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Predicting Risk Factors of Heart Disease among Jordanian Patients

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Abstract

Aims and Objectives: This study focused on the predictive effects of physical inactivity, body shape, and tobacco use on heart disease patients. **Background:** Heart disease is a condition that can be prevented with healthy lifestyle choices such as physical exercise, proper nutrition, and avoiding tobacco use. **Design:** The current study used a correlational cross-sectional survey design. **Methods:** Primary healthcare centers were selected randomly from the all practices in the middle region in Jordan. Patients were included if they had a working diagnosis of heart disease which was documented in their case notes, aged 18 years and older, visited out-patient department within the community hospitals or whom attended primary healthcare centers. **Results:** Factors associated with heart disease, as identified in the univariate regression analysis, were tobacco use, body shape, and employment status. Furthermore, Odds Ratio for patients with heart disease and tobacco was calculated and found that patients who smoked tobacco are more likely to have heart disease compared to non-smokers. **Conclusion:** The study findings suggest that the behavioural modification should be given top priority to prevent heart disease form occurring. On the other hand, regular physical activity may be useful to prevent the development of heart disease.

Keywords

Heart Disease, Tobacco Use, Physical Exercise, Body Weight

1. Introduction

Heart disease is a term most often used interchangeable with the cardiovascular disease. It is a condition that describes a range of disorders which affect the heart such as, coronary artery disease, arrhythmias, heart attack, and angina. However, many forms of this condition can be prevented with healthy lifestyle choices such as physical exercise, proper nutrition, and avoiding alcohol consumption

and tobacco use [1]. The WHO [2] estimates in the year 2013 cardiovascular diseases (CVD) will account for 23.3 million deaths worldwide, primarily from heart disease and stroke, with the highest prevalence occurring in the Eastern Mediterranean Region. In developing countries, higher prevalence rates of heart disease are due to not only increased risk factors of CVD but also a lack of effective preventive strategies. In addition, in low- and middle-income countries such as Jordan, mortality rate of heart diseases occurs in both older and younger populations [1]. Differences in the prevalence of heart disease in developing countries indicate the differences in physical exercise, food intake, and lifestyle characteristics among people. Furthermore, certain lifestyle factors may increase the risk of heart disease. The prevalence of heart disease was reported to be significantly higher among people who are smokers, obese, and sedentary life style. However, tobacco use, physical inactivity, and obesity are the major risk factors for heart disease [2]. Risk factors defined as attributes or exposures of an individual are significantly associated with the development of a disease [3]. They are factors that make the occurrence of the disease more possible. Some of these risk factors are modifiable while others are non-modifiable. Furthermore, the immutable risk factors for heart disease are hereditary and genetic factors, race, age, sex, family history, and personality [3]. The modifiable risk factors are result of adoption of unhealthy lifestyles such as physical inactivity, overweight, tobacco use, employment status, and some others. The modifiable factors are greatly affected by behavioural modifications and other interventions such as changing diet, exercise, and tobacco cessation.

A sedentary lifestyle is one of the major risk factors for heart disease. Evidence from many scientific studies shows that reducing this risk factor decreases the chance of having a heart disease or experiencing another cardiac event. Regular exercise has a favourable effect on many of the established risk factors for heart disease [4]. Eshah [5] has argued that the low levels of physical activity could be related to the Jordanians' perceptions of physical activity as not being part of the daily routine. Ammouri *et al.* [4] assessed the levels of physical activity of Jordanian adults aged 18 - 75 years (n = 285) across three cities in Jordan. The study revealed that the male participants reported more physical activity than the females ($P < 0.05$). Age, gender, income, education, perceived self-efficacy, perceived benefits and competing demands were related to physical activity. Additionally, the participants who perceived more exercise barriers reported less physical activity ($P < 0.01$). In addition, Al-Nsour *et al.*'s [6] and Mukattash *et al.*'s [7] studies reported that 38% and 41%, respectively, of their patients engaged in regular physical activity. Thus, there is a lack of research on the low levels of physical activity in Jordan.

