

Risk Factors of Heart Disease in Nurses

Abstract

Background: Identifying and correcting the modifiable risk factors reduces the prevalence of coronary artery disorders (CAD). Nurses, with regards to their employment conditions, can be prone to cardiovascular disease (CVD). This study aimed to determine the prevalence of cardiovascular risk factors among nurses. **Materials and Methods:** In this cross-sectional study, census sampling was conducted among nurses of Jahrom, Iran, in 2014. Data were collected through interviews, blood pressure measurement, anthropometric parameters, and blood sample collection. To analyze the data, descriptive statistical analysis, and comparative (independent *t*-test) and correlation (Pearson) tests were used; the significance level was considered to be $P < 0.05$. **Results:** In this study, 263 (89.76%) nurses participated, 79.8% of whom were women. The mean age of the participants was 31.04 (6.97). In terms of body mass index, 41.7% was the waist-to-hip ratio, 16.7% was the waist-to-height ratio, and 63.1% were in the range of obesity. In addition, 5.7% had abnormal triglyceride, 4.9% had high cholesterol, and 15.1% had high blood pressure. The mean percentage of the Framingham risk score of the participants was 1.07 (1.84). **Conclusions:** In this study, the total mean percentage of the Framingham risk score of the nurses was 1.07, which showed a low risk of CAD in the study population over the next decade.

Keywords: Coronary artery disease, Iran, nurse, risk factors

Introduction

Heart disease is a major global health problem and is the cause of more than 50% and 25% of deaths in the developed and developing countries, respectively. It is predicted that, by 2020, 25 million new cases of heart disease will be diagnosed annually and it will become the first cause of death.^[1] Many of the problems and deaths caused by heart disorders are due to the adjusted risk factors, and lifestyle changes can reduce the incidence and prevalence of this disease even if inherited.^[2] Providing an appropriate life model, along with other factors such as training and raising awareness, can have an important role in reducing disability and death due to heart disease by changing the lifestyle and motivation.^[3]

Nurses are the health providers in a society. The best provider is someone who sincerely believes in their own health. Nurses must understand that their health performance has a profound impact on the receivers of healthcare.^[4] Nurses must have programs available to help them, if necessary, to change their risky behavior habits.^[5]

Nurses, due to the nature of their job, are prone to hard work, stress, burnout, and sleep and eating disorders. This leads to various health complications, particularly cardiovascular disease (CVD), neurological disorders, and immune decline.^[6,7] In countries with limited resources, effective strategies should be designed for the prevention of heart disease, individuals should be classified in terms of risk factors, and the necessary measures must be taken to prevent complications in at-risk individuals.^[8] In a case-control study in 52 countries, which investigated the risk factors for myocardial infarction (MI), 9 modifiable risk factors, including smoking, diabetes, hyperlipidemia, central obesity, hypertension, diet, physical activity, alcohol, and mental factors, were detected.^[9] By controlling these 9 factors, up to 90% of the incidence of heart attacks could be prevented.^[2,9]

In a study conducted by Miller *et al.* on health risk factors of nurses, more than 54% were obese, 96% considered their obesity as a cause of heart disease, 26% were unaware of their diabetes, and approximately 90%

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Access this article online

Website: www.ijnmrjournal.net

DOI: 10.4103/1735-9066.212986

Quick Response Code:



How to cite this article: Jahromi MK, Hojat M, Koshkaki SR, Nazari F, Ragibnejad M. Risk factors of heart disease in nurses. Iranian J Nursing Midwifery Res 2017;22:332-7.

Received: November, 2016. **Accepted:** November, 2016.

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were also unaware of having hyperlipidemia.^[5] In a study of the Cardiovascular Nurses Association, 20%, 23%, and 17% of the nurses working in the field of prevention of heart disorders had a history of hypertension, lipid disorders, and obesity.^[10]

On the other hand, heart disease, in addition to its direct and indirect costs, leads to problems such as burnout, absenteeism, loss of working time, leaving the service, or deciding to change jobs.^[9] Given that nurses have an important role in promoting public health, their physical problems cause a reduction in their beneficial service duration, pain, and suffering, as well as degradation of the quality and quantity of work.^[11] Thus far, no study has been conducted on nurses regarding coronary heart disease (CHD) risk factors in Iran. This study aimed to investigate the prevalence of cardiovascular risk factors among nurses of medical sciences hospitals in Jahrom, Iran.

