Knowledge and Beliefs Toward Risk of Cardiovascular Disease among Pre-Eclamptic Women

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Abstract

Background: Preeclampsia is associated with an increased risk of cardiovascular disease later in life, but studies suggest that women with previous preeclampsia are not aware of this. Little is known about how these women perceive the condition and the associated long-term risks. The current study **aims** to assess pre-eclamptic women's knowledge and beliefs toward the risk of cardiovascular disease. A descriptive exploratory research **design** was adopted to achieve the aim of the current study. A convenience **sample** of 100 pre-eclamptic women was recruited. **Setting:** the current study was conducted at the post-partum department in teaching hospital of the university hospital in Shebin-Alkom, Menoufia University, Egypt. Three **tools** were used to collect data: 1) a Structured interviewing questionnaire, 2) a cardiovascular disease knowledge assessment tool, and 3) Likert belief scale regarding cardiovascular disease. **Results**: Findings of the current study revealed that the mean age of women was 31.25 ± 6.00 years old. About 84% had an unsatisfactory level of knowledge, and 89.0% of them had negative beliefs about the risk of cardiovascular disease among pre-eclamptic women. Also, the study findings show that there is a highly statistically significant correlation between women's knowledge and belief scores toward CVD (P<0.01). The current study **concluded** that, majority of the study sample had an unsatisfactory level of knowledge, and negative beliefs about the risk of cardiovascular disease among pre-eclamptic women. It was **recommended** that, increase pre-eclamptic women's knowledge and beliefs about the risk of cardiovascular disease later in the future focusing on health education programs for women with the risk of pregnancy induced hypertension and follow-up after delivery to reduce the long-term complications.

Keywords: Pre-eclamptic women, Cardiovascular disease, Knowledge, Beliefs.

Introduction

Pre-eclampsia is a pregnancy-specific syndrome and a multisystem disorder characterized by uteroplacental and maternal endothelial dysfunction and continues to be a major cause of morbidity and mortality, affecting 2% to 8% of all pregnancies worldwide, and accounting for up to 15% of maternal deaths and is often complicated by fetal growth restriction. There is increasing evidence that the harmful effects of pre-eclampsia on a woman's health may not be restricted to the pregnancy period, but also, could represent an important risk factor for future cardiovascular and cerebrovascular events **(Dimitriadis, et al., 2023).**

The American Heart Association (AHA) and the American College of Obstetrics and **Gynecology (ACOG) (2019)** include preeclampsia as a risk factor for future cardiovascular disease (CVD) with the recommendation of obtaining a history of preeclampsia and improving lifestyle behaviors for women with such disease. In additional, **Arnett et al., (2019)** reported that, women with a history of preeclampsia have double the risk of future heart disease, stroke and elevated risks of hypertension and diabetes. Despite CVD being the leading cause of mortality for women, there has been little awareness among obstetricians and gynecologists about this association and the published guidelines do not include

preeclampsia as a risk factor for future CVD. Therefore, women with a history of preeclampsia do not receive adequate counseling for reducing the risk of CVD. Moreover, there is limited knowledge related to the association between pre-eclampsia and future CVD, which may limit the application of this risk factor to clinical care **(Sharma, et al., 2021).**

In Egypt, the incidence of Pre-eclampsia is about 29%, and the incidence of cardiovascular disease (CVD) is about 47.5% of total deaths in Egypt and 23.4% of them are female **(WHO, 2021).** There is a growing body of evidence linking preeclampsia to the future development of cardiovascular disease (CVD). Although CVD is well-known as the leading cause of death in women, a lack of evidence exists demonstrating that women with preeclampsia are routinely informed of their risks for future CVD. Most of the complications related to pre-eclampsia occur due to maternal negligence or unawareness of the disease and its management **(Khan, 2022).**

The potential explanations for the association between pre-eclampsia and CVD are debated. It has been proposed that persisting endothelial damage caused by pre-eclampsia may result in an increased risk of CVD. Alternatively, an unfavorable cardiovascular risk profile characterized by higher levels of glucose, cholesterol, hypertension, and abdominal obesity may contribute to both the development of pre-eclampsia and CVD in later life **(Yang et al., 2023)**. A study conducted by **Roth et al., (2019)** to assess the knowledge gaps of women concerning cardiovascular risk after hypertensive disorders of pregnancy, the results of this study revealed that women were unaware of the link between pre-eclampsia and increased risk of future cardiovascular complications. There are gaps in the literature related to the relationships between pre-eclampsia during pregnancy and the future development of CVD.