Fatness and obesity are associated with a number of comorbidities, including several forms of heart disease. Although most of the comorbidities relating obesity to heart disease increase as body mass index increases [8]. Long-term longitudinal studies indicate that obesity not only relates to but also independently predicts coronary atherosclerosis [8]. The WHO [9] acknowledged that the

prevalence of obesity among male and female Jordanians was 27.3% and 41.7%, respectively in 2008. This is in line with existing knowledge that suggests that adults without heart disease are more likely to be within normal body weight [2]. Although, there is a clear relationship between healthy diet and incidence of heart disease [2], the Jordanian people seem to pay less attention to their diet. Eshah [5], for instance, found that 50% of the participants had excess weight; 53% had never assessed their cholesterol level; and 33% reported having a family history of coronary heart disease.

In 2010, it was estimated that cardiovascular disease was the leading cause of death in Jordan, accounting for 40% of all deaths in that particular year [10]. Ammouri *et al.*'s [11] survey in four large cities in Jordan assessed the awareness of adult Jordanians on the risk of coronary heart disease and its relationship to demographic variables and health behaviours. Significantly, almost half of the participants (n = 294) demonstrated a lack of knowledge regarding the risk of coronary heart disease, particularly women and young adults. Similarly, a recent study carried by Eshah [5] using a convenience sample (n = 250) aimed at identifying the level of adoption of healthy lifestyle behaviour among Jordanian adults, and found that 50% of the participants had excess weight; 53% had never assessed their cholesterol level; 30% were current smokers; and 33% reported having a family history of coronary heart disease. These results suggest that there is clearly a need for health promotion programs relating to CVD among the general population in Jordan.

There is limited knowledge of when the Jordanian people begin tobacco use and the motivations for it. Naddaf's [12] study, for instance, aimed to determine the age at which students start to smoke cigarettes and explored the environmental factors and social influences that motivate Jordanian students to smoke. The study revealed that 33% of the students reported being active smokers (26.5% male and 6.5% female). Moreover, two thirds of the active smokers started to smoke before the age of 18 years with 23% beginning between the ages of 18 - 21 years. The students reported their motivations for smoking as trying something new (79%), others smoked around them (28%) and because smoking was forbidden (27%). However, the majority of Naddaf's [12] sample (87%) expressed a positive desire to stop smoking by avoiding friends who smoke (96%).

In addition, Al-Nsour *et al.*'s [6] study recruited a large sample of adults aged 18 years and older (n = 3654) to measure the prevalence of non-communicable disease risk factors in Jordan. The study revealed that nearly one-third of the participants reported being active smokers. Likewise, Mukattash *et al.* [7] recruited a general public sample (n = 1000) with the majority (87%) having at least secondary level education. A third (33.4%) of the participants reported being smokers. The WHO [9] reported that 29% of the Jordanian population were active smokers in 2012. In addition, active smokers were more likely to be male compared to females. The Department of Statistics in Jordan [13] surveyed the smoking rate across 13,000 families around different cities in Jordan in 2010 and found that 61% of families had at least one active smoker with the majority

(96%) smoking tobacco. Notably, 96% of the families who had at least one active smoker in the family reported smoking inside the house and 72% had not heard of the term "Passive Smoking", reflecting the high rate of smoking in Jordan as well as a lack of awareness about its detrimental health effects. Abu-Baker *et al.* [14] conducted a survey to compare the frequency of cigarette smoking before and after diagnosis of coronary heart disease (n = 300) in one city in Northern Jordan. The sample was aged 29 - 80 years, 62% having less than a high school education and the majority (77.7%) were male. The study revealed that 48.3% of the participants were active smokers with 11.7% having smoked in the past. The majority of the active smokers were male (89%). After a diagnosis of CHD, 70.3% of the patients were still smoking three months later while 29.7% had quit smoking. The reported reasons for continued smoking were "do not incline to stop smoking" (25.6%), "craving for a cigarette" (25%) and "other people around me smoke" (11.3%). Abu-Baker *et al.*'s [14] sample were mainly male, recruited from one site and had low education level; these may affect the generalisation of the study findings. In addition, Abu-Baker *et al.*'s [14] study, however, has only focused on smoking habit and heart disease with no other studies exploring the association of physical exercise and body weight with heart disease in Jordan.

