High levels of risk factors and poor secondary prevention for coronary heart disease patients in public hospitals: A descriptive repeated measures study.

High Levels of Risk Factors and Poor Secondary Prevention for Coronary Heart Disease Patients in Public Hospitals: A Descriptive Repeated Measure Study

ABSTRACT

Background: Secondary prevention is a priority after coronary revascularization for effective long term cardiovascular care. Coronary heart disease is a major health problem in Jordan, but little is known about the current provision of secondary prevention.

Aim: To evaluate risk factors and explore the current provision of secondary Coronary heart disease prevention among patients presenting with first-time Coronary heart disease at two time points: during hospitalization (Time 1), and six months later (Time 1), in multicenter settings in Jordan.

Methods: A descriptive, repeated measures research study design was applied to a consecutive sample of 180 patients with first-time Coronary heart disease. Demographic and clinical details were recorded from medical files. Self-administered questionnaires developed by the researchers were used to measure secondary prevention information related to Coronary heart disease, including *secondary prevention services*, *lifestyle advice received*, and *medical advice topics*. A short form of the International Physical Activity Questionnaire was used to measure physical activity. Participants were met at Times 1 and 2.

Results: Unstructured lifestyle advice given to the patients at Times 1 and 2 most frequently related to medications, smoking, diet, and blood lipids control advice topics, with no statistically significant improvement in cardiovascular risk factors among patients between Times 1 and 2.

Conclusion: Despite an extremely high prevalence of risk factors in this population, the provision of secondary prevention is poor in Jordan, which requires urgent improvement, and the contribution of nurses' to secondary prevention should be enhanced.

SUMMARY STATEMENT

What is already known about this topic?

- Cardiovascular diseases have relatively earlier onset and higher prevalence in the Middle East and North Africa. However, there is a limited knowledge about the prevalence of risk factors of cardiovascular diseases in the region.
- There is strong evidence that behavioral modification should be given high priority to help patients with coronary heart disease to be compliant with healthy lifestyle behaviors.
- The prevalence of coronary heart disease and premature mortality in the Middle Eastern countries is progressively increasing, indicating a lack of effective strategy.

What this paper adds

- The prevalence of coronary heart disease risk factors is still egregiously high in the Jordanian population.
- The secondary prevention strategy and lifestyle changes are insufficient among patients with coronary heart disease in Jordan.
- Health policy makers are strongly recommended to establish cardiac rehabilitation programs to reduce cardiac events and mortality in Jordan.

The implications of the study

- Nursing administrations need to focus on secondary prevention strategies to minimize the risk factors of cardiovascular disease in developing countries.
- Nursing leaders in Jordan should develop health intervention programs to help patients with coronary heart disease change their lifestyles.
- Greater efforts are needed to stop progression of risk factors and improve secondary prevention in Jordan and further studies are warranted, such as interventional studies to enhance secondary prevention for patients with coronary heart disease.

Keywords: “Coronary heart disease”, “Coronary revascularization”, “Secondary prevention”, “Jordan”; nursing.

Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

INTRODUCTION

Coronary heart disease (CHD) remains a major cause of mortality worldwide, despite decades of urgent medical attention by the World Health Organization (WHO, 2020). Approximately 9 million people died from CHD in 2019, representing 16% of all deaths from all causes globally (WHO, 2020). In Jordan, cardiovascular disease (CVD), a particular variant of CHD, continues to be the leading cause of death, accounting for 37% of all fatalities in 2018 (WHO, 2018). CHD survival rates are increasing as a result of advances in technology and treatment (Berkelmans et al., 2018; Mensah et al., 2017). However, patients with established CHD remain at high risk for later adverse cardiac events and poor long-term outcomes (Patel et al, 2019). Therefore, these patients need

to adhere to a range of evidence-based secondary preventive strategies, to minimize the risk of disease progression and recurrence (Frederix, Dendale, & Schmid, 2017). These strategies are focused on making individually appropriate behavioral changes and implementing lifestyle interventions (smoking cessation, increased physical activity, and healthy food choices), blood pressure (BP) control, cholesterol and diabetes management, and the use of prophylactic drugs therapies (Cosentino et al., 2020).

