Cardiovascular Preventive Activities and its Associated Factors Among Female Nurses in Universiti Sains Malaysia Hospital

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ABSTRACT

Cardiovascular diseases (CVDs) are the leading cause of death globally, significantly impacting healthcare providers, including nurses. Despite their critical role in health promotion, many nurses neglect their cardiovascular preventive activities (CVPAs). This study assessed the prevalence and associated factors of good CVPAs among female nurses at Universiti Sains Malaysia (USM) Hospital. 212 registered female nurses participated in a cross-sectional study that was carried out between June and August 2015. Data on sociodemographic characteristics, work-related factors, and CVPAs were collected through a structured self-administered questionnaire. Good CVPAs were defined as adherence to dietary guidelines, regular physical activity, non-smoking, alcohol avoidance, and regular health screenings. Logistic regression analysis was used to identify factors associated with good CVPAs. Only 14.2% of nurses practiced good CVPAs. While 75.5% were physically active, only 17.9% consumed five or more servings of fruits and vegetables regularly. Nurses in medical-based departments had lower odds of practicing good CVPAs compared to those in surgical-based units (OR = 0.24, 95% CI: 0.08-0.76, p = 0.015). The prevalence of good CVPAs among female nurses at USM Hospital is low, especially regarding dietary adherence. The work department significantly influences preventive practices, suggesting the need for targeted interventions to promote cardiovascular health among nurses.

Keywords: cardiovascular preventive activities, female nurses, dietary adherence, healthcare providers, targeted interventions

INTRODUCTION

Cardiovascular diseases (CVDs) are a leading global health concern, responsible for approximately 32% of all deaths worldwide. A significant proportion of this burden falls on low- and middle-income countries (LMICs), which account for over 80% of global CVD mortality. The Global Burden of Disease Study highlighted that in 2019, the number of people living with CVD reached 523 million, reflecting a substantial increase from previous decades. (Lopez et al., 2023).

In Malaysia, CVDs represent a major public health issue, particularly among women. The Malaysian National Cardiovascular Disease-Acute Coronary Syndrome (NCVD-ACS) registry

has shown a concerning increase in CVD-related mortality among women, highlighting the gender-specific impact of cardiovascular risk factors (Ministry of Health, 2016). Factors such as hypertensive pregnancy disorders, gestational diabetes, and the transition to menopause contribute to the heightened risk in women. The presence of these factors, combined with a longer life expectancy, women will face a greater risk of developing CVD later in life (Ministry of Health, 2016).

Nurses, who make up a large part of the healthcare workforce, are in a good position to promote public health by teaching and encouraging healthy lifestyles. However, studies show that many nurses do not engage in the recommended cardiovascular preventive activities (CVPAs) (Hayman et al., 2015). A study conducted in China found that only 5% of nurses adhered to the recommended physical activity levels, and less than a third had undergone blood lipid screening in the past five years (Zhao et al., 2023). Similar trends have been observed globally, suggesting that healthcare providers may neglect their own health despite their role in promoting patient wellness.

Understanding the factors that influence nurses' engagement in CVPAs is crucial for developing targeted interventions that can support their health and well-being. The aim of this study is to assess the prevalence of good CVPAs among female nurses at Hospital Universiti Sains Malaysia (USM) and to identify the factors associated with these practices. By understanding the current state of CVPAs among nurses, we can develop strategies to improve their cardiovascular health, thereby enhancing their role as health educators and role models for patients.

Cardiovascular diseases are a significant public health challenge, accounting for over 18 million deaths annually. Most of these deaths are due to ischemic heart disease and stroke, which are largely preventable through lifestyle modifications and early intervention. The Global Burden of Disease Study reported that the prevalence of CVDs increased significantly from 1990 to 2019, with the highest burden observed in low- and middle-income countries due to limited access to healthcare and preventive services (Sun et al., 2023). In 2019, CVDs were responsible for approximately 8.9 million deaths among women worldwide, highlighting the significant impact of these diseases on female health (Di Cesare et al., 2024).