Maternity nurse has a crucial role in conducting a risk assessment of preeclamptic pregnant women who are at risk for CVD and providing adequate management. Also, have an educating role to raise awareness of these women related to understanding the link between preeclampsia and future risk of CVD and how

women take care of themselves and adopt a healthy lifestyle to prevent or reduce the development of CVD **(Angelina, et al., 2020).** There are several research carried out to assess the level of knowledge among healthcare practitioners about the association between PIH & CVD. Also, there is scarce research that assesses women's knowledge and beliefs related to the association between preeclampsia and the future occurrence of CVD.

Significance of the study

Currently, CVD is the leading cause of death in women regardless of the presence or absence of pre-eclampsia during pregnancy **(Tamam, 2022).** Despite evidence suggesting that women who experience pre-eclampsia are at increased risk for CVD many researchers recommended informing women who experience pre-eclampsia of their increased CVD risk. So, this study will represent one of the first such efforts aimed to explore women who have experienced pre-eclampsia of their increased risk for CVD. Also, the results obtained would serve as baseline information for educational programs about the risk of cardiovascular disease aimed at improving women's health and identifying areas of deficiency in knowledge about the risk of cardiovascular disease among women with pre-eclampsia.

Because nurses are in close contact with women who experience pre-eclampsia, both during pregnancy and in the postpartum period, nurses should be equipped with information to raise their awareness related to these issues and improve their practice in follow-up with women who experience preeclampsia. Moreover, provides patient education related to fundamental elements associated with CVD risk reduction. In addition, limited studies have been conducted in Egypt to evaluate women's awareness and perception of future risk for cardiovascular disease. So, this study aimed to assess pre-eclamptic women's knowledge and beliefs about the risk of cardiovascular disease.

Aim of the study

The current study aims to assess pre-eclamptic women's knowledge and beliefs about the risk of cardiovascular disease.

Research questions

1. What is the knowledge level toward the risk of cardiovascular disease among pre-eclamptic women?

2. What are the beliefs toward the risk of cardiovascular disease among pre-eclamptic women?

3. Is there a relationship between knowledge, and beliefs scores toward risk of cardiovascular disease among pre-eclamptic women?

Subject and Methods

Research Design

A Descriptive exploratory research design was adopted for this study to assess pre-eclamptic women's knowledge and beliefs about the risk of cardiovascular disease.

Sample

convenience sample of 100 women who were admitted to the postpartum department in the teaching hospital of the university hospital in Shebin-Alkom, Menoufia University through a period of six months from 1st of February, 2023 to end of July, 2023. The study sample was recruited according to the following inclusion criteria: willing to participate in the study, during their reproductive age 18 -45 years, diagnosed previously by pre-eclampsia, including eclampsia and/ or HELLP syndrome during the recent pregnancy; and free from any cardiac disease. As well as delivering a live baby and rooming in. Women who were mentally and/or cognitively impaired were excluded from the current study.

Sample size

A total of (100) woman selected according to the following statistical formula.

$$n = Z2p (1-p)/d2$$

Where z = level of confidence according to the standard normal distribution (for a level of confidence of 95%, z = 1.96). p = estimated proportion of the population that presents the characteristic (when unknown we use p = 0.5), d = (d is considered 0.05).

Setting

The study was conducted at the postpartum unit in the teaching hospital of the university hospital in Shebin-Alkom, Menoufia University, Egypt. It serves 100 to 120 pregnant women from different regions every day and approximately 28000 annually. The postpartum unit provides free healthcare to all postpartum women.

Tools of data collection

Three tools were used to collect data: 1) Structured interviewing questionnaire, 2) cardiovascular disease knowledge assessment tool, and 3) the Likert belief scale regarding cardiovascular disease.

