https://doi.org/10.15218/zjms.2022.001

Perception of cardiovascular diseases among women attending primary health care centers in Erbil city, Iraq

Received: 14/09/2020 Accepted: 25/11/2020

Nazleen Shakir Mala Ahmed[1]* Ali Shakir Dauod[2] Karwan Hawez Sulaiman[2]

Abstract

Background and objective: Worldwide, cardiovascular diseases remain the leading cause of death in both genders. Good knowledge about cardiovascular disease symptoms, risk factors, and protective measures can improve the public's preventive practice and overall future health outcomes. This study aimed to assess women's awareness of cardiovascular diseases and preventive measures.

Methods: A cross-sectional study was conducted in Erbil city, Iraq. The data were collected from 674 women aged 18 years and above, using convenience sampling method, who attended 12 primary health care centers in six municipalities in Erbil City. The study period was from the 1st of October 2019 to the end of February 2020. An interview questionnaire was used to collect the study data from the participants to assess the women's knowledge of cardiovascular diseases, their attitudes and challenges.

Results: The mean age ± standard deviation of the women was 37.6 ± 13 years. Only 15.3% of women could recognize cardiovascular diseases as the number one leading cause of death. More than 90% of them had poor cardiovascular disease knowledge scores. Recognition of coronary artery disease symptoms, cardiovascular disease risk factors, and preventive measures was made by less than 50% of them. The multiple regression analysis showed that age, body mass index, socioeconomic status, employment, and educational level independently predicted cardiovascular disease knowledge.

Conclusion: Awareness of cardiovascular diseases among women was poor. Thus, proper institutional foundations, mass media campaigns, other media, and community programs can prompt public discussion of health issues to change women's health behavior and reduce future health consequences from cardiovascular diseases.

Keywords: Cardiovascular diseases; Perception; Primary health care; Erbil city.

Introduction

Cardiovascular diseases (CVD) are the leading cause of death worldwide. They were accountable for 17.8 million deaths worldwide in 2017.[1] This makes more than 30% of global death. Ischemic heart diseases are the most common cardiovascular cause of death, followed by a stroke. Ischemic heart diseases ranked first as a cause of years of life lost (YLL) and disability-adjusted life-years (DALYs) between 1980 and 2017.[2,3] As per the World Health Organization (WHO) Health profile report of 2017, CVD accounted for 33.2% of total deaths in Iraq in 2015 with coronary heart diseases being the most common cause, followed by a stroke.[4] The common risk factors for CVD among Iraqi population were age, sedentary lifestyle (46%), hypertension (24%), obesity (27%, more in females), and smoking (32.3% were self-reported as passive smokers).[4]

Women have long been disadvantaged in terms of CVD. Women's health research and public education have gone more toward maternal and child health.[5] Despite

[1] Department of Basic Sciences, College of Medicine, Hawler Medical University, Erbil, Iraq.
[2] Department of Community Medicine, College of Medicine, Hawler Medical University, Erbil, Iraq.
* Correspondence: nazleen.shakir@hmu.edu.krd

https://doi.org/10.15218/zjms.2022.001

being the number one killer of both sexes, the true burden of CVD is underestimated by the general public, especially women. Women fear breast cancer more than CVD; meanwhile, breast cancer is responsible for only one in every 38 deaths compared to one in every three deaths due to CVD.[1,6]

The other traditional risk factors for CVD in the form of diabetes mellitus, dyslipidemia, hypertension, unhealthy weight, smoking, sedentary lifestyle, unhealthy diet, and psychosocial factors are also more common in men than women. However, they tend to have worse outcomes in women.[7,8] Non-traditional risk factors unique to women have increasingly contributed to the development of CVD in women. Those factors are hypertensive disorders of pregnancy, gestational diabetes, preterm delivery, autoimmune diseases, depression, and breast cancer treatment.[7]

Estrogen depletion like menopause and premature ovarian failure is another known risk factor for CVD confined to women.[9,10] The pattern of coronary artery disease in women differs from that of men. Angina and non-obstructive coronary artery disease are more common in women, and the prognosis is worse.[7] The atypical symptoms in the form of fatigue, neck and jaw pain, dyspnea, and nausea are more common in women than in men. For those reasons, CVD, particularly coronary artery disease, are thought to be under diagnosed and undertreated in women.[11]

Early recognition of risk factors and timely diagnosis of CVD are crucial to decreasing the mortality, morbidity, and health expenses from CVD. The American Heart Association had conducted a national survey on the awareness of CVD in women. It was found that less than one-third of American women were aware that CVD is the leading cause of death in 1997.