The benefits of smoking cessation on reducing the risk of recurrent cardiovascular events and decreasing mortality rates have been widely documented (Berg et al., 2019). Pharmacological aids such as nicotine replacement therapy (NRT) and anti-depressant drugs can all improve quit rates (Lindson, Chepkin, Fanshawe, Bullen, & Hartmann-Boyce, 2019).

Evidence shows that participating in organized comprehensive and medically supervised cardiac rehabilitation (CR) programs improves prognosis and promotes recovery, as well as improving the quality of life in CHD patients (Schopfer & Forman, 2016). The benefits of drug therapies, and adherence to healthy lifestyle behaviors (i.e. performing regular exercise, smoking cessation, weight reduction, consumption of fruit, fish, less alcohol consumption, and sleeping duration of 5.5-7 hours daily) have clear efficacy in secondary prevention for CHD (Cosentino et al., 2020).

Jordan’s health care system mainly consists of three major sectors that work collaboratively to provide relatively high-quality health services: public (governmental and military); private; and international and charitable sectors. The public sector provides care for the majority of Jordanians at low cost, consisting mainly of hospitals administered by the Ministry of Health (MoH), the Royal Medical Services (RMS), and state university

hospitals. The public sector provides primary, secondary, and tertiary services through a network of hospitals and numerous primary health centers (MoH, 2016).

While international research has demonstrated the efficacy of secondary prevention in reducing cardiovascular mortality and morbidity (Schopfer & Forman, 2016), there is a paucity of evidence from Jordan on this issue, and investigation within this culture is required (Eshah, 2013; Mosleh & Almalik, 2016). Previous researches in Jordan addressed the learning needs of acute coronary disease patients and management of CHD (Eshah, 2011), focusing on the association between psychological factors and secondary prevention (Shajrawi, Granat, Jones, & Astin, 2021), and primary prevention of cardiovascular disease in a primary care setting (Tahaineh, Barakat, Albsoul-Younes, & Khalifeh, 2016). However, this study is the first seeking to address the gap in the literature of exploring CHD risk factors and the current provision of secondary prevention of CHD in the country.

METHODS

Design and objectives

A descriptive quantitative repeated measures research design was applied at two time points: during hospitalization (Time 1), and six months later (Time 2), in multicenter settings in Jordan. The repeated measures were selected to examine the changes in risk factors and secondary preventions.

The objectives were to evaluate risk factors and explore the current provision of secondary Coronary heart disease prevention among patients presenting with first-time

Coronary heart disease at two time points: during hospitalization (Time 1), and six months later (Time 1), in multicenter settings in Jordan.

Research setting

This study was conducted in three main referral hospitals with interventional cardiac units and CHD patients who need cardiac interventions, such as percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG), referred from all other public hospitals in the country in Jordan to three main hospitals, including available advisory and cardiac rehabilitation services, as listed below.

Queen Alia Heart Institute (QAHI) located in Amman, the capital city of Jordan. QAHI is the main specialist cardiac institution in Jordan, with over 9,500 admissions per year. The QAHI is affiliated with the RMS, which offers health care services to members of the RMS and their families. The QAHI consists of five units with a capacity of 170 beds, and three catheterization rooms equipped with the most advanced technology. Every year QAHI implements around 8,000 diagnostic and therapeutic cardiac catheterization procedures, including PCI and primary PCI, and 1,000 open-heart operations (MoH, 2016).

Prince Hamza Hospital (PHH) is also in Amman, and it is one of the major facilities of the MoH. The PHH provides health services to a large service population from different cities in Jordan, with 433-bed capacity, including a 12-bed Coronary Care Unit, and a 35-bed Cardiac Surgeries Ward, for post-cardiac surgery patients, as well as three catheterization rooms. PHH conducts about 3,500 cardiac catheterization procedures and 135 open-heart operations annually, with over 2188 admissions to the Coronary Care Unit in 2012 (MoH, 2016).

King Abdullah University Hospital (KAUH) is situated in the northern part of Jordan, east of Irbid. The KAUH is affiliated with Jordan University of Science and Technology, with 700 beds. The KAUH consists of five units: Coronary Care Unit (12 beds); Cardiac Surgery Unit; Catheterization Laboratory; Cardiac Intensive Care Unit; and an Intermediate Cardiology Unit. The KAUH receives referral from Ministry of Health and RMS based on a prior agreement (MoH, 2016).