Tool (1): Structured Interviewing Questionnaire. This tool was developed by researchers after an extensive literature review, This tool included three parts:- Part 1) This part included data related to personal demographic characteristics of the study sample as; age, occupation, residence, level of education, occupation, and family income; part 2) this part included data related to family history as the occurrence of chronic diseases as hypertension & cardiac diseases; part 3) this part included data related to obstetric profile as; gravidity, Parity, living children, health problems during previous pregnancy such as history of pregnancy-induced hypertension and gestational diabetes and complications of previous delivery as; a history of preterm labor, and low birth weight were also collected.

Tool (2): Cardiovascular Disease Knowledge Assessment Tool

This tool was developed by the researcher after an extensive literature review, and included data related to cardiovascular disease consisting of 25 questions to knowledge about the meaning of cardiovascular disease; signs and symptoms, risk factors, causes; and how pre-eclamptic women avoid CVD disease.

The scoring system ranged from (0 to 2); score (2) denoted to correct answers; score (1) denoted to incorrect answers and score (0) denoted to I don't know. The total knowledge scores were categorized into Unsatisfactory level of knowledge (less than 60 percent); and

satisfactory level of knowledge (more than 60 percent) with a total knowledge score equal to 50.

Tool (3): Likert Belief Scale Regarding Cardiovascular Disease

It was developed by researchers after an extensive literature review. This tool included data related to cardiovascular disease belief consisting of 20 questions that were measured by using a 5-point Likert scale from (1 to 5). Score (1) denoted to strongly disagree; score (2) denoted to disagree; score (3) denoted to neutral; score (4) denoted to agree; and score (5) denoted to strongly agree. Total scoring about beliefs was categorized into two levels less than 50% was considered as a negative belief, and equal or more than 50% was considered as a positive belief. With a total score of 100.

Tool Validity and Reliability

Tools were developed by the researcher then they were tested for content validity by five experts in the field of maternity nursing and obstetric medicine. Modifications were carried out according to the experts' judgment on the clarity of sentences and appropriateness of content. After the questionnaire was collected, test reliability was applied by the researcher for testing the internal consistency of the tool. It was done through **Cronbach's alfa=** α was estimated at (0.982) for the overall score (0.891) for the cardiovascular disease knowledge assessment tool and 0.976 for the Likert belief scale regarding cardiovascular disease, showing a strong significant positive correlation between the items of tools.

Ethical Considerations

Ethical approval to conduct the study was obtained from the Ethics Committee of the Faculty of Nursing, at Menoufia University (code number 937). Also, ethical approval was obtained from the administrative authority personal at postpartum unit in the teaching hospital which affiliated with a university hospital in Shebin-Alkom, Menoufia University. Written consent was obtained from eligible women who met the inclusion criteria were informed about the aim of the present study and knew that their participation was voluntary. The anonymity and confidentiality of the participants were considered.

Pilot Study

A total of 10% of the sample was included in the pilot study to assess the feasibility and clarity of the tools and to determine the needed time for answering the questions. Based on its results, minimal changes were carried out. The samples included in the pilot study were excluded from the main study sample.

Procedure

Data was collected over 6 months starting from the 1st of February 2023 to the end of July, 2023. The researcher attended the postpartum department 3 days per week (Sunday; Monday and Wednesday). After the official permission was obtained from the teaching hospital of the university hospital in Shebin-Alkom, Menoufia University, Egypt. The researcher contacted the medical and nursing directors of the post-partum department to explain the purpose of the study, and benefits to mothers, and fetus and then obtained written approval to conduct the study.

After that, the researcher selected the preeclamptic women in the post-partum department and explained the purpose and nature of the study as well as to obtain informed written consent from those who agreed to participate and met the selection criteria. All women in the study sample were interviewed to collect data related to personal demographic, family medical history, current reproductive history, problems in the previous pregnancy, and current and previous labor problems. The researcher faced the women and interviewed them individually to collect data and after that, the questions were asked in clear Arabic language and recorded their response in the questionnaire. This interview took about 10-15 minutes with each pre-eclamptic women.