This figure was increased to half in 2012 after 15 years of public health education and cardiovascular campaigns.[12] This study aimed to assess women's awareness of CVD and enhance the importance of a healthy lifestyle.

Methods

This cross-sectional study was conducted in Erbil city, the capital of Kurdistan Region, Iraq. Erbil city covers 115 km^2 and has a population of over 846,000; 50% of them are female, and 35% are under 15 years old.[4,13,14]

A total of 674 women aged 18 years old and above who visited primary health care (PHC) centers in Erbil city for any reason from the 1st of October 2019 to the end of February 2020 had participated in the study. The sample was chosen by using a convenience method. The sample size was calculated using the Daniel formula by an online sample size calculator.[15] Owing to the wide spectrum of CVD and wide range of risk factors with prevalence ranging from 46% for type 2 diabetes mellitus to 24% for hypertension and lack of exact numbers for these frequencies in women in Iraq, the prevalence of CVD was entered as 0.5, and a confidence interval of 99% was considered.[4] Twenty-four PHC centers provide six hours a day of health services for six municipalities in the city of Erbil. A total of 12 PHC centers were visited, two PHC centers were randomly chosen from each municipality, and a minimum of 50 women were chosen from each center.[16]

An interview questionnaire was used to address all relevant patients' demographic characteristics, age, sex, marital status, residency, educational level, smoking status, employment, and socioeconomic status.[12,17]

The questionnaire consisted of two sections. The first part included five questions to evaluate participants' awareness of CVD as a leading cause of death, their knowledge about coronary artery disease's main and atypical symptoms, CVD risk factors, preventive measures, and understanding of healthy diet. Each question was given a specific score based on how information was

https://doi.org/10.15218/zjms.2022.001

provided, and "do not know" or blank were given zero. These scores were then summed to calculate CVD knowledge scores. The second part assessed participants' preventive practice by asking about exercise habits, their perception of their weight, and whether they made steps to lose it and the reasons behind it. They were asked about the last time their blood pressure and serum lipids were checked. Finally, they were asked about their possible motivators and/or barriers to improving their cardiovascular health.

The socioeconomic status scoring that ranges from 0-12 was calculated from educational level (0-5), homeownership (0-2), number of rooms (0-2), car ownership (0-1), and monthly family income (0-2). Scoring lower than 5 is considered a low socioeconomic status, 5–8 is medium socioeconomic status, and more than 8 is considered a high socioeconomic status.[18]

Participants' weight (in kilograms), and height (in centimeters) were measured using Brecknell® HS-200M Mechanical Height and Weight Physician Scale, up to 440lb. capacity. Body mass index (BMI) was calculated by dividing weight in kilograms by squared height in meter and categorized as underweight with BMI less than 18.5kg/cm^2; normal weight with BMI between 18.5 and 24.9; overweight with BMI between 25 and 29.9; class I obesity with BMI between 30 and 34.9; class II obesity with BMI between 35 and 39.9; and class III obesity with BMI more than 40.[19]

Knowledge about CVD and preventive measures was categorized as high knowledge with scores of more than 70%, intermediate knowledge with scores of 50-70%, and poor knowledge with scores below 50%.[20]

Data were analyzed using the IBM statistical package for the social sciences (version 25). Age was expressed as means ± standard deviations (SD). Sociodemographic data, knowledge about heart diseases, risk factors, and preventive measures were expressed descriptively as proportions. Multiple response analysis was used when needed. Multiple regression analysis was used to assess the relationship between sociodemographic characteristics and CVD knowledge. The socioeconomic status, age, BMI, and educational level were entered into the multiple regression model as numerical. The educational level was entered as years of education, with zero for illiterate and ≥13 years for those with higher educational degrees. Being employed was two categories (unemployed entered as (0) and employed as (1)). A *P* value of ≤0.05 was considered statistically significant.

This study protocol was approved by the Research Ethics Committee of the Kurdistan Board for Medical Specialties. A pilot study was initially conducted on 25 women to consider the feasibility of the questionnaire. Then some adjustments were made accordingly. All the women were informed of the study aims, then recruited after obtaining verbal informed consent. The women were assured of the anonymity of the study. After completing the questionnaire, they were acknowledged and given proper instructions about a healthy lifestyle.

Results

Table 1 shows the sociodemographic characteristics of the women (total 674). The mean age of the women was 37.6 ± 13 SD; more than 70% were between 25 and 55 years old. Only 37.4% of them had a normal weight. There was a linear relationship between participants' BMI and age (R = 0.55, *P* <0.005). More than 70% of the women were married, 31.8% had attained ≥13 years of education, and around 21% never went to school.