Women frequently experience underdiagnosis and misdiagnosis of CVDs. Despite this, there is a general underestimation of CVD risk among women, partly due to the misconception that heart disease primarily affects men. They may not receive appropriate preventive measures or

treatments compared to men, contributing to higher mortality rates. (Zhang, Jin, Jia, Li, & Zheng, 2021) Moreover, non-traditional risk factors such as hypertensive pregnancy disorders, gestational diabetes, and menopause contribute to the increased risk in women.

Nurses play a vital role in the prevention and management of cardiovascular diseases (CVDs) due to their direct contact with patients and their influence on health behaviors. Their involvement is crucial in various settings, from hospitals to community health initiatives. Nurses are often the primary educators for patients regarding lifestyle changes that can mitigate CVD risk factors. They provide counselling on diet, exercise, smoking cessation, and medication adherence, which are essential for effective disease management (Hayman et al., 2015).

Studies have shown that nurses often do not engage in adequate CVPAs for themselves. Several factors have been identified as barriers to adopting healthy behaviors among nurses, which significantly impact their ability to maintain personal health despite their training and knowledge in health promotion. The barriers have been highlighted through various studies. These include long working hours, shift work, (Chong & Shorey, 2022) job-related stress, (Akubuilo, 2020) and lack of time. Additionally, organizational factors such as insufficient workplace health promotion programs and lack of support from management also play a role. (Day & Nielsen, 2017) It is essential to address these barriers to support nurses in maintaining their health and well-being, which in turn can improve their ability to advocate for patient health

Previous research has also identified several sociodemographic, work-related, and medical factors that affect CVPAs among nurses (Heidke et al., 2020). For instance, younger age, lower education level, and high work stress have been associated with lower adherence to preventive activities. Additionally, nurses working in high-stress environments such as emergency departments or intensive care units are less likely to engage in health-promoting behaviors due to demanding work conditions (Heidke et al., 2020).

This study aims to fill the gap in the literature by examining the prevalence and determinants of good CVPAs among female nurses at Hospital USM. By identifying the key factors that influence nurses' engagement in preventive activities, we can develop targeted interventions to promote cardiovascular health among healthcare providers.

METHODS

Study Design and Site

A cross-sectional study was conducted at Universiti Sains Malaysia (USM) Hospital, a tertiary healthcare facility in Kelantan, Malaysia, from June 2015 until August 2015. This study was approved by the University's Research and Ethical Committee with reference code USM/JEPEM/14090326

Study Population

The sample size was determined by using a single proportion formula. With the value of the standard normal distribution of 1.96, a precision of 0.06, the percentage of nurses with cardiovascular preventive activities of 78.1% (Gonçalves-Silva et al., 2010) The calculated sample size was 220 after accounting for a 20% non-response rate, with a minimum sample size of 183. The study targeted all female nurses at USM Hospital aged 40 years and above. Exclusion criteria included nurses on long-term leave (sick leave, maternity leave, or study leave) or those with pre- existing chronic conditions such as hypertension, diabetes, or cardiovascular diseases. Only those who consented became the subject.

Sampling Method and Data Collection

A universal sampling method was employed; out of 1140 nurses, only 215 were eligible after exclusion criteria. Selected participants were approached individually through phone calls. They were explained about the study and invited to participate in the study. Once agreed, the researcher will meet the participants to answer the questionnaire. Data were collected using a structured, self-administered questionnaire. The participants completed the questionnaire in roughly thirty minutes. 212 of the 220 surveys were fully completed and submitted for data analysis, resulting in a response rate of 98.6%.

Data Collection and Study Instrument

The questionnaire was designed to capture detailed information on sociodemographic characteristics, engagement in eight specific CVPAs, and the nurses' perception of their health. The questionnaire assessed eight different activities for cardiovascular preventive activities. The activities were assessed using the Malaysia NCD Surveillance-1 (MyNCDS-1) questionnaire. (Malaysia, 2006), which is essential for reducing CVD risk. All eight practices were combined to produce a total score for good cardiovascular preventive activities. Only those who followed all dietary recommendations, being physically active, were not a current

smoker, avoided alcohol intake and had blood pressure, blood cholesterol, blood sugar and BMI assessments within the recommendation period were considered as having good cardiovascular practices.