As well as collected data about women's knowledge regarding CVDs, this tool consisted of 25 questions related to CVDs definition, causes, signs, and symptoms, and risk factors. After that, collecting data about women's CVDs risk beliefs regarding CVD among pre-eclamptic women, the questionnaire consisted of 20 questions. Data collection took about 15-20 minutes with each pre-eclamptic

women regarding knowledge and beliefs toward CVDs.

Statistical Design

Data management was done by coding, tabulating, and analyzing entering responses into the statistical package for the social sciences (SPSS) software program version 23 was used for the statistical analysis of data. The researcher checked all data to avoid any discrepancies. Data were examined for coding and entering errors; data was summarized and tabulated by using descriptive and inferential statistics were used for analyzing the data. Parametric inferential statistics were used. Pearson correlation was used to examine the relationship between variables. The level of significance was set at < 0.05 and a $p > 0.05$ indicates a significant result, the p- p-value being the probability of error of the conclusion.

Result

The findings of the current study are presented in three main sections: Section I: a description of the study sample regarding demographic characteristics; Section II: a description of women's knowledge toward cardiovascular disease and Section III: a description of women's beliefs toward risk of cardiovascular disease.

Section I: a description of the study sample regarding demographic characteristics

Table (1) shows that the age of the women ranged from (18-45) years old with a mean age was 31.25 ± 6.00 years, more than half (50%) of them their age ranged from (25-35) years, age at marriage range was 16-37 years old with mean was 24.58 ± 4.90 years, the mean marriage duration was 6.58 ± 5.25 years. About 80% of them live in urban areas, 50% had complete secondary education, about 15% of them married from consanguinity, and less than three-fourths 72% were housewives.

Table (2) shows (85%) of women had gestational age less than 37 weeks with mean age of 32.51 ± 0.91 weeks; (40%) of women had 2-3 deliveries, with a mean of 2.28 ± 1.36 deliveries; (45%) of women had one abortion, with mean of

0.65 ± 0.71 abortion;(48%) of them had 2-3 children with a mean of 2.17 ± 1.29 children.

Figure (1) shows that nearly half of the study sample 46.4% suffered from hypertension in the previous pregnancy.

Section II: a description of women's knowledge toward cardiovascular disease

Table (3) shows that 40% of women didn't know regarded CVDs related to women's age; 50% of them knew that obesity could cause CVDs, 30% of women didn't know that chest pain, chest tightness &unusual tiredness were symptoms of heart disease, 70 % of them didn't know that women are exposed to CVDs after menopause, 50 %of them didn't know that CVDs are disturbances affect the heart and blood vessels, 50 % of them know that hypercholesterolemia causes CVDs, 49% of them didn't know that CVDs symptoms include pain in the neck, shoulders, arm & back, 50% of them didn't know that women have more risk than men to develop dangerous disease or death, 32 % of them know that stress could cause CVDs; 50 % of them didn't have any knowledge that hormonal contraception could lead to hypertension. 47% of them didn't know hereditary is an important factor in having heart disease. About 80 % of them knew that heart disease & stroke may lead to death of the woman.

Figure (2) shows that the majority of the women (84%) had unsatisfactory knowledge levels concerning CVDs, and (16 %) of them had satisfactory knowledge.

Section III: a description of women's beliefs toward risk of cardiovascular disease.

Table (4) shows women's beliefs regarding the occurrence of CVDs, the study finding revealed that 30% of the women strongly disagree about the possibility of having heart disease in the future, 44% of them strongly disagree about a good chance of getting heart disease during the next 10 years, 14% of them strongly disagree that preeclampsia is a dangerous risk factor to have heart disease. About 37% of them strongly disagree with the fear of getting heart disease. 22% of them strongly disagree that the causes of heart disease are unknown.

Figure (3) shows that the majority of the women (89.0%) had negative beliefs levels regarding CVDs, (11.0%) had positive beliefs levels regarding CVDs.

Table (5) shows that there is a highly statistically significant correlation between Women's knowledge and beliefs score toward CVDs (P<0.01).