The majority of the women were not employed (75.8%). Around half of them had medium socioeconomic status, and more than 43.6% had a low socioeconomic status. Although only 2% were active smokers, around 30% of them were

https://doi.org/10.15218/zjms.2022.001

exposed to second-hand smoke.

Regarding their self-reported medical history, 14% of the women had hypertension, 9.8% said they had diabetes, 8.6% had dyslipidemia, 69.2% reported having no known chronic medical illness, and some had more than one illness.

Table 1 Sociodemographic characteristics of the women

Sociodemographic variables		No.	%
Age groups in years	< 25	123	18.2
	25-34	184	27.3
	35-44	181	26.9
	45-54	107	15.9
	55-64	58	8.6
	≥ 65	21	3.1
BMI category	Underweight	25	3.7
	Normal weight	252	37.4
	Overweight	198	29.4
	Class I Obesity	130	19.3
	Class II obesity	50	7.4
	Class III obesity	19	2.8
Marital status	Single	150	22.2
	Married	483	71.7
	Divorced	8	1.2
	Widowed	33	4.9
Employment	Unemployed*	511	75.8
	Employed	163	24.2
Socioeconomic status	Good	215	31.9
	Medium	165	24.5
	Low	294	43.6
Smoking status	Smoker	14	2.0
	Non-smoker	446	66.2
	Ex-smoker	12	1.8
	Passive smoker	202	30.0
Medical History**	Heart disease	29	4.4
	Hypertension	92	13.9
	Diabetes	65	9.8
	Stroke	11	1.7
	Dyslipidemia	57	8.6
	Negative	457	69.2
	Others	60	9.1
Total		**674**	**100**

* Including housewives, retired, and students.
** The percentage here represents the percentage of cases not responded using multiple response set analysis.

https://doi.org/10.15218/zjms.2022.001

The mean CVD knowledge score was 6.8 ± 5.2, with the maximum score gained was 24 out of 30 points. More than 90% (615) of the women were found to have poor knowledge of CVD and preventive measures (Figure 1).

Figure 2 shows women's responses to "What is the leading cause of death in women?". Less than one-third (28.1%) of the women who participated in the study recognized cancer as the most cause, while only 15.3% of them recognized CVD as the leading cause of death.