As noted, few studies in Jordan have addressed the association between heart diseases and personal health behaviours such as, physical exercise, body weight, and tobacco use. This study focused on the predictive effects of physical inactivity, body shape, and tobacco use on heart disease patients. This study designed to assess the following aims.

1) To assess whether the association of physical exercise, body shape, and tobacco use are dissimilar in heart disease patients and non-heart disease patients.

2) To explore the relationship between heart disease and tobacco use.

3) To assess whether the association of tobacco use and body shape with heart disease patients are dissimilar in men and women.

4) To assess if physical exercise will be a predictor of heart disease among Jordanian patients.

5) To identify if body shape will be a predictor of heart disease among Jordanian patients.

6) To explore if tobacco will be a predictor of heart disease among Jordanian patients.

7) To determine if gender will be a predictor of heart disease among Jordanian patients.

8) To identify if age will be a predictor of heart disease among Jordanian patients.

9) To explore if work experience will be a predictor of heart disease among Jordanian patients.

10) To assess if type of employment will be a predictor of heart disease among Jordanian patients.

11) To asses if marital status will be a predictor of heart disease among Jordanian patients.

2. Methodology

2.1. Variables of the Study

The dependent variable of the study was heart disease. The independent variables were physical exercise, body shape, and tobacco use. Moreover, the researchers included gender, age, work experience, employment status, and marital status.

2.2. Study Design

The current study used a correlational cross-sectional survey design to predict the risk factors of heart disease among Jordanian patients. A cross-sectional survey was the appropriate design to answer the research questions and collect views of the patients with heart disease at one point of time.

2.3. Study Sites and Settings

The proposed study was conducted in the primary healthcare canters and out patients departments of governmental hospitals in the central region of Jordan Kingdom. The primary healthcare services in Jordan are delivered through 92 comprehensive healthcare centres and 372 primary healthcare centres [15]. Major cities in Jordan are located on the north-western part of the kingdom. These include Irbid, Jerash and Zarqa in the northwest, the capital Amman and Al-Salt in the central west, and Madaba, Al-Karak and Aqaba in the southwest.

2.4. Study Population and Target Sample

The study population comprised patients with heart disease in Jordan. The prevalence of the major conventional heart disease risk factors in Jordan has not been studied extensively. However, the Centers for Disease Control and Prevention (CDC) in Jordan estimated that the heart disease listed the first top cause of death and counts for 18% of the total deaths [16].

The target population were patients attended outpatient departments within general hospitals or attended primary healthcare centers in the Center region of the country. Primary care centers were selected randomly from the all practices mentioned above. Patients were included if they had a working diagnosis of heart disease which was documented in their primary healthcare centers, aged 18 years and older, visited out-patient department within the community hospitals or whom attended primary healthcare centers. They were excluded if they were terminally ill, had dementia, not able to speak and write Arabic and has other diseases beside the heart disease or at the request of their general practitioner.

2.5. Sampling Size

The estimated sample size was calculated based on previous literature that examined heart disease among Jordanians, a conservative effect size of 0.15 was estimated using the statistical software G*Power V.3.21. Therefore, with a statistical power of 0.95, effect size 0.15, and a statistical significance of 0.05, the esti-

mated sample size needed to perform logistic regression taking into account the number of potential non-respondents [17] was 400 for the two groups.