Table (1): Distribution of the study sample related to their Demographic Characteristics (n=100)

Age	No	%
-25 years	20	20
-35 years	50	50
≥ 35 years	30	30
(Mean ± SD) yrs.	31.25 ± 6.00	
Educational level		
Can't read and write	10	10
Preparatory level	6	6
Secondary level	50	50
University education	34	34
Residence		
Urban	80	80
Rural	20	20
Occupation		
Working	28	28
Housewife	72	72
Consanguinity		
No	85	85
Yes	15	15
Age at Marriage		
<25 years	50	50
25-30 years	40	40
>30 years	10	10
(Mean ± SD) yrs.	24.58 ± 4.90	
Duration of marriage		
< 5 years	42	42
5-10 years	40	40
>10 years	18	18
(Mean ± SD) yrs.	6.58 ± 5.25	
Income		
Inadequate	5	5
Adequate	80	80
Adequate and saving	15	15

Table (2): Distribution of the study sample related to Previous Obstetric History (n=100)

Items	Frequency	%
Gestational age		
<37 weeks	85	85
37-40 weeks	15	15
Mean + SD	32.51±0.91	
Number of gravidity		
0	0	0.0
1	40	40
2-3	40	40
≥4	20	20
Mean + SD	2.28 ±1.36	
Number abortion		
0	42	42
1	45	45
2-3	13	13
Mean + SD	0.65 ±0.71	
Number of parity		
0	3	3
1	38	38
2-3	48	48
>=4	11	11
Mean + SD	2.17 ± 1.29	

Figure (1): Distribution of the women related to a history of hypertension in the previous pregnancy (n=100)
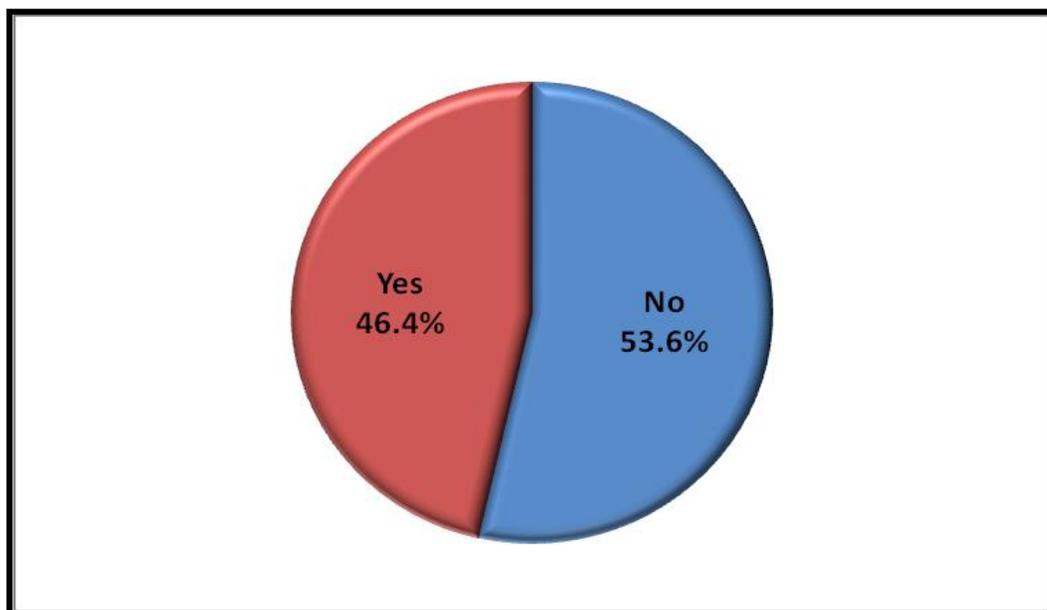
Table (3): Distrubtion of the study sample regarding to Knowledge of Cardiovascular Disease (CVDs) (n=100)