The definitions of all eight practices are as follows: (1) Fruit and Vegetable Intake: Participants were asked about their daily consumption of fruits and vegetables. The responses were categorized as "five or more servings per day" or "less than five servings per day". Participants who reported five or more servings of fruits and vegetables per day are defined as being consistent with national recommendations (Malaysia, 2006), (2) Physical Activity: Physical activity was assessed using a question that combined work-related, travel-related, and recreational activities. The participants need to indicate the duration for each level of physical activity in each subsection. All three types of activities will be grouped together and given metabolic equivalent (MET) values based on the intensity of the activity. Participants who achieved at least 600 MET min/week are defined as being physically active, (3) Smoking Status: Participants were classified as non-smokers (never smoked or ex-smokers) or current smokers (Manaf & Shamsuddin, 2008), (4) Alcohol Consumption: Participants were categorized as non-drinkers or current drinkers. Study participants who indicate they have consumed alcoholic drinks in the past 12 months are defined as current drinkers. One standard drink of alcohol equal to 8-13g ethanol. Moderate drinking is defined as not more than one drink for women and two drinks for men daily. (Gonçalves- Silva et al., 2010; Malaysia, 2006), (5) Blood Pressure Check: Participants were asked if they had their blood pressure checked within the last year (Lee et al., 2015). (6) Cholesterol Check: The questionnaire asked whether participants had undergone blood cholesterol, blood sugar check and BMI measurement within the past year (Chew et al., 2011; Said & Chia, 2017), (7) Health Perception: Health perception was assessed using a single-item question: "How would you rate your overall health?" Responses were recorded on a 4-point scale (poor, fair, good, excellent). For analysis, responses were divided into "good" (good/excellent) and "poor" (poor/fair) (Lundberg & Manderbacka, 1996).

Data Analysis

Data was analyzed using SPSS version 22. Descriptive statistics, such as means and standard deviations for continuous variables and frequencies and percentages for categorical variables, were used to describe the study population. The prevalence of good CVPAs was calculated along with 95% confidence intervals. Simple Logistic Regression: Simple logistic regression was initially conducted to identify potential factors associated with good CVPAs. Independent

variables included sociodemographic factors (age, marital status, education), work-related factors (shift work, department of employment), and medical factors (family history of CVD, self-perceived health status). Variables with a p-value less than 0.25 were considered for inclusion in the multiple logistic regression model. Multiple logistic regression was performed to determine the factors independently associated with good CVPAs, controlling for potential confounders. Forward Likelihood Ratio (LR) and Backward LR methods were used for variable selection. The model's goodness-of-fit was assessed using the Hosmer- Lemeshow test, and the predictive ability was evaluated using the area under the Receiver Operating Characteristic (ROC) curve. The final model presented adjusted odds ratios (AORs) with 95% confidence intervals and *p*-values, with statistical significance set at $\alpha = 0.05$

RESULTS

Sociodemographic and Health Characteristics

The study included 212 female nurses with a mean age of 48.2 years (SD ± 5.3). Most were married (90.1%) and had tertiary-level education (82.5%). Most nurses (62.7%) perceived their health as good, while the remaining 37.3% reported poor health perception. The sociodemographic and health characteristics are shown in Table 1.

Table 1. Sociodemographic, Work-Related and Medical Characteristics of Nurses (n=212)