2.6. Study Instrument

The study instrument collected the personal health behaviour data of the participants. This scale comprised eight items from three scales [18] [19] to measure the patients' physical exercise and their perceived body weight and size; and two items measuring tobacco use. The first sub-scale asked the participants about their personal physical exercise derived from McDowell *et al.* [18] developed by Prochaska and DiClemente [20]. This sub-scale included four items followed by two alternative responses "yes" or "no". The second sub-scale relating to the personal health behaviour data derived from Greenleaf *et al.*'s [19] study developed by Stunkard *et al.* [21]. This sub-scale measured the participants' perception of their body weight size. This sub-scale comprised two items asking the participants to select the figure which best depicts their actual body weight and size ranged from 1 to 9 body shapes. This scale has been used widely and reported good validity and reliability [19].

Additionally, two items followed by "yes" or "no", asking the participants about their tobacco use. Also, the instrument included demographic data such as age, gender, marital status, and educational level.

A pilot study was undertaken to obtain feedback from the participants on the clarity and content of the study instrument [22]. The study instrument (Arabic version) was distributed to a convenience sample of patients with heart disease (n = 25) attended primary care settings. It included open-ended items asking the participants about the clarity of the study instrument. The participants who took a part in the pilot study were not included the study sample. The study instrument reported good validity [19] [23]. Additionally, the researcher of the current study measured the reliability of the instrument of the subscales and found that the Cronbach alpha for the subscales was acceptable (personal physical exercise $\alpha = 0.82$, perception of patients' body weight and size $\alpha = 0.86$).

2.7. Ethical Considerations

Ethical approval to conduct this study was obtained from the University of Jordan. Ethical approval was then attained from the relevant research ethics committees of each site (*i.e.* public sectors). Confidentiality, voluntary participation, and the right to refuse participation were highlighted in the participant information sheet. The researcher explained the study purpose to the participants. To assure voluntary participation, the patients were informed that their refusals to participate in the study would not affect their right to caring or treatment in any way. A completed questionnaire was considered as consent to participation.

2.8. Data Collection Procedure

The data collection procedure took place over the summer. The patients who agreed to participate in the study were taken to another exam room to fill out the

questionnaire.

Researchers met the primary physicians to explain the purposes of the study. Then, researchers held an interview with the subjects and invited them to voluntarily participate in the study. Those who accepted participation were handed the survey packets enclosed in sealed envelopes. To ensure a high response rate, each survey packet contained a cover letter, self-administered questionnaire, and an envelope addressed to the principal researcher for participants' use in returning the completed surveys to the in charge nurse at the designated Center.

2.9. Data Analysis

The data were analysed using SPSS version 22.0 statistical software [24]. Descriptive statistics including frequency and cross tabulation tests were used. Parametric and non-parametric tests were performed for this study. Type I error (false positive) was avoided by setting the significance level at less than 5% ($P < 0.05$). Type II error (false negative) was avoided by increasing the statistical power and recruiting a convenient sample size.

3. Results

3.1. Demographic Data

A total of 800 questionnaires were distributed over the designated primary care centers and out patients' clinics at governmental hospitals. One hundred eighty six patients with heart disease and 406 patients without heart disease returned the completed questionnaires. This represents a response rate of 74%. The majority of the study sample was males 336 (56.8%), not employed 355 (60%), have high school or less (59%), 72.6% are married, and 51% of them are above the age of 40 years. The patients with heart disease were mainly males (n = 119, 64%), 69% (n = 127) not employed, less than half of them (n = 79, 42%) aged above 50 years with one third (n = 57, 30%) aged between 40 - 49 years and over the quarter (n = 48, 26%) aged below 39 years. The majority of the patients with heart disease (n = 124, 67%) were not currently smokers (Table 1).

3.2. The Difference between Heart Disease Patients and Non-Heart Disease Patients Regarding Exercise and Tobacco Use

Student's *t*-test was used to examine the difference between heart disease and non-heart disease patients in regards to exercise and body shape. The normality of the exercise and body shape were tested. The homogeneity of variances for the two groups (heart disease patients and non-heart disease patients) were examined. The researchers carried out this through Levene's test for equality of variances. The results of Levene's tests were not significant for the exercise ($P = 0.45$) ($\alpha = 0.05$ with a CI of 95%) and body shape ($P = 0.078$) ($\alpha = 0.05$ with a CI of 95%). Thus, the results of the Student's *t*-test showed a statistically significant difference in scoring of exercise ($t(528) = 2.50$, $P = 0.033$) and body shape ($t(517) = 2.48$, $P = 0.002$). The non-heart disease patients scored significantly

Table 1. Descriptive statistics of demographic characteristics (n = 592).