Materials and Methods

In this cross-sectional study, census sampling method was conducted among all nurses (263 people) of Motahari and Peymanieh Hospitals of Jahrom in summer 2014. After obtaining permission from the Vice President for Research and the ethics committee of Jahrom University of Medical Sciences, an informed consent was obtained from nurses. The inclusion criteria included having a nursing degree and working in hospital wards. Nurses who had a history of pregnancy^[4] (3 people) and heart disease (7 people) were not included in the study. The data collection tool was a two-part checklist. The first part included questions regarding the demographic characteristics, history of heart disease and related drug use, history of major risk factors for CAD (diabetes, hypertension, smoking, and dyslipidemia) in them or their first degree relatives, history of alcohol consumption, regular exercise, and number of working hours. The second part included a list to determine height, weight, body mass index (BMI), waist circumference, and blood pressure. Blood pressure was measured using a pressure gauge while sitting, after 5 minutes of rest in a chair, with the support of the left arm.^[12] The classification criteria for hypertension was the JNC-7 guideline. Based on this guideline, blood pressure of lower than 120/80 mmHg was considered normal, blood pressure of 140/90 mmHg and higher was considered high blood pressure, and in between the two was considered as pre-hypertension.^[13] Based on the World Health Organization (WHO) criteria and American Diabetes Association, fasting blood glucose of 70–99 mg/dl was considered to be normal, 100–125 mg/dl was considered as pre-diabetes, and 126 mg/dl and higher was considered to be diabetes.^[14,15] Smoking at least 5 cigarettes a day for 6 months was considered as a history of smoking.^[4] For calculating BMI, weight (kg) was divided by the square of height (m). BMI classification for the Asian population

was 27.5–23 (overweight), 32.5–27.6 (type 1 obesity), 37.4–32.6 (type 2 obesity), and more than 37.5 (type 3 obesity).^[16] To determine weight, a standard scale with calibrated pan (Richter) was used and the participants were weighted with minimum clothing and without shoes. To determine height, the participants stood without shoes with legs paired so that the knees, hips, shoulders, and back were aligned in a vertical line and the head was facing forward, then, their height was measured from the top of the head using a standard tape measure.

To measure waist-to-hip ratio (WHR), the waist size (the distance between the lower edge of the ribs and iliac spine without compression of the soft tissue) in centimeters was divided by the size of the pelvis (the hip circumference with the tape parallel to the ground) in centimeters. This criterion has a sensitivity of 96.6% in obesity evaluation.^[17] The maximum normal amount is 0.90. Increase in this amount indicates central obesity and increased risk of CHD.^[11] Another criterion for examining obesity was waist-to-stature ratio (WSR), which is obtained by dividing waist circumference by height. Numbers higher than 0.50 were interpreted as obesity.^[11] This ratio has a sensitivity of 75.4% in determining obesity.^[17]

To study dietary habits, the participants were interviewed on their consumption of tea (green tea, black tea, and lack of consumption), fast food, and breakfast, as well as weekly intake of meat (less or more than 500 g), vegetables (less or more than 1000 g), fruits (less or more than 1000 g), and fish (less or more than 500 g).^[18] The use of black tea, consumption of fast food, lack of consumption of breakfast, and low consumption of vegetables, fruits, and fish are risk factors for CHD.^[4,19] In the assessment of daily routine activities, job performance method (sitting, standing, supervisory, or standing and sitting), commute method (car, motorcycle, vehicle, public transport, or walking), exercising and the type of exercise (walking or group exercise), exercise duration (less than or more than 30 minutes), praying (regular, irregular, or not at all), and reading the Quran (never, sometimes, half an hour daily, or more than half an hour daily) were studied. Seated occupational activity, use of personal vehicles and motorcycles, lack of exercise, short duration of exercise, lack of attention to or noncompliance with religious practices (prayer and recitation of the Quran) increased the risk of CHDs.^[4]