Sample and inclusion criteria

Patients were eligible for the study if they presented with first-time CHD treated medically. The European Guidelines on Cardiovascular Disease Prevention in Clinical Practice (2020) were used to compare against recommended targets, as they constitute the most up-to date international guidance on secondary prevention (Cosentino et al., 2020). Other inclusion criteria included: first time undergoing elective PCI, or first time undergoing CABG; men and women over 18 years of age; physically and mentally suitable for study participation; pain-free and hemodynamically stable for more than eight hours; willing to provide informed consent; and able to communicate, read, and write in Arabic.

Sample size calculation was used to determine the minimum sample needed for the study. Based on a confidence level of 95%, confidence interval of 5, and effect size of 0.3, G Power indicated a required sample of at least 134 patients. The study population comprised an initial prospective consecutive sample of 257 patients who presented to the three studied settings over a four-month period in 2014. After being contacted by the primary researcher, 49 patients (19%) did not meet the inclusion criteria. Of the 208 eligible patients, six (3%) refused to participate in the study without giving a reason for their refusal, and 22 (11%) patients did not return the questionnaire. The researcher

continued to recruit patients until the proposed quota sample was reached (strata). As a result, a total of 180 eligible patients were recruited (60 AMI, 60 PCI, and 60 CABG) at Time 1 (T1). Sixty patients from each setting were recruited with 20 patients from each patients group from each setting.

After six months, at Time 2 (T2) 11 (6%) patients dropped out from the study and did not complete the follow-up stage. As a result, 169 patients (94%) (57 AMI, 56 PCI, and 56 CABG) participated from the 180 patients at the baseline stage. During the follow-up data collection stage, the medical records of the 11 patients who dropped out from the study were excluded. In addition, 15 medical records belonging to participants at the follow-up stage could not be traced (because these patients were withdrawn from the study without giving a reason). As a result 154 patients' medical records were reviewed again after six months to complete the medical record follow-up data sheet.

Data collection procedure

The data collection was conducted by the primary researcher, who collected the data from the patients during their hospital stay or at their homes, and reviewed patients' medical records at two times points: during hospitalization (T1), and six months later (T2) following hospital discharge, using standardized methods, medical files, and administering self-reported questionnaires.

Demographic and clinical variables

A demographic data and self-reported clinical variables sheets was developed by the authors. The patients filled out the clinical data sheet with information on cardiovascular risk factors at Times 1 and 2. The clinical data sheet included the following.

- Behavioral outcomes and lifestyle changes (smoking status, physical activity).

- Physiological outcomes, such as BP, blood glucose, glycated haemoglobin (HbA1c), blood lipids (cholesterol and low-density lipoprotein (LDL)) and obesity as indicated by body mass index (BMI), obtained from medical record.
- Prescribed medication, secondary prevention services, lifestyle advice received, and medical advice topics (activity, exercise, stress management, and weight and blood pressure control) were obtained from medical records.

Blood investigations were carried out were conducted at baseline and after six months during their appointment in the outpatients clinic in the three hospitals, using standardized machines with quality assurance control.

Poor BP control was defined according to the 2021 European Society of Cardiology Guidelines on cardiovascular disease prevention in clinical practice; that is, hypertension was defined as office BP ≥140 systolic or ≥ 90 diastolic (mm Hg), ambulatory BP ≥135 systolic or ≥ 85 diastolic (mm Hg), and home BP ≥135 systolic or ≥85 diastolic (mm Hg) (Visseren et al , 2021). In addition, uncontrolled blood glucose was defined in line with the same 2021 European Society of Cardiology Guidelines as HbA1c >_6.5% (48 mmol/mol) for type 2 DM, and HbA1c >7.0% for type 1 DM (53 mmol/mol).

Short Form of the International Physical Activity Questionnaire (IPAQ-SF)

The Short Form of the IPAQ (IPAQ-SF) was used to assess patients' physical activity (PA) (Craig et al., 2003). As advised in the literature, the back-translation technique with monolingual test of the target language version was used to translate the instrument into Arabic for this study (Maneesriwongul & Dixon, 2004). Previous studies show that the IPAQ is a valid and reliable method for measuring PA (Craig et al, 2003; Helou, 2018). The original version shows a good internal consistency of 0.70 (Craig et al, 2003). The

Arabic version of IPAQ had a high internal consistency, with a Cronbach's alpha ranging from 0.769–1.00 and from 0.73 to 0.95 (Helou, 2018; Regaieg et al., 2016).