Variable	N (%)
Gender	
Female	249 (42.1)
Male	336 (56.8)
Educational level	
≤Tawjehi	337 (59)
Diploma/bachelor	243 (41)
Marital status	
Single	122 (20.6)
Married	430 (72.6)
Divorced	23 (3.9)
Widows	17 (2.9)
Age group	
20 - 29 years	133 (22.5)
30 - 39 years	149 (25.2)
40 - 49 years	154 (26)
50 years and more	141 (23.8)
Having heart disease	
Yes	183 (31)
No	393 (69)
Smoking status	
Smokers	156 (27)
Non-smokers	420 (77)

higher in exercise and body shape, respectively (M = 33.15, SD = 5.49;M = 7.67, SD = 2.80)) than heart disease patients (M = 31.92, SD = 7.34; M = 6.91, SD = 2.52) (Table 2). Furthermore, there were statistically significant differences between heart disease patients and non-heart disease patients regarding tobacco use (*chi square* (1) = 4.612, P = 0. 037). Fifty-nine heart disease patients out of 183 answered yes they are using tobacco while 124 they have heart disease but they are not using tobacco. Moreover, Ninety-Seven of non-heart disease patients are smokers out of 393 (Table 3). Furthermore, Odds Ratio for patients with heart disease and tobacco was calculated and found 1.45 that means that patients who smoked tobacco are more likely to have heart disease compared to those who are not smokers as shown in Table 4.

3.3. The Difference between Male Patients and Female Patients with Heart Disease Regarding Exercise and Body Shape

Student's *t*-test was used to examine the difference between male and female patients with heart disease concerning exercise and body shape. The normality of the two variables (exercise and body shape) was tested. The homogeneity of

Table 2. The difference between heart disease patients and non-heart disease patients regarding exercise and tobacco use.

Variable	Group				Student t-test
	HDPs*	NHDPs*	df	t-value	*P* value
	Mean (SD)	Mean (SD)			
Exercise	31.92 (7.34)	33.15 (5.49)	528	2.5	0.033*
Body shape	6.91 (2.52)	7.67 (2.80)	517	2.488	0.002**

**Significant at $P < 0.01$, HDPs: Heart Disease Patients, NHDPs*: Non-Heart Disease Patients. *Significant at $P < 0.05$.

Table 3. The difference between heart disease patients and non-heart disease patients regarding tobacco use.

Variable	Group		*df*	Chi square	*P* value
	HDPs*	NHDPs*			
Tobacco use	59/184	97/393	1	14.612	0.037*

Significant at $P < 0.05$, HDPs: Heart Disease Patients, NHDPs: Non-Heart Disease Patients.

Table 4. Odds ratio for patients with heart disease and tobacco use.

Having heart disease	Tobacco use	Non tobacco use	Total
Yes	59	124	183
No	97	296	393
Total	156	420	576

Odds Ratio = A/B divided By C/D = AD/BC, Odds Ratio = 59/124/97/296 = 1.45.

variances of these variables for the two groups (male and female) were examined. The researchers carried out this through Levene's test for equality of variances. The results of Levene's tests were not significant for the exercise and body shape ($P = 0.745$; $P = 0.440$) ($\alpha = 0.05$ with a CI of 95%). Thus, the results of the Student's *t*-test showed a statistically significant difference in scoring of exercise among male and female patients (t (184) = 2.500, $P = 0.003$). Male patients scored significantly higher ($M = 32.75$, $SD = 6.84$) than female patients ($M = 28.82$, $SD = 6.6$). Furthermore, there were statistically significant differences between male and female regarding body shape (t (184) = 2.488, $P = 0.013$). Female patients scored significantly higher ($M = 7.35$, $SD = 2.660$) than male patients $M = 6.80$, $SD = 2.56$) (Table 5).