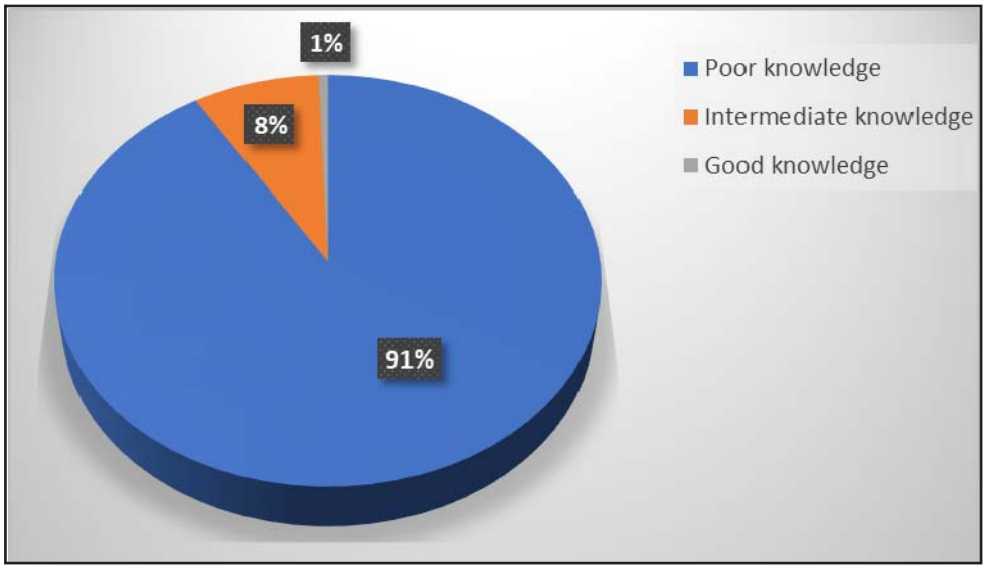

Figure 1 Knowledge of CVD and preventive measures

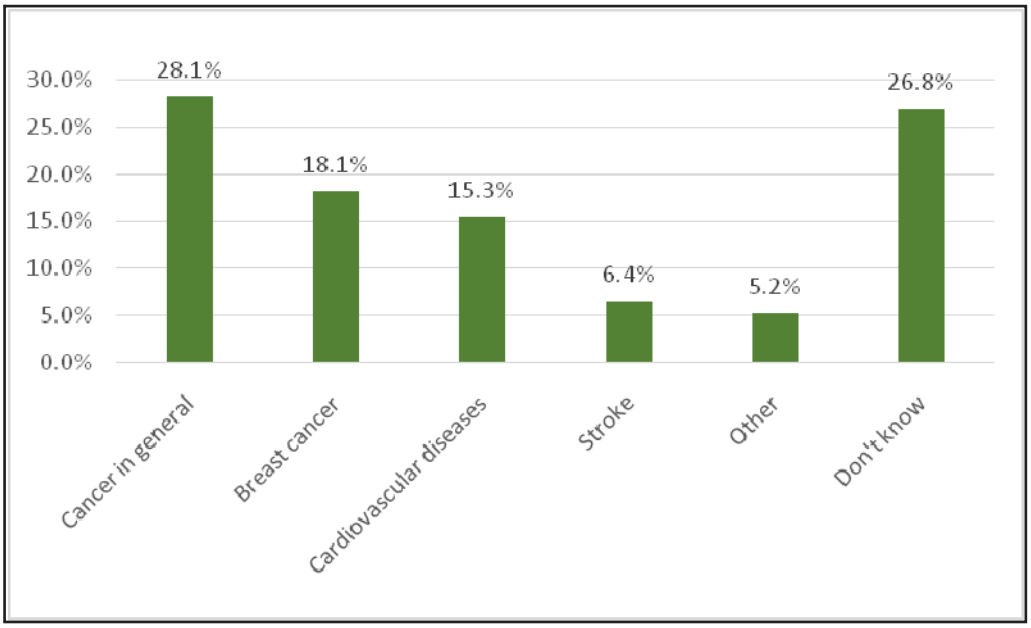

Figure 2 Knowledge of CVD as a leading cause of death

https://doi.org/10.15218/zjms.2022.001

Among the main symptoms of heart attack, chest pain and breathlessness were the most common symptoms identified by 65.5% of the women. Meanwhile, one-third of the women (33.2%) chose "Don't know" among the options of symptoms of heart attack. The atypical symptoms like fatigue, shoulder pain, sweating, syncope, and neck/jaw pain were identified less (Figure 3).

Regarding women's knowledge about CVD risk factors, stress was the most common risk factor identified by 40.6% of participants, followed by being obese, high blood pressure, abnormal lipids, and smoking (32.2%, 22.7%, 22.2%, and 20.5%, respectively). Less than one-fifth of the women could recognize a sedentary lifestyle, unhealthy diet, and high blood sugar as causes of heart diseases. More than 40% of the women correctly identified regular exercise and healthy eating habits. More than one-third of them identified minimizing stress as a preventive measure, 23% identified smoking, and 3.5% said nothing could reduce CVD risk (Figure 4).