IPAQ-SF consists of seven questions providing information on the time spent doing vigorous activities, moderate activities, time spent walking, and time spent sitting in the last seven days (Craig et al., 2003). According to the scoring protocol from IPAQ (www.ipaq.ki.se), patients' PA was categorized into low, moderate, and high based on calculated metabolic rate (MET) for walking, moderate and vigorous activities using the proposed formulas: Walking = 3.3 METs, Moderate PA = 4.0 METs, Vigorous PA = 8.0 METs. Total MET-minutes/week = Walking (METs*minutes*days) + Moderate (METs*minutes*days) + Vigorous (METs*minutes*days) (Forde, 2018). Particpants were then classified into low, moderate, and high PA based on Forde's (2018) classifications. The IPAQ-SF was administered at T1 to measure previous PA before hospitalisation and T2 to measure PA 6 months following hospitalisation.

Statistical analysis

All statistical analyses were undertaken using SPSS version 21. Descriptive statistics were used to analyze demographic data, patient outcome details, estimated prevalence of risk factors, received secondary prevention services, medical advice topics, lifestyle advice received, and medication prescribed by diagnostic category.

Further analysis was implemented to examine the changes between baseline and follow-up time; the McNemar test was used for dichotomous dependent variables between two related groups, including lifestyle advice received and cardiovascular risk factors (such as BP measurement, blood glucose control, blood lipid control, and smoking status at baseline and follow-up). When the assumption was violated and the use of the dependent

t-test was inappropriate, Chi square test was used to examine the change between baseline and follow-up for level of PA.

Ethical considerations

The ethical issues were considered carefully for this study. Ethics approval was obtained from the ethics committee in each study setting. Written informed consent was obtained from each participant prior to participation. Confidentiality was guaranteed, and all questionnaires were numerically coded, with no personal identifiable information being collated or reported. All data were kept secure, in password-protected computer files accessible only to the researchers.

RESULTS

Data regarding secondary prevention services received, risk factor measurements, lifestyle advice received, and medical advice topics were collected at baseline (T1) and follow-up (T2). This was to assess the provision of secondary prevention services provided for CHD during hospitalization and after discharged from hospital, to examine changes between baseline and follow-up. The overall response rate was 89.1%. The normality of data was assessed by Shapiro Wilk test, which indicated that the study data were normally distributed.

Personal demographic and clinical details

Of the 180 patients at discharge, the majority were male (88.3%, n=159). Their mean (SD) age was 54.3 (9.3) years old. Most of the patients (90%, n=162) were married and Muslim (97.2%, n=175). Almost half had not completed secondary school education (45%, n=81) and (46%, n=83) were employed, while 29.4% (n=53) were retired. More

than two-thirds (68.3%, n=123) reported their monthly income as less than 400 Jordanian dinars. The majority (72.2%, n=130) of patients reported that they had a medical history of previous illness, with 44.4% (n= 80) reporting a history of hypertension HTN, and 36.1% (n= 65) having a history of diabetes mellitus DM.

Please insert Table 1 here: (Demographic details of participants from the three hospitals)

Secondary prevention services

No patients at Times 1 or 2 attended or were referred to any course or program that would enable them to manage their CHD, such as CR, health education, smoking cessation, exercise training, or psychological intervention programs. None of the patients at Times 1 and 2 had undergone psychological risk factors or dietary assessment.

Lifestyle advice received

At T1, the majority of patients (72.2%, n=130) received at least one advice about healthy lifestyle either from a physician or nurse; 95 out 130 patients received the advice verbally.

At T2; slightly more than half of patients (50.9%, n=86) received the advice verbally about healthy lifestyle and from their physicians only. The McNemar test showed a significant decrease in received advice among patients at T2 compared to T1 (T1: n=130; T2: n=86; $P \leq 0.005$).

