics analysis was conducted to determine risk factors associated with moderate-high CVDs risk among primary HCWs. Univariate analyses were conducted by using Pearson chi-square or Fisher's exact test for categorical variables and Welch's t-test for continuous variables. Multivariable analysis, binary logistic regression was used to identify factors associated with moderate-high CVDs risk. Variables were included in the multiple logistic regression model based on a statistically significant p-value <0.05 in the simple logistic regression. Variable selection was conducted using the backward elimination method. The preliminary model was tested for linearity in the logit, interaction, and multicollinearity. The model's fitness was determined using the Hosmer-Lemeshow goodness-of-fit test and the receiver operating characteristic (ROC) curve. The strength of association between each risk factors and outcome measure was reported as crude or adjusted odds ratios (OR), 95% confidence intervals (CI), and their corresponding p-values. The significance level for the statistical test was set at p-value <0.05.

Ethics Approval

This study was conducted in compliance with ethical principles outlined in the Declaration of Helsinki and Malaysian Good Clinical Practice Guideline. The ethical approval from UiTM Research Ethics Committee (REC) - (FERC-EX-24-08) and Medical Research and Ethic Committee (MREC) - NMRR ID-24-00930-EVZ (IIR) were obtained for this study.

RESULTS

Figure 1 shows the flowchart diagram of participant selection from three DHOs in Selangor, Malaysia. A total of 543 participants were analysed with 513 categorised as low-risk and 30 in the moderate-high risk category for the ten-year CVDs risk prediction. The prevalence of CVDs risk among the participants was 94.5% (95% CI: 92.2–96.2) for the low-risk category and 5.5% (95% CI: 3.8–7.8) for the moderate-high-risk category. The characteristics of the primary HCWs in Selangor are shown in Table I with most participants being female 453 (83.4%), Malay ethnicity 439 (80.8%), mean (SD) for age of 44.4 (4.38). Majority of primary HCWs with

moderate-high CVDs risk were male, with 26 (86.7%), malay ethnicity, 25 (83.3%), non-clinical group, 17 (56.7%), and obesity, with a mean BMI of 30.2 kg/m^2.

Table II shows factors associated with moderate-high CVDs risk among primary HCWs in Selangor. The simple logistic regression analysis produced a significant p-value <0.05 for six independent variables, prompting a subsequent multiple logistic regression analysis. The factors that were significant included sociodemographic factors; non-clinical job category with crude OR 3.52 (95% CI: 1.67, 7.43) and health-related factors; elevated blood glucose with crude OR 7.95 (95% CI: 3.34, 18.93), history of DM with crude OR 4.3 (95%CI: 1.8, 10.28), HPT with crude OR 2.59 (95% CI: 1.14, 5.86), and hypercholesterolemia with crude OR 3.41 (95% CI: 1.31, 8.9), as well as symptoms of anxiety with crude OR 3.22 (95% CI: 1.15, 9.01).

Table III displays the results of the multivariable analysis which showed three significant factors after adjustment of confounders, including non-clinical job category with aOR 3.13 (95% CI: 1.43,6.85), elevated blood glucose with aOR 7.94 (95% CI: 3.25, 19.41) and anxiety symptoms with aOR 4.50 (95% CI: 1.46, 13.86). We found that other factors that were not significant, including known case of DM, HPT and high cholesterol were confounders in this study.

DISCUSSION

The prevalence of moderate-high risk of developing CVDs among the primary HCWs was found to be lower compared to previous studies conducted in a tertiary center in Kuala Lumpur[4] and among the general Malaysian population.[19] This contrast could be due to an imbalanced proportion of HCWs, with the majority of the workers in government health clinics in Selangor being young age and female that contributed to lower CVDs risk.[21]

From the current findings, 61.7% of primary HCWs had modifiable CVDs risk factor, including elevated BP (≥140/90 mmHg). This findings were higher than the KOSPEN WOW 2022 report, where only 19% of the general workers in Malaysia had elevated BP.[9] Despite their good knowledge and perception of health, HCWs were at risk of developing hypertension as they tend to consume fast foods and lack of physical activity duration.[23] Future health promotion programmes must be implemented, with a focus on changing lifestyle behaviours such as adopting healthy eating habits and engaging in active physical activity.