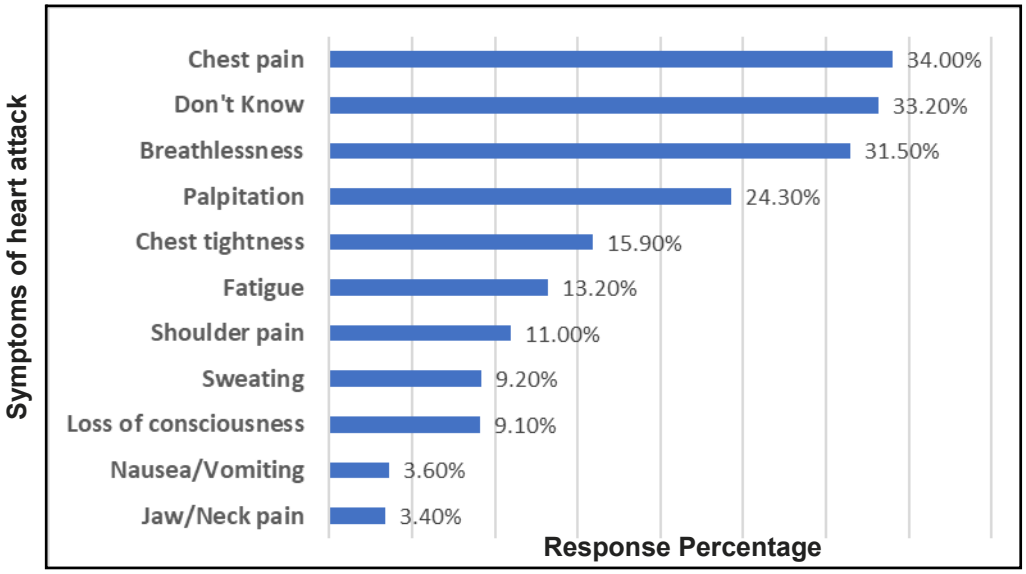

Figure 3 Symptoms of heart attack identified

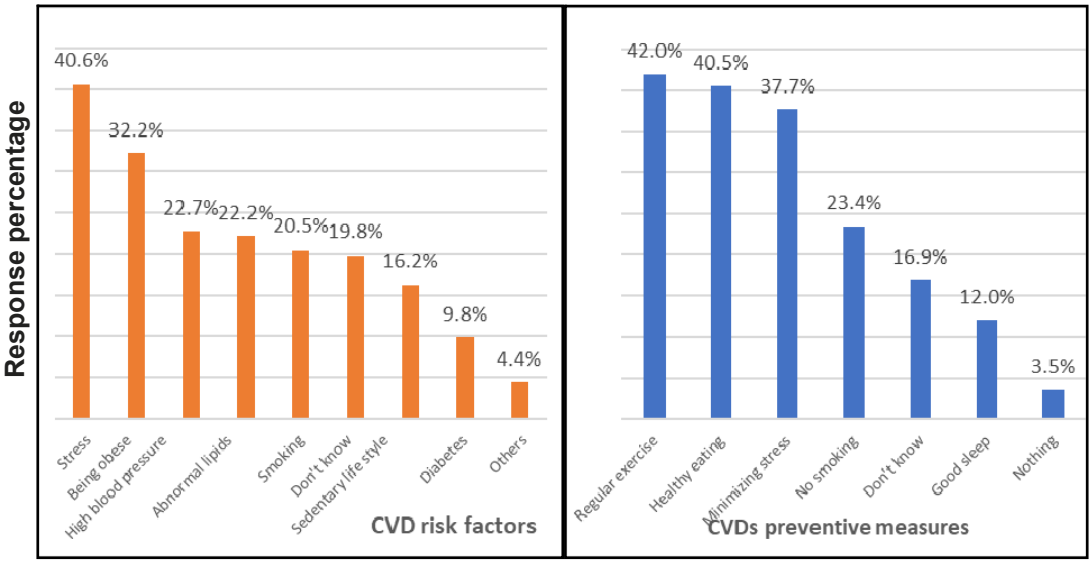

Figure 4 CVD risk factors and preventive measures identified by the participants

https://doi.org/10.15218/zjms.2022.001

When the women were asked about the definition of a "healthy diet," low fat, consuming vegetables and fruits, low carb, and low salt were mentioned by 57.4%, 46.6%, 29.8%, and 26.9%, respectively. Fish and high fiber were mentioned by very few women (2.9% and 1.3%), and one-third mentioned irrelevant foods as a definition of a healthy diet.

A healthy systolic blood pressure of ≤ 120 mmHg was correctly recognized by around 89% of the women, and diastolic blood pressure of ≤ 80 mmHg was recognized by around 40% of them.

Only 13.9% of the women mentioned that they were doing exercises. In 10.8% of them, the type of exercise they were doing was aerobic, and in 30%, it reached 150 minutes per week.

Around 64% of the participants reported that they think about their weight as normal weight. Therefore, they have never tried to lose weight.

Around 56.1% of those who tried to lose weight reported that longevity and good health were the reasons why they tried to do so. Shape, symptom control (mainly backache), better mobility, and fertility were reported as other reasons (Table 2).

Among the motivators recorded by the women to reduce their future CVD risk, "To have better health" was recorded by 80.6% of the respondents. "For my family" was recorded by 32.4%, "To avoid medications" by 24.3%, and "To live longer" by 19.9% of them (Table 2).

Table 2 Motivators mentioned by the women to reduce their weight and CVD risk

Factors enhanced weight reduction	**No.**		**%**
Longevity and health	78		56.1
Shape	25		18.0
Symptom control	15		10.8
Shape, longevity and health	15		10.8
Better mobility	4		2.9
Fertility	2		1.4
Total	139		100
Missing	535		
Factors enhanced willingness to reduce CVD risk	**No. of responses***	**% of responses**	**% of cases**
To have a better health	514	42.8	80.6
For my family	207	17.3	32.4
To avoid medications	155	12.9	24.3
To live longer	127	10.6	19.9
A close person developed or died of heart disease	101	8.4	15.9
I heard information related to heart disease	49	4.1	7.7
My doctor has explained to me the risks and preventive measures	22	1.8	3.4
I have heart disease	21	1.8	3.3
Others	4	0.3	0.6
Total	1200	100	

*Multiple response set analysis was used

https://doi.org/10.15218/zjms.2022.001

Among the most frequent CVD risk reduction barriers recorded by the women, lack of time and carelessness were mentioned by 32.4% and 23.2% of them, respectively. Feeling that God determines their health, having many family obligations, and having scarce money was recorded by 10% of the women.