Medical advice topics

The most frequent topics that patients received advice about were related to medications (T1: 60.8%, T2: 72.1%), smoking (T1: 60.8%, T2: 48.8%), diet (T1: 53.8%, T2: 47.7%). and blood lipids control advice (T1: 52.3%, T2: 30.2%). The least frequent topics they

received advice about were related to stress management (T1: 3.1%, T2: 3.5%), weight control (T1: 4.6%, T2: 2.3%), blood pressure control (T1: 7.7%, T2: 2.3%), and activity and exercise advice (T1: 37.7%, T2: 23.3%), as shown in Table 2. At T2, McNemar Test showed that there was a significant decrease in the advice received about diet (n=86, P=0.008), blood lipids control (n=86, P≤0.05), activity and exercise (n-169, P=0.02), and smoking (n=169, P≤0.05).

Please insert Table 2 here (Medical advice topics)

Information on cardiovascular risk factors

The available information on cardiovascular risk factors history and measurements at T1 is shown in Table 3. Smoking status history was the highest recorded risk factor (81.1%), followed by the patients' history of hypertension (76.7%) and patients' history of DM (68.9%).

Please insert Table 3 here (Available information (%) on cardiovascular risk factor history and measurements of blood pressure, lipids and glucose in hospital discharge documents by diagnostic category).

Changes in cardiovascular risk factors between Times 1 and 2

The changes in CHD risk factors was limited in this population between T1 and T2 and are presented in Figure 1. At T1, of the 180 patients, 77% were obese (BMI ≥30 kg/m^2) or overweight (BMI ≥25 to 29.9 kg/m^2). At T2, 75% were obese or overweight. McNemar test showed no significant decrease (P=0.3) in the prevalence of obesity at T2 compared to baseline.

The prevalence of smoking (self-reported) at T1 was 59% and at T2 (47%), McNemar test showed a significant decrease (P=0.001) in the prevalence of smoking at T2 compared to baseline.

The study showed that the majority of patients (59%, n=106) had low levels of PA at T1 and this had declined to 41% at T2. By examining the change in PA level between Times 1 and 2 , using Chi square test, a significant improvement was found in PA levels at T2: $\chi(1) = 7.758$, $p = .005$.

Regarding blood glucose, at T1, 58% had uncontrolled blood glucose compared to 64% at T2. McNemar test showed that there was a significant increase of control among patients with poorly controlled blood glucose between T1 and 2 ($p \leq 0.05$). In addition, 11% had poor BP control at T1 compared to 25% at T2; the McNemar test showed a significant increase in poor control of BP in the follow-up compared to baseline (n=102, P=.001). The LDL and HbA1c level were not recorded for any patients at the follow-up time point.

Please insert figure 1 here (The changes in CHD risk factors at both baseline and follow-up)

DISCUSSION

The results of the current study revealed a high prevalence of cardiovascular risk factors among Jordanian CHD patients, while the provision of secondary prevention is poor. Patients have high rates of obesity, smoking, dyslipidemia, DM, physical inactivity and lower HTN compared to European countries (Kotseva et al., 2016). Moreover, a large proportion of CHD patients in Jordan do not achieve the behavioral and physiological

therapeutic targets of cardiovascular disease prevention recommended by the European guidelines on cardiovascular disease prevention in clinical practice, and have much worse compliance than their European counterparts (Cosentino et al., 2020; Kotseva et al., 2016).

These discrepancies could be attributed to the differences in cultural norms and lifestyle behaviors between Jordan and European countries. The majority of patients were Muslims, who have a tendency to rely spiritually on Allah (God), and believe that illness or wellness is God's will, which may influence their self-efficacy, health care-seeking decisions, and attitudes towards changing lifestyle behaviors (Nabolsi & Carson, 2011). Conservative social attitudes in Jordan inhibit women from participating in outdoor physical activities, due to the social and cultural taboo of women wearing sports clothes or even participating in physical activities in public *per se* (Al-Ali & Haddad, 2004; Benjamin & Donnelly, 2013)

The differences in the prevalence of risk factors are also likely to be related to poor lifestyle behaviors, such as consuming high-fat and caloric diets, low consumption of fruit, low uptake of exercise, and the considerable preference for using herbal medicine rather than biomedical services among the Jordanian population (Wazaify, Alawwa, Yasein, 2013). This could be related to limited secondary prevention and insufficient discharge teaching planning in many hospitals in Jordan and also to the cheaper and more available methods to treat some signs and symptoms of cardiac disease in Jordan. Moreover, many people do not participate in regular medical checkups (Mohannad, Mahfoud, Kanaan, & Balbeissi, 2008) which may be related to lack of knowledge.