Variables	Total (n=212)	Good CV Practice (n=30)	Poor CV Practice (n=182)
	n (%)	n (%)	n (%)
Age[a]	48.2 (5.29)	49.6 (5.52)	47.9 (5.23)
Duration of working[a]	23.7 (4.78)	24.4 (5.62)	23.6 (4.64)
Marital status			
Married	191 (90.1)	27 (90)	164 (90.1)
Not married	21 (9.9)	3 (10)	18 (9.9)
Educational level			
Secondary	37 (17.5)	8 (26.7)	29 (15.9)
Tertiary	175 (82.5)	22 (73.3)	153 (84.1)
Income (RM/month) <RM6000	135 (63.7)	23 (76.7)	
≥RM6000	77 (36.3)	7 (23.3)	112 (61.5)
Work department			70 (38.5)
Surgical based	86 (40.5)	8 (26.7)	
Intra department	72 (25.5)	4 (13.3)	78 (42.9)
Medical-based	54 (34.0)	18 (60)	54 (29.7)
Shift work			50 (27.4)
No shift	132 (62.3)	23 (76.7)	
Shift	80 (37.7)	7 (23.3)	109 (59.9)

Variables	Total (n=212)	Good CV Practice (n=30)	Poor CV Practice (n=182)
	n (%)	n (%)	n (%)
Family history of CVD			73 (40.1)
No	203 (95.7)	28 (93.3)	
Yes	9 (4.3)	2 (6.7)	175 (96.2)
Perception of health			7 (3.8)
Poor	79 (37.3)	9 (30)	
Good	133 (62.7)	21 (70)	70 (38.5)
			112 (61.5)

[a] Expressed as mean (SD)

Prevalence of Cardiovascular Preventive Activities

Only 30 nurses (14.2%) practiced all eight CVPAs. The most practiced CVPAs were non-smoking (100%) and non-alcohol consumption (100%), followed by regular BMI assessment (91.5%) and blood pressure checks (92.0%). The least practiced CVPAs consumed five or more servings of fruits and vegetables per day (17.9%). The proportion for each of the cardiovascular preventive activities are shown in Table 2.

Table 2. Proportion of Cardiovascular Preventive Activities Practiced by Nurses (n=212)

Activity	n	%
5 or more servings of vegetables/fruits per day	38	17.9
Physically active	160	75.5
Blood pressure check within 1 year	195	92.0
Blood cholesterol checks within 1 year	178	84.0
Blood sugar check within I year	186	87.7
BMI assessment within 1 year	194	91.5
Non-smoker	212	100.0
Non-alcohol drinker	212	100.0

Associated factors for good cardiovascular preventive activities by logistic regression

The results of simple logistic regression analysis are shown in Table 3. The result for multiple logistic regression analysis is shown in Table 4.

Table 3. Associated Factors for Good Cardiovascular Preventive Activities Using Simple Logistic Regression (n=212)

Variable	Crude odds ratio	(95% CI[a])	Wald stat[b]	*p*-value
Age(years)	1.06	(0.99,1.14)	2.59	0.108
Duration of working(years)	1.04	(0.96,1.13)	0.75	0.385
Level of education				
Secondary	1			
Tertiary	1.92	(0.78,4.73)	2.01	0.157
Marital status				
Not married	1			
Married	0.99	(0.27,3.58)	0.00	0.985

Variable	Crude odds ratio	(95% CI[a])	Wald stat[b]	*p*-value
Income				
<RM6000	1			
≥RM6000	2.05	(0.84,5.04)	2.47	0.116
Shift work				
No shift	1			
Shift	2.20	(0.90,5.40)	2.97	0.085
Work				
Surgical based	1			
Intradepartmental	0.31	(0.13,0.76)	6.56	0.010
Medical-based	0.24	(0.08,0.76)	5.92	0.015
Family history of CVD				
No	1			
Yes	2.09	(0.40,10.90)	0.77	0.379
Perception of health status				
Poor	1			
Good	0.82	(0.36,1.85)	0.23	0.631

a Confidence interval
b Wald statistics

Table 4. Associated Factors for Good Cardiovascular Preventive Activities Using Multiple Logistic Regression (n=212)

Variable	Adjusted Odds Ratio[a]	(95% CI[b])	Wald stat[c]	*p*-value
Work department				
Surgical based	1			
Intradepartmental	0.31	(0.13,0.76)	6.56	0.010
Medical-based	0.24	(0.08,0.76)	5.92	0.015

[a] Forward and Backward methods of Multiple Logistic Regression model were applied
[b] Confidence interval
[c] Wald statistic

Fitness Testing for The Preliminary Model

There was no multicollinearity problem or significant interaction. Hosmer-Lemeshow test for fitness of model was not significant with *p*-value equal to 1.000. The overall correctly classified percentage was 85.8%, and the area under the ROC curve was 66.0%, indicating that the model was fit. The model can accurately discriminate 66.0% of the case. The results were shows female nurses of the intradepartmental unit have 0.3 at odds of practicing good cardiovascular preventive activities compared to female nurses of the surgical-based department. Female nurses of a medical-based department have 0.2 at odds of practicing good cardiovascular preventive activities compared to female nurses of a surgical-based department.