This study also found that primary HCWs in Selangor were mostly overweight and obese, including abdominal obesity with a waist circumference of ≥80 cm in females and ≥90 cm in males. These findings are consistent with other study findings in Africa[24], Palestine[25] and Malaysia[6,26] with more than half of the HCWs being overweight and obese. The high prevalence of overweight and obesity among primary HCWs is a growing concern to MOH as Malaysia was even ranked as the most obese country in Southeast Asia.[27] On top of that, HCWs were also found to have abdominal obesity, which is related to developing other CVDs risk factors, including HPT, DM, hypercholesterolemia, and obstructive sleep apnea (OSA).[28,29] The effects of OSA for example may cause a reduction in workplace performance ability, loss of focus and memory, fatigue, and emotional disturbance.[30] Furthermore, individuals with a normal BMI but a high waist circumference have poor life expectancy than overweight or obese individuals who do not have abdominal obesity.[31] Therefore, a vigorous weight reduction programme among HCWs should not only target a normal BMI but also to achieve a normal waist circumference.

Our analysis showed that job category had a significant association with higher CVDs risk, with non-clinical HCWs having a higher odd to develop moderate-high risk of CVDs compared to the clinical group. A similar finding was found in Singapore, which showed that the modifiable risk factors for CVDs among non-healthcare professional were higher.[32] This is due to the fact that HCWs in hospitals were required to move around frequently, compared to those in health clinics who were less physically active.[5] Other than that, knowledge of CVDs is higher among the clinical group compared to the non-clinical group, which is related to their better attitude and perception about the disease.[33] Hence, it is crucial to prioritise health awareness and educational activities to enhance non-clinical HCWs' understanding of the issues before inviting them to join the programme aimed at mitigating the risk of CVDs.

This study also showed that primary HCWs with elevated capillary blood glucose levels during KOSPEN WOW screening had a significant association with an increased risk of CVDs. High glucose levels were associated with the progression of atherosclerosis or heart failure, which will lead to increased CVDs risk.[34] A hospital-based study conducted in Taiwan showed that there was a significant increase in blood glucose plasma among HCWs following the COVID-19 pandemic.[35] Due to workplace burden, HCWs were prone to chronic exhaustion, which affected their health behaviour, reduced their time for exercise, and led to unhealthy eating habits that resulted in elevated blood glucose levels.[35] Therefore, a preventative programme must target this group of HCWs to prevent them from developing DM as well as reduce the risk of CVDs.

Psychosocial factor was another factor that we found to have significant association with moderate-high risk of developing CVDs. Primary HCWs with anxiety had a 4.5 times odd to develop moderate-high CVDs risk compared to those without the condition. This was in congruent with other similar studies in German[36] and United States[37] communities, where generalized anxiety disorder (GAD) was significantly associated with CVDs. Anxious individuals tend to develop sympathetic nervous system hyperactivity, which can overstimulate heart rate and blood pressure, leading to the rapid progression of atherosclerosis.[38] In contrast, another study suggested anxiety as a cardio-protective factor in the CVDs context, where it reduced the risk of myocardial infarction.[39] This was related to a situation where anxiety arose due to a CVDs diagnosis whereby people tend to focus more on their health and took protective measures to avoid the CVDs events.[39] Although depression was found not to be significant, proper assessment and treatment of depression and anxiety symptoms among primary HCWs is necessary to

prevent further health deterioration that may result in increased risk of CVDs.