There was a low prevalence of females in this study, despite recruiting a consecutive quota sample, whereby men and women presenting with the conditions had equal chance of recruitment. The reasons for this are unclear, and require further investigation. Since the average life expectancy in Jordan is 73 years old, perhaps this means that in this younger cohort of patients women are less prevalent. In addition, child bearing and household duties are generally female responsibilities in Jordanian society, which may lead women to de-prioritize their own healthcare needs, and thus inhibit them from attending health settings (Bawadi & Al-Hamdan, 2017). Some women may feel embarrassed to seek treatment, and it is unacceptable for some women and families for women to be examined by male physicians in Jordanian culture. For this, female physicians need to be available in cardiology clinics and /or refer female CHD patients to central cardiology clinics where female physicians are available. Other studies have found that women delay seeking medical care more than men, because they fear that a diagnosis with CHD may affect their marital life (Omran & Al-Hassan, 2006). Therefore, improving knowledge of the patients and their families about CHD is necessary and to assure patients that they could maintain their health and live along with CHD if they adhere with prescribed medications and healthy life style behaviours.

Evidence supports the view that lifestyle modifications relating to physical activity, diet, and smoking can improve survival, and decrease subsequent cardiac events in patients with established CHD (Brinks, Fowler, Franklin, & Dulai, 2017). In the current study, 59% of CHD patients were smokers, which is much higher than the 38.1% prevalence reported by a previous study conducted in Jordan (Khattab et al., 2012), as well as the rate of 35% in Lebanon (Sibai et al., 2016), which was found to have the highest smoking prevalence

in the Middle East and North Africa in 2012 (Khattab et al., 2012). Moreover, the percentage of persistent smokers at follow-up in the current study (47%) is still higher than in other regional countries (Khattab et al., 2012). Smoking is still generally considered to be socially acceptable in Jordan, and many patients do not believe that smoking seriously impacts their life expectancy (Abu-Baker, Haddad, & Mayyas, 2010), being unaware about the hazards of smoking and the long-term health benefits of quitting (Elshatarat, Stotts, Engler, & Froelicher, 2013).

Studies in Jordan have found a significant correlation between exercise participation and socio-demographic variables: high-income, well-educated males have more frequent exercise performance (Al-Ali & Haddad, 2004). The majority of patients in this study had a low level of education and employment, and tended to have low monthly incomes. These findings could be also attributed to lack of public parks and limited access to sport facilities outside the major cities (Barghouti, AbuRmaileh, Jallad, & Abd-Qudah, 2015), as well as the high expense of home exercise equipment for low income families in Jordan (Al-Hassan & Wierenga, 2000).

International evidence indicates that secondary prevention strategies for CHD patients effectively reduce disease progression (Brinks et al., 2017; Cosentino et al., 2020), morbidity, and mortality, and improve patients' quality of life (Al-Smadi et al., 2017). Evidence also confirms that lifestyle modifications can reduce the risk of recurrent CHD events (Brinks et al., 2017). The findings from the current study showed evidence that despite the high prevalence of cardiovascular risk factors, the provision of secondary prevention in Jordan is poor, and there was a heavy reliance on medical treatment and medications, whilst lifestyle modifications were largely neglected.

None of the patients at both baseline and follow-up attended or were referred to any cardiac rehabilitation or behavioral intervention courses, or had undergone psychological or dietary assessments. Recording of risk factor history and measurements was suboptimal at baseline, and severely below guideline targets at follow-up compared to European studies (Kotseva et al., 2016).

This result is incongruent with previous literature which found clear evidence of the effectiveness of cardiac rehabilitation programs (Schopfer & Forman, 2016), and the evidence-based European Society of Cardiology (ESC) secondary prevention guidelines (Cosentino et al., 2020). As a result, primary and secondary prevention programs for CHD in Jordan need to focus on improving the knowledge levels related to CVD risk factors and preventing the high prevalence of cardiovascular risk factors among Jordanians and learn from the experiences of countries that have similar risk factor prevalences and such programs.