Items	Don't know. (0)		Incorrect answer (1)		Correct answer (2)	
	No.	%	No.	%	No.	%
1- Cardiovascular diseases related to women's age	40	40	40	40	20	20
2- Obesity could cause cardiovascular diseases	30	30	20	20	50	50
3- Symptoms of heart disease include chest pain, chest tightness, unusual tiredness	30	30	12	12	58	58
4- Women are more exposed to CVD after menopause	70	70	27	27	3	3
5- CVDs are disturbances that affect the heart and blood vessels	50	50	15	15	35	35
6- Hypercholesterolemia causes CVDs	37	37	13	13	50	50
7- Other CVDs symptoms include pain in the neck, shoulders, arm & back	49	49	22	22	29	29
8- Women have more risk of developing dangerous disease or death than men if they develop CVDs	50	50	38	38	12	12
9- Stress could cause CVDs	32	32	32	32	36	36
10- Hormonal contraception could lead to hypertension	50	50	41	41	9	9
11- Hypertension during pregnancy may lead to CVDs in the future	51	51	44	44	5	5
12- Hypertension may lead to stroke	60	60	18	18	22	22
13- Hypercholesterolemia causes coronary heart disease	40	40	22	22	38	38
14- One of the causes of stroke is hemorrhage or thrombosis of cerebral blood vessels	78	78	12	12	10	10
15- Passive smoking may lead to coronary heart diseases	39	39	50	50	11	11
16- Reduction of the hormonal level after menopause may lead to coronary heart disease	78	78	22	22	0	0.0
17- One of the causes of stroke is lipid deposition in cerebral blood vessels	71	71	29	29	0	0.0
18- Decrease fat intake in the diet may prevent coronary heart diseases	39	39	31	31	30	30
19- Exercise may prevent CVDs	34	34	26	26	40	40
20- Symptoms of cerebrovascular stroke are numbness of the arm, face & foot	70	70	10	10	20	20
21- Smoking leads to coronary heart diseases	34	34	24	24	42	42
22- A family history of CVDs increases the risk of heart disease	40	40	36	36	24	24
23- Preeclampsia increases the risk of heart diseases	70	70	28	28	2	2
24- Hereditary is an important factor in having heart diseases	47	47	22	22	31	31
25- Heart diseases & stroke may lead to the death of the woman	12	12	8	8	80	80
Total Mean score	**6.94 + 4.71**					

Figure (2): Distribution of The Study Sample Regarding Level of Knowledge about CVDs
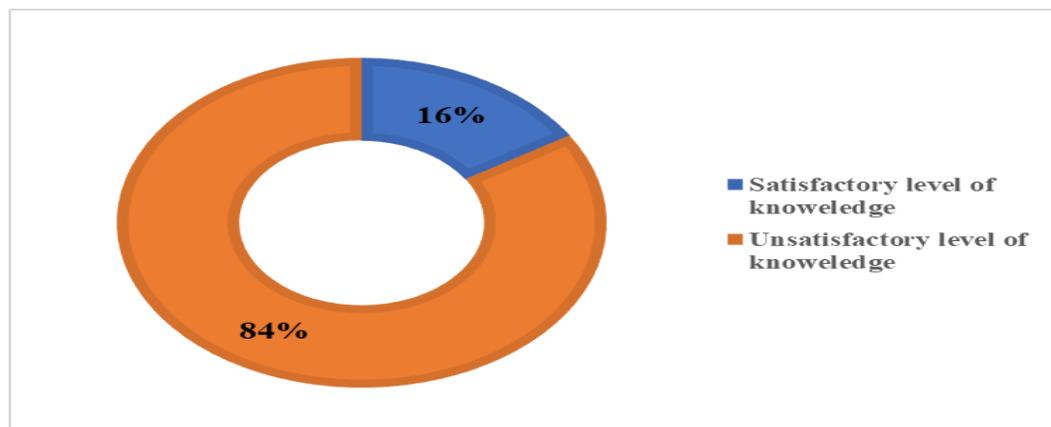

Table (4): Distribution of the study sample regarding Beliefs of Cardiovascular Disease (CVDs) (n=100)