This study indicated that the office-based Globorisk calculator is a valuable tool for predicting ten-year CVDs risk in primary HCWs over 40 years of age. We proposed that the estimation of CVDs risk should be mandatory via the use of this instrument. Moreover, the intervention planning strategies aimed at combating CVDs should prioritise the non-clinical HCWs due to their associated risk of developing a higher CVDs risk. We encourage the DHOs to implement the intervention strategies outlined in the KOSPEN WOW component, such as the promotion of active living, healthy eating, and weight management. It is also crucial to ensure that a significant number of primary HCWs participate in these intervention activities and to make it compulsory for those who are at risk. Furthermore, the intervention strategy must involve the participation of all HCWs to achieve an ideal waist circumference, which can serve as an effective foundation for a weight loss program. For instance, DHOs or MOH may mandate that all HCWs must achieve and maintain an ideal waist circumference as a component of workplace requirements. We also recommend that psychological distress, such as anxiety and depression among HCWs need to be properly assessed, and if the root cause is work-related, a proactive intervention must be implemented. Proactive interventions may include collaborative care, whereby an interprofessional team collaboratively manages cases and monitors HCWs, task or workplace shifting as necessary, and referral to a specialised care for more intensive treatment.[40] We strongly urge that these initiatives and activities require coordination and understanding among all stakeholders to ensure their effectiveness in reducing CVDs risk development among HCWs. This study may provide baseline data for further cohort studies related to CVDs risk involving HCWs.

Strength and limitations

This is the first study in Malaysia that employed office-based Globorisk tool as a CVDs risk prediction among HCWs. This study utilised reliable data obtained from medical officers responsible for yearly health screening among HCWs. The anthropometric and biological measurements were performed using calibrated instruments by well-trained health personnels who presumed to have good clinical skills. The use of a cross-sectional study design limited this study by the inability to establish a temporal relationship and a causality effect between the exposure and outcome. It was also necessary to exercise caution when generalizing the results of this study, as it was conducted in a single state, restricted to the primary HCWs population, imbalance percentage of gender and race where majority was conquered by female and Malay participants. Furthermore, the use of secondary data resulted in a lack of important factors, such as residential type, marital status, household income, stress symptoms, physical activity, and dietary habits, that may have been valuable for this study. Moreover, the lack of data on the percentage of HCWs participating in the health screening could potentially lead to selection bias in this study. The quality of data collected were solely based on the skills of health personnels in charged. Variables such as smoking status, alcohol consumption, history of illness and psychological screening relied on HCWs' responses, where information bias may occur.

CONCLUSION

The three main factors that have an association with a moderate-high risk of CVDs among primary HCWs are the non-clinical group, elevated capillary blood glucose levels, and anxiety. Therefore, it is crucial to employ intervention strategies considering these findings to reduce the risk of developing CVDs among HCWs. The KOSPEN WOW platform is effective for screening and guiding the implementation intervention programmes to prevent CVDs.

ACKNOWLEDGEMENTS

We express our gratitude to the Director General of Health Malaysia for granting us permission to publish this article. We would like to thank to the Selangor State Health Department, as well as the District Health Offices in Petaling, Hulu Langat, and Kuala Selangor, for providing us secondary database to perform this study. We also would like to express our appreciation to the Department of Public Health Medicine, Faculty of Medicine, Universiti Teknologi MARA (UiTM) for their valuable support during the study duration.

CONFLICT OF INTEREST

The authors have stated that they have no conflicting interests in the study, authorship, and publishing of this article.

FUNDS

None

REFERENCES

1. WHO. Cardiovascular Diseases (CVDs) [Internet]. World Health Organization. 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds).
2. Murray CJL. Findings from the global burden of disease study 2021. Lancet 2024; 403(10440): 2259–62.
3. Khaw WF, Yee Mang Chan, Nur Hamizah Nasaruddin, Alias N, Tan L, Shubash Shander Ganapathy. Malaysian burden of disease: years of life lost due to premature deaths. BMC Public Health. 2023; 23(1).
4. Ahmad N, Panduragan SL, Chong Hong Soon, Gemini K, Yee San Khor, Bahrin NA, et al. Ten-year cardiovascular disease risk amongst workers in a tertiary healthcare institution in Kuala Lumpur. Borneo Epidemiology Journal 2020; 1(1): 35-45.
5. Abu Saad H, Low PK, Jamaluddin R, Chee HP. Level of physical activity and its associated factors among primary healthcare workers in Perak, Malaysia. Int J Environ Res Public Health 2020; 17(16): 5947.
6. Kunyahamu MS, Daud A, Jusoh N. Obesity among health-care workers: which occupations are at higher risk of being obese? Int J Environ Res Public Health 2021; 18(8): 4381.
7. Fond G, Fernandes S, Lucas G, Greenberg N, Boyer L. Depression in healthcare workers: results from the nationwide AMADEUS survey. Int J Nurs Stud 2022; 135(135): 104328.
8. Kuan PX, Chan WK, Chua PF, Yeo J, Sapri FE, Bujang MA, et al. Lifestyle factors associated with cardiovascular risk among healthcare workers from the tertiary hospitals in Sarawak. Malays Fam Physician. 2020 [cited 2023 Nov 8]; 15(1): 15-22.