The third phase of the study involved obtaining 5 cc blood samples for laboratory studies. To determine hyperlipidemia, the Adult Treatment Panel III (ATP III) guidelines were used [fasting TG \geq 150 mg/dl (\geq 1.96 mmol/l) and fasting cholesterol \geq 200 mg/dl].^[20] Positive family history was considered as one of the first degree family members having CHD (men $<$ 50 and women $<$ 60).^[4] Low density lipoprotein (LDL) levels of less than 100 mg/dl and high density lipoprotein (HDL) greater than 40 and 50 mg/dl in

men and women were considered to be desirable levels.^[9] To determine the risk of CHD, the Framingham formula software was used. This software predicted the risk of CHD over the next 10 years based on gender, age, systolic blood pressure, cholesterol, and HDL, blood pressure medication, smoking, and diabetes using an algorithmic formula.^[21] The validity of the Framingham formula has been reviewed and approved in black and white Americans, as well as in Europe, Mediterranean, and Asia.^[22]

To analyze the data, descriptive statistics (mean and frequency), and comparative (independent *t*-test) and correlation (Pearson) tests were conducted using the Statistical Package for the Social Sciences software (version 16, SPSS Inc., Chicago, IL, USA).

Ethical considerations

The study was approved by the ethics committee of the Jahrom University of Medical Sciences; the patients signed an informed consent form to participate in the study. They were also assured of the confidentiality of personal information and their right to quit the study at any time.

Results

Of the total of 293 nurses, 263 (89.76%) participated in the study, 79.8% of whom were women. The mean age of the participants was 31.04 (6.97) years. Independent *t*-test showed no significant difference between the mean age of women 31.05 (6.79) and men 31.03 (7.72) ($P = 0.989$, $t = 0.01$). Average work experience was 7.46 (6.65) years. Regarding BMI, 51 individuals (19.39%) were in the overweight range and 232 (88.21%) were in the normal range.

The mean total WHR and the mean WHR of women and men were within the normal range (<0.9). In total, 44 individuals (16.73%) had high WHR. In total, 97 nurses (36.88%) were within the normal range of WSR [Table 1]. A total of 16 individuals (6.08%) had abnormal TG and 14 participants (5.32%) had high cholesterol.

Moreover, the mean LDL in female and male nurses was 70.50 (17.12) and 71.20 (16.82), respectively. In total, 16 nurses (6.08%) had high LDL and 134 nurses (50.95%) had high HDL. Mean systolic and diastolic blood pressure were 106.93 (11.88) and 70.25 (9.95), respectively. Systolic blood pressure ($P = 0.017$) and diastolic blood pressure ($P = 0.016$)

of men was significantly higher than women. In addition, 24 nurses (9.12%) and 20 nurses (7.60%), respectively, had high systolic and diastolic blood pressure.

WHR indexes in 123 participants (46.70%) were normal, WSR in 97 (36.88%) participants was in the normal range. The total mean and the mean percentage of Framingham score of both genders showed the least possibility of risk of CHD over the next 10 years. The difference in the percentage among the two genders was not significant ($P = 0.848$). Tables 2 and 3 present the frequency of nurses' nutrition habits and daily lifestyle.

Discussion

CVD in nurses causes numerous problems for themselves, medical centers, and patients. In this study, the total mean percentage of the Framingham score of nurses was 1.07. This showed a low risk of CAD in the study population over the next decade.