Variables	Strongly Disagree (1)		Disagree (2)		Neutral (3)		Agree (4)		Strongly Agree (5)	
	No.	%	No.	%	No.	%	No.	%	No.	%
1. There is a possibility that I have heart disease	30	30	40	40	22	22	5	5	3	3
2. There is a good chance will get heart disease during the next 10 years	44	44	30	30	26	26	0	0.0	0	0.0
3. A woman who gets heart disease has no chance of being cured.	5	5	9	9	77	77	8	8	1	1
4. I have a high chance of getting heart disease because of my pregnancy-induced hypertension	28	28	25	25	42	42	5	5	0	0.0
5. I have a high chance of heart disease because of my family history	4	4	10	10	65	65	20	20	1	1
6. I am not doing anything now that is unhealthy to my heart	6	6	25	25	30	30	35	35	4	4
7. Young women don't have heart diseases due to pregnancy	17	17	5	5	23	23	20	20	35	35
8. Preeclampsia is a dangerous risk factor for heart disease	14	14	41	41	27	27	17	17	1	1
9. Keeping blood pressure level normal decreases the chance of having heart diseases	3	3	16	16	72	72	8	8	1	1
10. Follow-up after labor is important to control blood pressure	1	1	15	15	77	77	5	5	2	2
11. I am too young to get heart diseases	4	4	3	3	25	25	28	28	40	40
12. Hypertension during pregnancy continues after labor and may cause heart diseases	5	5	4	4	51	51	21	21	19	19
13. My body can resist heart disease and stroke	6	6	2	2	29	29	16	16	47	47
14. I have no fear of getting heart diseases	37	37	5	5	14	14	12	12	32	32
15. Women who have preeclampsia can reduce their chance of having heart disease if they keep their blood pressure normal	4	4	26	26	66	66	3	3	1	1
16. Women who have preeclampsia & have healthy dietary habits will decrease their chance of having heart diseases	1	1	7	7	70	70	21	21	1	1
17. My lifestyle habits don't put me at risk of getting heart diseases	6	6	2	2	47	47	11	11	34	34
18. If I'm going to get heart disease, I will get it	5	5	9	9	15	15	38	38	33	33
19. My age and my health condition aren't risks of heart diseases	11	11	4	4	27	27	27	27	31	31
20. The causes of heart disease are unknown	22	22	17	17	34	34	8	8	19	19
Total mean score					$50.20 + 9.52$					

Figure (3): Distribution of the Study Sample Regarding Beliefs of CVDs
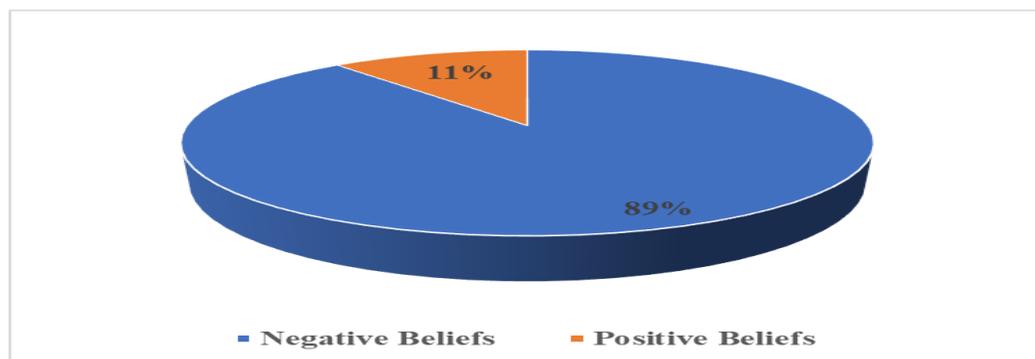
Table (5): Correlation between Women's knowledge score and Beliefs score toward CVDs.

Variables	Knowledge score	
	Pearson Correlation	**Sig. (2-tailed)**
Believes score	.314	.0001**
**. Correlation is significant at the 0.01 level (2-tailed).		

Discussion

The American Heart Association has listed preeclampsia as a risk factor for CVD, and several countries now recommend lifestyle interventions and preventive measures after preeclampsia to reduce the risk of future CVD. Some studies indicate that women with previous preeclampsia are not aware of the increased risk of CVD later in life **(Nielsen, et al., 2022).** Therefore, the study aims to assess pre-eclamptic women's knowledge and beliefs about the risk of cardiovascular disease. The frame of reference regarding the discussion is as follows; pre-eclamptic women's knowledge about the risk of cardiovascular disease, pre-eclamptic women's beliefs of the risk of cardiovascular disease, and the correlation between women's knowledge and beliefs score toward CVDs.