DISCUSSION

This study explored the prevalence of good cardiovascular preventive activities (CVPAs) among female nurses at Universiti Sains Malaysia (USM) Hospital and examined the factors associated with these practices. The findings indicate that only 14.2% of the participants engaged in all eight recommend CVPAs, which include adequate intake of fruits and vegetables, regular physical activity, non-smoking, avoiding alcohol, and regular screenings for blood pressure, cholesterol, blood sugar, and BMI. This low prevalence is alarming, given the nurses' critical role in promoting health and preventing diseases. Their engagement in such practices is crucial not only for their own well-being but also for serving as role models for their patients. (Wang et al., 2024).

Among the eight CPAs assessed, the consumption of five or more servings of fruits and vegetables per day was the least practiced activity, with only 17.9% of nurses following this guideline. A study by Lee et al. (2022) found that healthcare workers often struggle to maintain healthy eating habits due to long working hours and the demands of their roles. (S.-g. Lee & Kim, 2022). This is further supported by research conducted by Han et al. (2016), which reported that shift work significantly disrupts normal eating patterns, making it challenging for nurses to consume adequate amounts of fruits and vegetables (Han, Choi-Kwon, & Kim, 2016).

Previous studies among Malaysian adults have identified barriers such as the high cost of healthy foods, lack of time, and limited understanding of dietary recommendations. They often consume whatever food is readily available at their workplace. Norimah et al. (2010) reported that many Malaysians also struggled with understanding terms like serving size and the importance of a balanced diet. However, in this study, the pictorial questionnaire clearly assesses the recommended number of vegetables and fruit intake, making them admit and realize they did not consume enough amount previously. The low intake of fruits and vegetables among healthcare workers, who are generally expected to have a better understanding of health guidelines, suggests that additional efforts are needed to improve their dietary practices.

Similarly, while 75.5% of nurses reported being physically active, the remaining 24.5% were not engaging in sufficient physical activity, which is essential for cardiovascular health. The relatively high prevalence of physical activity compared to dietary adherence might reflect the more immediate and accessible nature of physical activity, such as walking or taking the stairs during shifts (Perry et al., 2018). The accessible nature of physical activity in the nursing profession may explain why a higher percentage of nurses engage in physical activity compared

to those who adhere to dietary recommendations. Melnyk et al. (2021) noted that many nurses find it easier to incorporate physical activity into their daily routines, even during shifts, compared to making healthier dietary choices. The ability to engage in short bursts of physical activity, such as walking or stretching during breaks, makes it more feasible for nurses to maintain some level of physical fitness despite their busy schedules (Melnyk et al., 2021).

The engagement of nurses in regular health checks is a critical aspect of maintaining their health and well-being, particularly in high-stress environments such as working in busy urban hospitals. Recent findings indicate that most nurses participate in health screenings, with 92.0% having their blood pressure checked and 91.5% undergoing Body Mass Index (BMI) assessments within the past year. These high rates can be attributed to the routine availability of these services within hospital settings and the awareness of the importance of monitoring key health indicators among healthcare professionals (Montayre et al., 2022).

However, the rates of cholesterol (84.0%) and blood sugar checks (87.7%) are comparatively lower, suggesting that some nurses may not priorities these screenings as much. This could be influenced by several factors, including a perceived sense of invulnerability or an underestimation of personal risk associated with these health indicators (Jahromi al., 2017). Additionally, the demanding nature of nursing work may lead to time constraints that hinder the ability to engage in these screenings (Vicent et al., 2020). Furthermore, there may be a reluctance among nurses to perform blood draws for these tests, which could further contribute to lower engagement rates (White et al., 2018).