About 68% of the women reported that their blood pressure had been checked during the last six months, and this percentage increased with increasing the age of women. About 46.6% of the women reported that their serum lipids had never been checked; most of them (60%) were younger than 45 years old.

The multiple regression analysis showed that being employed, socioeconomic status, age, BMI, and educational level independently predicted the CVD knowledge, and being employed was the strongest predictor (Table 3).

Table 3 Predictors of CVD knowledge

Model	R	R square	Adjusted R square	Std. Error of the Estimate
	0.369	0.136	0.129	4.866

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	*P* value
	B	Std. Error	Beta		
[b.] (Constant)	0.519	1.478		0.351	0.726
Age	0.099	0.018	0.245	5.462	0.000
BMI	-0.094	0.040	-0.106	-2.339	0.020
Being employed	2.399	0.535	0.221	4.487	0.000
socioeconomic status	0.381	0.134	0.144	2.853	0.004
Years of education	0.010	0.147	0.003	0.065	0.048

a. Dependent Variable: Knowledge Score.
b. Predictors: (Constant), Age, BMI, Being employed, socioeconomic status, Years of education.

https://doi.org/10.15218/zjms.2022.001

Discussion

Studies and guidelines have revolutionized the field of CVD, but with a tendency towards men. Women need health awareness programs to adopt a healthy lifestyle, and the raised mortality due to CVD among them has just accelerated this need. The current study is the first in Iraq to assess the knowledge, risk factors, and perception of CVD among a sample of women at PHC centers in Erbil city.

More than 70% of the women were younger than 55 years old, most of them were overweight and unemployed. The majority of the women who participated in the study had poor knowledge of CVD. Almost half of them still believed that cancer is the number one leading cause of death, specifically breast cancer. This belief was reflected in their attitudes towards knowing the preventive measures and practicing a healthy lifestyle.

This percentage was similarly observed by Mosca et al. in 1997, but it became 32% after 15 years of health education.[12] Around 31% was described by Khan and Ali among Emirati women in 2017.[21]

In the results of our study, women had a low awareness of the seriousness of the CVD (only 15.3% had a good knowledge). Mosca et al. observed a better response, and 56% of participants could regard heart disease as the number one cause of death.[12] A very close number (55%) was recorded by Merz et al.[22] Meanwhile, 32% of the participants studied by Khan and Ali could identify the seriousness of CVD.[21] The reason behind this low figure in our study compared to the other mentioned studies might be due to the effects of the broadcasting that has widely stressed women cancer in expense to CVD as well as inadequate health institutional alertness and support.

Slightly over 30% of the women in our study have recognized the symptoms of the heart attack. This percentage was close to that of Tedesco et al.[23] and slightly higher than that of Khan and Ali, where the recognition of the main symptoms of a heart attack by their study participants did not exceed 25%.[20] While this number was close to 50% in Awad and Al-Nafisi's study.[24] Psychosocial stress was recorded by 40% of the women as the only risk factor for CVD. The figure about stress was close to that found by Sarnecka et al.[17] Regular exercise and healthy eating were recognized by 40% of the women, but attitudes toward avoiding smoking, having a normal weight, control of blood pressure and blood sugar were very low.

Most women believed in a "healthy diet" and could recognize consuming low fat, vegetables and fruits, low carb, and low salt as components of a healthy diet (by 57.4%, 46.6%, 29.8%, 26.9% of the participants, respectively). Fish and high fiber foods were ignored; probably, they could not exactly recognize the high fiber diet and did not appreciate the nutritional facts of fish.

There were significant gaps between participants' perceived knowledge of the role of regular exercise as a CVD protective measure and their habits. In the current study, only 13.9% of the women recorded that exercise is included in their habits, and most of them were below standards. Most overweight women did not perceive their weight as unhealthy. Therefore, they never tried to lose weight. Longevity and health were the main reasons for losing weight; better contour was another reason. These unhealthy lifestyle habits were much worse than what was found by Szoeke et al.[25] The reason could be due to the direct distressful effects of the family, culture, and social backgrounds.