3.4. Risk Factors for Heart Disease

To view the overall heart disease patients' risk factors, a logistic regression analysis was conducted. The model analysis included the six independent variables of tobacco use, body shape, employment status, gender, exercise, and marital status. The combination of the six independent variables was significantly related to the dependent variable (Heart disease) chi square = 60.518, $P = 0.000$. Factors associated with heart disease as identified in the univariate regression analysis, were tobacco use (OR = 9.58, $P = 0.002$), body shape (OR = 4.82,

Table 5. The difference between male and female in respect to exercise and body shape.

Variable	Gender			Student t-test	
	Male	Female	*df*	*t*-value	*P* value
	Mean (SD)	Mean (SD)			
Exercise	32.75 (6.84)	28.82 (6.6) 567	184	2.5	0.003**
Body shape	6.80 (2.56)	7.35 (2.66)	184	2.488	0.013*

**Significant at $P < 0.01$, *Significant at $P < 0.05$.

$P = 0.028$), and employment status (OR = 4.69, $P = 0.03$). Further associated variables such as exercise total score (OR = 2.27, $P = 0.131$), gender (OR = 1.48, $P = 0.223$), and marital status (OR = 9.121, $P = 0.728$) were not found significant factors related to the heart disease in the patients sample taken in Jordan (Table 6).

4. Discussion

The current study addressed the association between heart diseases and personal health behaviours such as, physical exercise, body weight, and tobacco use. Moreover, it focused on the predictive effects of physical inactivity, body shape, and tobacco use on heart disease patients. The non-heart disease patients scored higher exercise than heart disease patients did. In Jordan, people seem to do less exercise, this could be related to some barriers such as lack of motivation; lack of time overall; and lack of time due to family commitments [25]. Despite these barriers, the number of exercise facilities including parks and recreational services has noticeably increased, particularly in the major cities of Jordan. The current study found significant differences between heart disease patients and non-heart disease patients regarding tobacco use. Over third of the patients who had heart disease were currently smoking tobacco. Furthermore, the patients who smoked tobacco are more likely to have heart disease compared to those who are not smokers. This association between heart disease and tobacco use has been found in many studies across the world. In Jordan, increasing the rate of tobacco use could be, as reporting by Naddaf's [12], related to some motivational factors such as trying something new; others smoked around them; and because smoking was forbidden. Although smoking is prohibited in public places according to the Public Health Law in Jordan, the number of people with tobacco is in continuous increasing [13]. The possible explanation for this increase could be due to factors such as reasonable price of tobacco and that shops are allowed to sell tobacco without a licence.

The current study found that the factors associated with heart disease among patients were tobacco use, body shape and employment status. Further associated variables such as physical exercise, gender, and marital status were not found significant factors related to the heart disease in the patients sample. There are limited studies in Jordan focusing on the factors that linked with heart disease patients. A survey conducted by Ammouri *et al.* [11] in four large cities

Table 6. Risk factors for heart disease as identified by multiple logistic regression analysis.

Risk factor	Odds ratio	95% confidence interval	*P* value
Tobacco use	9.58	0.47 - 1.19	0.002**
Body shape	4.82	1.06 - 3.06	0.028*
Employment status	4.69	1.05 - 2.63	0.03*
Exercise	2.27	0.998 - 1.057	0.131
Gender	1.48	0.47 - 1.19	0.223
Marital status	0.121	0.60 - 1.42	0.728

**Significant at $P < 0.01$, *Significant at $P < 0.05$.

in Jordan, for instance, assessed the awareness of adult Jordanians on the risk of coronary heart disease and its relationship to demographic variables and health behaviours. Significantly, almost half of the participants (n = 294) demonstrated a lack of knowledge regarding the risk of coronary heart disease, particularly women and young people. Similarly, a recent study by Eshah [5], using a convenience sample (n = 250) aimed at identifying the level of adoption of healthy lifestyle behaviour among Jordanian adults, found that 50% of the participants had excess weight; 53% had never assessed their cholesterol level; 30% were current smokers; and 33% reported having a family history of coronary heart disease. These results confirmed the findings of the current study that suggest the association of heart disease with gender, tobacco use, and body weight and this can be added to the evidence.