The implications of these findings are significant, as they highlight the need for targeted interventions to promote comprehensive health checks among nursing staff. While the high engagement in blood pressure and BMI assessments is encouraging, the lower rates of cholesterol and blood sugar checks indicate potential gaps in health monitoring practices. Healthcare institutions should consider implementing educational initiatives to raise awareness about the importance of these screenings and develop streamlined processes to facilitate more accessible access to cholesterol and blood sugar tests. (Vaismoradi et al., 2020).

The study also found significant differences in CVPAs based on the department of employment. Nurses working in medical-based and intradepartmental units had lower odds of practicing good CVPAs compared to those in surgical-based units. This finding is consistent with previous research indicating that work-related stress and the demanding nature of certain departments can negatively impact health behaviors (Chong & Shorey, 2022) Medical-based and

intradepartmental units, such as intensive care units and emergency departments, often involve high stress levels and irregular working hours, which can limit the time and energy nurses have for self-care activities like healthy eating and regular exercise (Akbar, 2022; Rink et al., 2023).

The role of work-related stress in influencing health behaviors has been highlighted in several studies (Akubuilo, 2020; Bartosiewicz & Łuszczki, 2023). Healthcare workers in high-stress environments, such as surgical and emergency units, were more likely to engage in unhealthy behaviors, including smoking. (Heuel et al., 2022) While smoking was not a significant issue in this study, as all participants were non-smokers, however high-stress work environments may discourage healthcare workers from being involved with unhealthy behaviors. The lack of significant associations between educational level, nature of work, and CVPAs further emphasizes the complex interplay between workplace factors and personal health behaviors. (Sudholz et al., 2018)

The findings of this study have several implications for practice. First, there is a need for targeted interventions aimed at promoting healthy lifestyle behaviors among nurses, particularly those in high-stress departments (Heuel et al., 2022). Stress management programs, workplace health promotion initiatives, and providing access to healthy food options within the hospital could help mitigate some of the barriers to practicing good CVPAs. Additionally, educational programs focusing on the importance of dietary adherence and physical activity should be tailored to the specific needs of nurses, considering their unique work environments and schedules.

Furthermore, hospital management should recognize the importance of supporting the health and well-being of their staff. Nurses who are healthy and engaged in preventive activities are more likely to be effective role models for their patients (Yoğurtcu & Ozturk Haney, 2022). This is particularly important in the context of CVD prevention, where lifestyle modifications are a critical component of risk reduction. By creating a supportive work environment that promotes healthy behaviors, hospitals can enhance the overall well-being of their staff and improve patient care outcomes (Day & Nielsen, 2017).

CONCLUSION

In conclusion, the prevalence of good cardiovascular preventive activities among female nurses at Hospital USM is low, particularly in dietary adherence. The department of employment significantly influences preventive practices, with nurses in high-stress departments less likely

to engage in good CVPAs. These findings underscore the need for targeted interventions to support the cardiovascular health of healthcare providers, ensuring that they can serve as effective role models for their patients. Future research should focus on identifying specific barriers to practicing good CVPAs and developing tailored educational programs to support healthcare professionals in leading healthier lifestyles.

LIMITATIONS AND STRENGTHS

This study has several limitations. First, the cross-sectional design limits the ability to establish causality between the identified factors and CVPAs. Second, the use of self-reported data may introduce social desirability bias, as participants may have over-reported their engagement in positive health behaviors. Additionally, the study was conducted in a single institution, which may limit the generalizability of the findings to other hospitals or healthcare settings. Despite these limitations, studying has notable strengths. The high response rate (98%) enhances the reliability of the findings, and the use of a comprehensive questionnaire allowed for a detailed assessment of various aspects of CVPAs. Moreover, the inclusion of multiple variables, such as sociodemographic, work-related, and medical factors, provides a holistic understanding of the factors influencing CVPAs among nurses.

ACKNOWLEDGEMENT

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