Women in the eastern countries have long been raised to be housewives, and doing outdoor exercise is still not socially acceptable. Most of those women are working hard to take care of their families' requirements, and they believe that doing so is enough daily exercise to stay healthy.

The literature has shown that there are barriers to implementing a healthy lifestyle. Mosca et al. have described some barriers,

https://doi.org/10.15218/zjms.2022.001

such as not having enough money, low self -confidence in making a change, lack of time, being too stressed to do the right thing, not knowing what to do, and having family obligations, among others. These responses were observed in 11 to 16% of his study participants.[12] Our participants highlighted a lack of time and not taking the subject seriously as their main technical barriers. This may reflect the nature of the woman who cares about her surroundings with less attention to her health and the tremendous benefits of a healthy lifestyle. On the other hand, women's main motivators to lower their CVD risk were having better health (80.6%), for the sake of their families (32.2%), and avoiding medications (24.5%). For better health, feeling better, living longer were the main motivators observed by Mosca et al.[12] Our study findings showed gaps in the proper health education that has to be delivered to the public, whether through their health care providers or health campaigns; not forgetting the role of the mass media and some international organizations such as the WHO. The health care professionals are required to integrate cardiovascular health into women's health and to deal with their female patients as a package rather than treating a specific disease. Avoiding clinical inertia among health care providers and using CVD risk assessment may improve cardiovascular health in women.

The multiple regression analysis showed that many independent variables could predict CVD knowledge among women. Being unemployed, having low socioeconomic status, being younger, having a higher BMI, and low education were significant predictors of poor CVD knowledge. The relationship between low educational status, younger age, and poor CVD knowledge was similarly observed by other researchers.[23,26] Poor CVD knowledge among our study sample can probably be explained by the fact that the majority of those who visit the public PHC centers are of low socioeconomic status, keeping in mind the relatively high cost of private clinics and the lack of health insurance systems obtained by the governmental health authorities. Knowing the population who needs health education can cost-effectively target specific population groups in health awareness campaigns.

Our study has limitations. It was done in public primary health centers, and private sectors were not included, which could involve a higher social degree population. The data were collected using questionnaires filled out by the participants rather than observing participants' actual behavior. Furthermore, the interviewing questionnaires have their limitations, especially during work rush hours. In addition, women who already had heart disease were included in the study, and they probably had better information about their illness. It would be better if they were excluded. Furthermore, it would be better if face-to-face interviews with more detailed information about CVD, what to do when having symptoms and observing the preventive practice were conducted through a wider community-based survey, including different other social classes, to correctly define public knowledge.

Conclusion

The awareness of CVD in women in our study was poor. Thus, proper institutional foundations, mass media campaigns, other media, and community programs targeting specific populations can prompt public discussion of health issues to change women's health behavior and reduce future health consequences from CVD.

Funding

Not applicable.

Competing interests

The authors declare that they have no competing interests.

References

1. Benjamin EJ, Virani SS, Callaway CW, Chamberlain AM, Chang AR, Cheng S, et al. Heart disease and stroke statistics - 2018