9. Disease Control Division, Ministry of Health Malaysia. MYCDCGP - Guidelines on KOSPEN WOW 2022. BKPKKM.
10. Hajifathalian K, Ueda P, Lu Y, Woodward M, Ahmadvand A, Aguilar-Salinas CA, et al. A novel risk score to predict cardiovascular disease risk in national populations (Globorisk): a pooled analysis of prospective cohorts and health examination surveys. Lancet Diabetes Endocrinol 2015; 3(5): 339-55.
11. Ueda P, Woodward M, Lu Y, Hajifathalian K, Al-Wotayan R, Aguilar-Salinas CA, et al. Laboratory-based and office-based risk scores and charts to predict 10-year risk of cardiovascular disease in 182 countries: a pooled analysis of prospective cohorts and health surveys. Lancet Diabetes Endocrinol 2017; 5(3): 196–213.
12. Jahangiry L, Dehghan A, Mojtaba Farjam, Aune D, Rezaei F. Laboratory-based and office-based Globorisk scores to predict 10-year risk of cardiovascular diseases among Iranians: results from the Fasa PERSIAN cohort. BMC Med Res Methodol 2022; 22(1).
13. Dehghan A, Rezaei F, Aune D. A comparative assessment between globorisk and WHO cardiovascular disease risk scores: a population-based study. Scientific Reports 2023; 13(1).
14. Adil SO, Uddin F, Musa KI, Khan A, Shakeel A, Shafique K, et al. Risk assessment for cardiovascular disease using the framingham risk score and globorisk score among newly diagnosed metabolic syndrome patients. Int J Gen Med 2023; 16: 4295–305.
15. Mulugeta Molla Birhanu, Ayse Zengin, Evans RG, Joshi R, Kartik Kalyanram, Kamakshi Kartik, et al. Comparison of the performance of cardiovascular risk prediction tools in rural India: the Rishi Valley Prospective Cohort Study. Eur J Prev Cardiol 2023; 31(6): 723-31.
16. Derivation, internal validation, and recalibration of a cardiovascular risk score for Latin America and the Caribbean (Globorisk-LAC): a pooled analysis of cohort studies. Lancet Reg Health Am 2022; 9: 100258.
17. Osei-Yeboah J, Kye-Amoah KK, Owiredu WKBA, Lokpo SY, Esson J, Bella Johnson B, et al. Cardiometabolic risk factors among healthcare workers: a cross-sectional study at the sefwi-wiawso Municipal Hospital, Ghana. Biomed Res Int 2018; 2018: 1-9.
18. Martinelli LMB, Mizutani BM, Mutti A, Dèlia MPB, Coltro RS, Matsubara BB. Quality of life and its association with cardiovascular risk factors in a community health care program population. Clinics (Sao Paulo, Brazil) 2008; 63(6): 783-8.
19. Che, Mohd Azahadi Omar, Keegan T, Yu YP, Kamarul Imran Musa. The Ten-year risk prediction for cardiovascular disease for Malaysian adults using the laboratory-based and office-based (globorisk) prediction model. Medicina (Kaunas) 2022; 58(5): 656–6.
20. Banks E, Welsh J, Joshy G, Martin M, Paige E, Korda RJ. Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk: a nationally representative cross-sectional study. BMJ Open 2020; 10(12): e038761.
21. Kaneko H, Yano Y, Okada A, Itoh H, Suzuki Y, Yokota I, et al. Age-dependent association between modifiable risk factors and incident cardiovascular disease. J Am Heart Assoc 2023; 12(2).
22. Mwale M, Mulenga M, Milandu P, Bwalya T, Nkhama E, et al. Prevalence and associated factors of hypertension among health workers: a systematic review. International Research in Medical and Health Sciences 2024; 7(1).
23. Al Baalharith IM, Alawad ABS, Pappiya EM, Ahmed Halosh IH, Ahmed Alsherim M. The prevalence of hypertension and it determinants among health care professionals in Saudi Arabia. Saudi Journal of Nursing and Health Care 2020; 3(12): 397-402.