In this study, the mean BMI and obesity percentage of WHR were less than that reported in the studies by Khan et al.,^[4] Qureshi et al.,^[2] Fawad et al.,^[23] and Williamson et al.^[24] The low rate of obesity indicated a suitable lifestyle, reducing the prevention of CVD by preventing immobilization, hypertension, hyperlipidemia, and diabetes.^[25-27]

Based on the findings, 0.8% had high fasting blood sugar, which was lower than that reported in studies by Khan et al.,^[4] Fawad et al.,^[23] and Jaber et al.^[28] It was close to the findings of the studies by Qureshi et al.^[2] in Pakistan and Fawad et al.^[23] The suitability of blood sugar levels, controlling of atherosclerosis progression and inflammatory factors effective in this area, and improvement of platelet function reduced the incidence of acute coronary syndromes.^[29,30]

The mean cholesterol in this study was less than that reported in the studies by Hafizullah et al.^[31] and Navar-Boggan et al.^[32] In the study by Fair et al., 15.4% of the nurses had a history of hyperlipidemia.^[11] Hyperlipidemia was also observed in 28% of the cardiologists.^[6,32] Low incidence of hyperlipidemia among patients without cardiac disorders decreases the incidence of CVD in the future.^[33]

In this study, 9.1% of nurses had high systolic pressure and 6.8% had high diastolic pressure; this amount was less than that of the studies by Jaber et al.,^[28] Khan et al.,^[4] and Go et al.^[34] However, it showed that 10% of the nurses were at risk regarding this factor. Therefore, it is recommended that, like in the case of other risk factors, screening programs, preventive education, treatment, and care of nurses is the agenda of healthcare providers to reduce high blood pressure risk factors.

Family history of 77.18% of the nurses in this study regarding the risk of CHD was positive. This rate was

Table 1: Total mean of physical parameters and its comparison based on genders among the nurses

| | Total mean (SD) | Mean (SD) of women | Mean (SD) of the men | <i>t</i> | <i>P</i> |
|-----|-----------------|--------------------|----------------------|----------|----------|
| BMI | 24.78 (3.96) | 24.66 (3.75) | 25.28 (4.73) | -1.015 | 0.311 |
| WHR | 0.83 (0.10) | 0.82(0.07) | 0.85 (0.16) | -2.193 | 0.029 |
| WSR | 0.52(0.07) | 0.52 (0.06) | 0.51 (0.09) | 0.649 | 0.517 |

BMI: Body mass index, WHR: Waist-hip ratio, WSR: Waist-stature ratio, SD: standard deviation

Table 2: The prevalence of abnormal cases, total mean, and comparison of the mean blood parameters affecting patients with heart disease with regards to gender among the nurses

| | Abnormal number (%) | Total mean (SD) | Mean (SD) of the women | Mean (SD) of the men | <i>t</i> | <i>P</i> |
|-------------|---------------------|-----------------|------------------------|----------------------|----------|----------|
| FBS | 7 (2.66) | 72.92 (1.27) | 73.19 (13.37) | 71.84 (9.88) | 0.686 | 0.493 |
| TG | 16 (6.08) | 101.68 (68.22) | 98.65 (62.91) | 111.21 (86.09) | -1.198 | 0.232 |
| Cholesterol | 14 (5.32) | 148.68 (33.25) | 148.77 (34.38) | 148.34 (28.63) | 0.083 | 0.934 |
| HDL | 159 (60.45) | 42.27 (10.43) | 42.83 (10.64) | 40.01 (9.33) | 0.048 | 0.079 |
| LDL | 16 (6.08%) | 70.65 (17.03) | 70.50 (17.12) | 71.20 (16.82) | -0.266 | 0.790 |

FBS: Fasting blood sugar, TG: Triglyceride, HDL: High density lipoprotein, LDL: Low density lipoprotein

Table 3: Absolute and relative frequency of dietary habits expressed by nurses and nurses' daily lifestyle activities