However, the poor provision of secondary prevention services in Jordan might be related to multiple barriers, such as an underdeveloped and diffused health care systems (lacking unification among different sectors), a lack of interest and priority afforded by the health care system to secondary prevention, limited availability of resources such as money and qualified staff, and a lack of national secondary prevention CHD guidelines. As this study found that nurses did not provide patients with health advice for secondary prevention, it is highly recommended that nurses and health care professionals be trained in how to advise and teach this group (i.e., deliver service user education) concerning preventive behaviors during their routine clinical appointments.

STUDY LIMITATIONS

The findings of the current study should be considered cautiously, as it has some limitations. First, the study recruited a convenience sample, and it was conducted in only three hospitals, which may limit the generalizability of the findings. Second, this study was conducted in Jordan, which has no cardiac rehabilitation program for patients; other populations have cardiac rehabilitation programs that may positively affect secondary prevention measures and outcomes. Third, a longer study follow-up period may reveal different study findings, and investigations including all categories of CHD patients are warranted. Finally, collecting data from medical records may have introduced some bias due to poor documentation in many Jordanian healthcare contexts, and the lack of a universal and coherent electronic medical record system.

CONCLUSIONS

The study findings confirm that despite a high prevalence of risk factors in this population, the provision of secondary prevention and lifestyle changes is poor. A large proportion of CHD patients did not reduce their risk factors, or achieve lifestyle and therapeutic targets for CHD prevention. These results reinforce the need to focus on primary and secondary prevention strategies to minimize the risk of recurrence, decrease CHD morbidity and mortality rates, and improve patients' quality of life in Jordan. Stakeholders in public health promotion, such as hospital administrators, nursing leaders, stakeholders, politicians, and decision makers, need to be involved in a national campaign that aims to highlight the importance of secondary prevention strategies for CHD patients and those who are at high risk. Greater effort and research is needed to improve the provision of secondary prevention, and an investigation within primary care settings is required.

Moreover, further researches with different methodologies are needed to confirm the results of this study and explore effective approaches to improve secondary prevention strategy among CHD patients.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest associated with this research.

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Table 1: Participant demographic details from three hospitals

	Categories	**Total N=180 (%)**	**AMI N=60 (%)**	**PCI N=60 (%)**	**CABG N=60 (%)**
Age	Mean (SD) year	54.3 (9.3)	52.3 (9.3)	53.9 (8.4)	56.6 (9.6)
Gender	Male	159(88.3%)	57 (95%)	48 (80%)	54 (90%)
	Female	21 (11.7%)	3 (5%)	12 (20%)	6 (10%)
Marital Status	Single	5 (2.8%)	2 (3.3%)	2 (3.3%)	1(1.7%)
	Married	162 (90%)	56 (93.3%)	53 (88.3%)	53 (88.3%)
	Divorced	1 (0.6%)	1 (1.7%)	0 (0%)	0 (0%)

	Widowed	12 (6.7%)	1 (1.7%)	5 (8.3%)	6 (10%)

Table 2: Percentage of medical advice topics among CHD patients

Advice Topic		Total N=130 (%) N=86 (%)
Medications	Time 1	79 (60.8%)
	Time 2	62 (72.1%)
Smoking	Time 1	79 (60.8%)
	Time 2	42 (48.8%)
Diet	Time 1	70 (53.8%)
	Time 2	41 (47.7%)
Blood Lipids Control	Time 1	68 (52.3%)
	Time 2	26 (30.2%)
Activity / Exercise	Time 1	49 (37.7%)
	Time 2	20 (23.3%)
Blood Pressure Control	Time 1	10 (7.7%)
	Time 2	2 (2.3%)
Weight Control	Time 1	6 (4.6%)
	Time 2	2 (2.3%)
Stress Management	Time 1	4 (3.1%)

	Time 2	3 (3.5%)

Table 3: Available information (%) on cardiovascular risk factors history and measurements of clinical data, by settings and diagnostic category

	Available information on risk factor history on discharge			
	Smoking %	HTN %	DM %	Dyslipidaemia %
Diagnostic category				
AMI	91.7	68.3	63.3	15
PCI	70	76.7	58.3	5
CABG	81.7	85	85	1.7
Total	81.1	76.7	68.9	7.2

AMI, acute myocardial infarction; PCI, percutaneous coronary intervention; CABG, coronary artery bypass graft; HTN, hypertension; DM, diabetes mellitus.