update: A report from the American Heart Association. Circulation. 2018;137(12):e467–92. https://doi.org/10.1161/CIR.0000000000000558.
2. Hay SI, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F, et al. Global, regional, and national disability-adjusted life-years (DALYs) for 333 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017;390:1260–344. https://doi.org/10.1016/S0140-6736(17)32130-X.
3. Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;397 (10159):1736–88. https://doi.org/10.1016/S0140-6736(18)32203-7.
4. WHO. Iraq Health Profile. Cairo; 2017. (Accessed March 20, 2019, at http://apps.who.int/bookorders).
5. Woodward M. Cardiovascular Disease and the Female Disadvantage. Int J Environ Res Public Health. 2019;16(7):1165. https://doi.org/10.3390/ijerph16071165.
6. DeSantis CE, Ma J, Gaudet MM, Newman LA, Miller KD, Goding Sauer A, et al. Breast cancer statistics, 2019. CA Cancer J Clin. 2019;69:438–51. https://doi.org/10.3322/caac.21583.
7. Garcia M, Mulvagh SL, Merz CNB, Buring JE, Manson JAE. Cardiovascular disease in women: Clinical perspectives. Circ Res. 2016;118:1273–93.https://doi.org/10.1161/circresaha.116.307547.
8. Humphries KH, Izadnegahdar M, Sedlak T, Saw J, Johnston N, Schenck-Gustafsson K, et al. Sex differences in cardiovascular disease – Impact on care and outcomes. Front Neuroendocrinol. 2017;46:46–70. https://doi.org/10.1016/j.yfrne.2017.04.001.
9. Newson L. Menopause and cardiovascular disease. Post Reproductive Health. 2018;24:44–9. https://doi.org/10.1177/2053369117749675.
10. Podfigurna A, Męczekalski B. Cardiovascular health in patients with premature ovarian insufficiency. Management of long-term consequences. Prz Menopauzalny. 2018;17:109–11. https://doi.org/10.5114/pm.2018.78551.
11. Canto JG, Rogers WJ, Goldberg RJ, Peterson ED, Wenger NK, Vaccarino V, et al. Association of age and sex with myocardial infarction symptom presentation and in-hospital mortality. JAMA. 2012;307:813–22. https://doi.org/10.1001/jama.2012.199.
12. Mosca L, Hammond G, Mochari-Greenberger H, Towfghi A, Albert MA, Harvey-Berino J, et al. Fifteen-year trends in awareness of heart disease in women: Results of a 2012 American Heart Association national survey. Circulation. 2013;127:1254–63. https://doi.org/10.1161/CIR.0b013e318287cf2f.
13. Inter-Agency Information and Analysis Unit/ United Nations. Najaf governorate profile overview Iraq millennium development goals who does what where (3W); 2016:9–10.
14. KRSO. DEMOGRAPHIC. Kurdistan Region of Iraq; 2018.
15. Dean AG, Sullivan KM SM. OpenEpi: Open Source Epidemiologic Statistics for Public Health. www.OpenEpi.com, updated 2013/04/06. (Accessed March 2, 2020, at http://openepi.com/SampleSize/SSPropor.htm).
16. Khidr Y, Ismail S. Applications of geographical information system (GIS) in planning of health services in Erbil city, Kurdistan Region. Zanco J Med Sci. 2010;14(1):47–54.
17. Sarnecka A, Kopec G, Waśniowska A, Waligóra M, Knap K, Lenart-Migdalska A, et al. Prevalence and knowledge of modifiable cardiovascular risk factors among patients of primary health care. Małopolska Cardiovascular Preventive Intervention Study (M-CAPRI). Prz Lek. 2016;73:641–7. https://doi.org/10.5604/12321966.1228400.
18. Fahmya S, Nofald L, Shehatad S, El Kadyband H, Ibrahim H. Updating indicators for scaling the socioeconomic level of families for health research. J Egypt Public Health Assoc. 2015;90:1–7. https://doi.org/10.1097/01.EPX.0000461924.05829.93.
19. WHO. WHO-Body mass index. 2020. (Accessed March 1, 2020, at http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi).
20. Yusof A, Chia YC, Mohd Hasni Y. Awareness and prevalence of mammography screening and its predictors - A cross sectional study in a primary care clinic in Malaysia. Asian Pac J Cancer Prev. 2014;15:8095–9. https://doi.org/10.7314/apjcp.2014.15.19.8095.
21. Khan S, Ali SA. Exploratory study into awareness of heart disease and health care seeking behavior among Emirati women (UAE) - Cross sectional descriptive study. BMC Womens Health. 2017;17:88. https://doi.org/10.1186/s12905-017-0445-4.
22. Tedesco LMR, Di Giuseppe G, Napolitano F, Angelillo IF. Cardiovascular diseases and women: Knowledge, attitudes, and behavior in the general population in Italy. Bio Med Res Int. 2015;2015:324692. https://doi.org/10.1155/2015/324692.
23. Bairey Merz CN, Andersen H, Sprague E, Burns A, Keida M, Walsh MN, et al. Knowledge, attitudes, and beliefs regarding cardiovascular disease in women. J Am Coll Cardiol. 2017;70:123–32. https://doi.org/10.1016/j.jacc.2017.05.024.
24. Awad A, Al-Nafisi H. Public knowledge of cardiovascular disease and its risk factors in Kuwait: a cross-sectional survey.

BMC Public Health. 2014;14:1131. https://doi.org/10.1186/1471-2458-14-1131.
25. Szoeke C, Dang C, Lehert P, Hickey M, Morris ME, Dennerstein L, et al. Unhealthy habits persist: The ongoing presence of modifiable risk factors for disease in women. PLoS ONE. 2017;12:e0173603. https://doi.org/10.1371/journal.pone.0173603.
26. Winham DM, Jones KM. Knowledge of young African American adults about heart disease: a cross-sectional survey. BMC Public Health. 2011;11(1):248. https://doi.org/10.1186/1471-2458-11-248.