Pre-eclamptic women's knowledge about the risk of cardiovascular disease.

The present study results indicated that the majority of the study sample had poor knowledge level regarding CVDs, less quarter of them had fair knowledge and none of them had a good level of knowledge. The findings of the current study agreed with **Eze et al., (2018)** who reported that, in a study on Determination, knowledge, and prevalence of pregnancy-induced hypertension/eclampsia among women

of childbearing age at Same District Hospital in Tanzania, two-thirds of women had poor knowledge. Moreover, **Abd Elhafeez et al., (2023)** stated that, in a study on Health-Related knowledge of Coronary Artery Disease Patients, patients had an overall low level of CVD knowledge. In the same line with **Burgess & Feliu (2019)** who added that, in a study on improving the postpartum care of women with a recent history of preeclampsia: a focus group study, a majority of the women were unaware of the link between preeclampsia and CVD. Moreover, **Nielsen et al., (2022)** pointed out that, the majority of participants stated that they had a poor level of knowledge of the link between preeclampsia and future CVD. Also, **Roth et al., (2019)** illustrated that, in a study on, Preeclampsia and cardiovascular disease, the most of women in the study were unaware of the link between preeclampsia and CVD.   The finding of This study may be due to the low educational level of women and as Egypt is a developing nation that has a low structure in educating and improving pregnant women's awareness of their health problems.

The findings of the current study were consistent with the findings of **Beussink-Nelson et al., (2022)** who clarified that levels of CVD knowledge have been reported as low among almost all women. Also, **Fondjo et al., (2019)**

found that, in a study on Factors associated with patient understanding of pre-eclampsia, women had a poor level of knowledge and confusion about the implications of preeclampsia. Moreover, **Koenig & Hilfiker-Kleiner (2019)** stated that, in a study on women's perception of future risk following pregnancies complicated by pre-eclampsia. They found that women had low knowledge levels and confusion about the complications (CVD) of pre-eclampsia.

Pre-eclamptic women's beliefs toward the risk of cardiovascular disease

The current study results revealed that the majority of the women had negative beliefs regarding CVDs and the remaining had positive beliefs. This finding was inconsistent with **Guo et al., (2023)** who concluded in their study of cardiovascular disease risk perception among community adults that, the majority of subjects had moderate level of risk perception regarding CVDs. Advanced age, higher monthly income, and better health status were significantly related to higher perceived CVD risk. On the other hand, this finding of the current study is supported by **de Melo Ghisi et al., (2023)** who found in their systematic review of studies on preeclampsia and future cardiovascular risk; they concluded that there is low knowledge of the risk of CVD in women after pregnancy complications. To increase this knowledge and self-management there is a strong need for education designed and tested intervention programs provided for those women.

Regarding the correlation between women's knowledge score and belief score toward CVDs

The present study results showed that there is a highly statistically significant correlation between women's knowledge and risk perception scores toward CVD. This finding was supported by **Maffei et al., (2022)** who clarified that CVDs knowledge was a significant predictor of CVDs risk perception. Their findings highlighted the low perception of cardiovascular risk in Italian women and suggested a crucial need to boost knowledge and perception of CVD risk in women as a serious health problem as well as a life-threatening threat.

Conclusion

The current study concluded that 84% of the study sample had an unsatisfactory level of knowledge, and 89.0% of them had negative beliefs about the risk of cardiovascular disease among pre-eclamptic women. Also, the study findings show that there is a highly statistically significant correlation between women's knowledge and belief scores toward CVDs (P<0.01).

Recommendations:

Based on the findings of this study, the following are recommended:

1- Increase awareness about the risk of cardiovascular disease among preeclamptic women.

2- Further study is to examine the effect of instructional programs on the level of knowledge and perception regarding cardiovascular diseases among preeclamptic women.

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