| Usual consumption of foods | Number (%) | Ordinary lifestyle | Number (%) |
|----------------------------------|------------|-----------------------------------|------------|
| Tea | | Type of work | |
| Green tea | 38 (14.4) | Sitting | 14 (5.3) |
| Black tea | 173 (65.8) | Standing | 46 (17.5) |
| Neither | 52 (19.8) | Supervisory | 7 (2.7) |
| Weekly consumption of fast food | | Sitting and standing | 196 (74.5) |
| Never | 105 (39.9) | Commute method | |
| Once | 143 (54.4) | Personal vehicle | 135 (51.3) |
| 2 times or more | 15 (5.7) | Motorcycle | 9 (3.4) |
| Habits of eating breakfast | | Public transport | 105 (39.9) |
| Never | 14 (5.3) | Walking | 14 (5.3) |
| Sometimes | 87 (33.1) | Exercise | |
| Often | 66 (25.1) | Yes | 148 (56.3) |
| Always | 96 (36.5) | No | 115 (43.7) |
| Weekly consumption of vegetables | | Type of exercise | |
| <1 kg | 185 (70.3) | Walking | 135 (51.3) |
| ≥1 kg | 78 (29.7) | Group | 128 (48.6) |
| Weekly consumption of fruits | | Discipline in praying | |
| <1 kg | 94 (35.7) | Never | 3 (1.1) |
| ≥1 kg | 169 (64.3) | Disordered | 25 (9.5) |
| Weekly consumption of fish | | Ordered | 235 (89.4) |
| <500 g | 213 (81.0) | The daily recitation of the Quran | |
| ≥500 g | 50 (19.1) | Never | 61 (23.2) |
| | | <15 minutes | 179 (68.1) |
| | | 15-30 minutes | 22 (8.4) |
| | | >30 minutes | 1 (0.4) |

very high compared to other studies. In various surveys, 19.96% of the teachers,^[28] 33.3% of nurses,^[4] and 30% of journalists^[23] had a family history of CHD. Family history regarding genetic and lifestyle factors had a major impact on the susceptibility of healthy individuals to heart disease.^[27]

Regarding dietary habits, the majority of nurses in this study consumed black tea; this finding was consistent with other studies.^[2-4]

In this study, 70.3% of the nurses consumed less than 1 kg of vegetables weekly, 64.3% had a weekly consumption of more than 1 kg of fruits, and 81% consumed less than 500 grams of fish per week. These results were consistent with the studies by Qureshi *et al.*^[2] and Khan *et al.*^[4] Therefore, regarding dietary habits, the nurses were among the high risk group and must change their attitude in terms of

dietary habits because poor dietary habits can put them at risk of coronary disease.

In this study, the majority of nurses regularly prayed and read the Quran. Religious activities reduced stress, and thus, reduce the risk of CHD.^[2] Due to the religious context of Iran and the effects of spiritual health on reducing stress, emphasizing and strengthening the religious component in this field can be effective.

In this study, approximately half of the nurses engaged in physical activities. In other studies, 42% of nurses,^[4] 71.7% of prisoners,^[31] and 75.5% of doctors^[2] had no regular daily exercise. In the study by Fair *et al.*, 55.6% of the nurses exercised for 20 to 30 minutes at least 3 times a week.^[10]

Based on this study, none of the nurses smoked. In another study, 99.4% of the nurses did not smoke.^[4] In other

studies, 18.8% of doctors,^[2] 1.7% of cardiologists,^[5] and 3.6% of nurses^[10] smoked. Reduction in smoking rates decreased heart disease in individuals.^[35]

Finally, in this study, factors of obesity, dietary habits, and lack of exercise had the highest frequency and factors of stress, hyperlipidemia, hypertension, smoking, and diabetes had the lowest frequency among the risk factors for CHD. In another study on nurses, factors of obesity, sedentary lifestyle, and smoking had the highest frequency and hyperlipidemia, diabetes, and hypertension had the lowest frequency.^[4] In another study on doctors, factors of hyperlipidemia, diabetes, and hypertension had the lowest frequency, and inactivity, obesity, diet, and smoking had the highest frequency.^[2] According to research in the field of risk factors, lifestyle patterns and poor behaviors associated with risk factors were the most common causes of death and disability caused by CVDs. The limitation in this study was that smoking and drinking in our culture and religion is unacceptable therefore anybody don't report it.^[28]

Conclusion

In this research, according to the study, all risk factors, especially the total mean Framingham score of the nurses indicated a low risk of CAD in the study population during the next decade.

Acknowledgment

This article was derived from the project number (jums. rec.1393.054), Jahrom University of Medical Sciences, Jahrom, Iran.

Financial support and sponsorship

Jahrom University of Medical Sciences.

Conflicts of interest

There are no conflicts of interest.

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