The study reported significant differences in scoring of exercise and body shape among male and female patients with heart disease. Female patients' scores reported more body weight than male patients. On the other hand, male patients scored significantly higher exercise than female patients. This is in line with other studies conducting in other nations [26] [27]. Minges *et al.*, [27] conducted an international prospective observational study with large sample size (n = 3572) in the USA, Australia and Spain to examine gender differences in physical activity after heart disease problem. The study reported male patients being more active than female patients at baseline, one month, and 12 months. There are no studies conducting in Jordan that have examined the gender differences in physical exercise after heart disease. The current study therefore adds to the evidence that male patients with heart disease are more likely to do exercise than females.

The prediction of heart disease risk factors in the current study was carried out using multivariate logistic regression and found that the strongest predictor was tobacco use, however, body shape, and employment status were found significant. This is in line with other studies conducting in different populations that have demonstrated that employment is associated with the occurrence of heart disease [28] [29]. However, other predictors such as physical exercise, gender, and marital status were not found significant factors related to the heart disease that were not in line with other studies such as Kotecha *et al.*, [30] who

found that age and gender were predictors of heart disease and Rademaker *et al.*, [31] found in their cohort study of 228 participants that gender is independently predictor for occurrence of coronary heart disease.

Although the risk factors for heart disease are not limited to the lifestyle modifications, this study adds to the body of evidence, that adherence to the life style recommendation could decrease the risk of heart disease. This study highlights the early benefits of physical exercise, body weight, and tobacco control may minimize the occurrence of heart disease. The first major practical contribution of the present research is that it provides much knowledge of the gender differences in physical exercise and body weight after diagnosis with heart disease in which male patients, according to the current study, are much healthier (*i.e.* having less body weight and performing physical exercise) than female patients. Nurses need to take into considerations these gender differences when they perform health education about body weight and physical exercise. A second important implication of our study derives from our finding on unhealthy behaviours of heart disease patients such tobacco use, lack of physical activity and increased body weight. Nurses should personally involve in an active lifestyle to familiarize themselves with the issues involved in maintaining lifelong physical activity and to set as a role model for their heart disease patients. This may increase the possibility that nurses will recommend physical activity to their heart disease patients. In addition, nurses caring for patients diagnosed with heart disease should support the development of exercise programs to manage these patients and make appropriate referrals for treatment.

There were several limitations to the current study that need to be addressed. The study findings are based on self-report; this type of data collection may result in social desirability in which the respondents may have answered some items in such a way as to deliberately or unconsciously represent oneself in a favourable light. This leads to an overestimation of positive attitude and behaviours. In addition, the participants were conveniently recruited for the study that is a non-random method. Nevertheless, it was not possible to use random approach as the researcher did not have access to the database of the participants. On the other hand, the study has large sample size and its inclusion of patients with heart disease from a wide range of multicentre.

5. Relevance to Clinical Practice

Nurses need to recognise and support patients with heart disease to keep their health at the optimum level and explore the barriers for doing exercise and tackle these barriers. Professional bodies and healthcare employers in Jordan need to provide nurses in practice with post-qualifications/training in general health promotion and relating to heart disease in particular in different clinical settings.

6. Conclusion

Adherence to behavioural advice such as maintaining body weight, and tobacco

use cessation was associated with heart disease. The study findings suggest that the behavioural modification should be given top priority to prevent heart disease from occurring. On the other hand, regular physical activity may be useful to prevent the development of heart disease.

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