24. Skaal L, Pengpid S. Obesity and health problems among South African healthcare workers: do healthcare workers take care of themselves? S Afr Fam Pract 2011; 53(6): 563–7.
25. Younis J, Jiang H, Fan Y, Wang L, Li Z, Majed Jebril, et al. Prevalence of overweight, obesity, and associated factors among healthcare workers in the Gaza Strip, Palestine: a cross-sectional study. Front Public Health 2023; 11.
26. Kit LP, Abu Saad H, Jamaluddin R, Phing CH. Prevalence of overweight and obesity among primary healthcare workers in Perak, Malaysia. IIUM Medical Journal Malaysia 2020; 19(1).
27. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the global burden of disease study 2013. Lancet 2014; 384(9945): 766-81.
28. Darsini D, Hamidah H, Notobroto HB, Cahyono EA. Health risks associated with high waist circumference: a systematic review. J Public Health Res 2020; 9(2).
29. Yacoub M, Youssef I, Salifu MO, McFarlane SI. Cardiovascular Disease Risk in Obstructive Sleep apnea: An update. Journal of Sleep Disorders & Therapy 2018; 07(01).
30. Mulgrew AT, Ryan CF, Fleetham JA, Cheema R, Fox N, Koehoorn M, et al. The impact of obstructive sleep apnea and daytime sleepiness on work limitation. Sleep Med 2007; 9(1): 42-53.
31. Wise J. Waist measurement, not BMI, is stronger predictor of death risk, study finds. BMJ 2017; j2033.
32. Leong L, Chia SE. Prevalence of cardiovascular risk factors among healthcare staff in a large healthcare institution in Singapore. Singapore Med J 2012; 53(8): 517-21.
33. Hassan D, Patel KK, Peddemul A, Sikandar R, Singh Kahlon Simranjit, Nair S, et al. Knowledge, attitude and health practice towards cardiovascular disease in health care providers: a systematic review. Curr Probl Cardiol. 2022 Apr;101206.
34. Poznyak AV, Litvinova L, Poggio P, Sukhorukov VN, Orekhov AN. Effect of glucose levels on cardiovascular risk. Cells 2022; 11(19): 3034-4.
35. Liao MH, Lai YC, Lin CM. Cardiovascular Risk Factors in Hospital Workers during the COVID-19 Pandemic: a hospital-based repeated measures study. Int J Environ Res Public Health 2022; 19(23): 16114.
36. Reiner IC, Tibubos AN, Werner AM, Ernst M, Brähler E, Wiltink J, et al. The association of chronic anxiousness with cardiovascular disease and mortality in the community: results from the Gutenberg Health Study. Sci Rep 2020; 10(1).
37. Liu H, Tian Y, Liu Y, Nigatu YT, Wang J. Relationship between major depressive disorder, generalized anxiety disorder and coronary artery disease in the US general population. J Psychosom Res 2019; 119: 8-13.
38. Tokgozoglu L, Canpolat U. Does depression and anxiety increase subclinical atherosclerosis more in dyslipidemic women than men? Eur J Prev Cardiol 2019; 204748731988372.
39. Karlsen HR, Matejschek F, Saksvik-Lehouillier I, Langvik E. Anxiety as a risk factor for cardiovascular disease independent of depression: a narrative review of current status and conflicting findings. Health Psychol Open 2021; 8(1): 205510292098746.
40. Henrique MG, de Paula Couto MCP, Araya R, Mendes AV, Nakamura CA, Hollingworth W, et al. Acceptability and fidelity of a psychosocial intervention (PROACTIVE) for older adults with depression in a basic health unit in São Paulo, Brazil: a qualitative study. BMC Public Health 2021; 21(1).