



## **Impact of the teaching program on cardiac disease women's knowledge, practice, and their pregnancy outcomes**

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### **Abstract**

**Background:** A group of diseases affecting the heart and blood arteries is known as cardiovascular disease. Pregnancy-related Cardiac disease is a significant global problem, especially in underdeveloped nations. The risk of complications for both the mother and the fetus is increased when cardiac disease is present. Health education refers to programs that can delay the occurrence of this complication and improve pregnant women's knowledge, practice, and pregnancy outcomes.

**The aim:** To evaluate the Impact of the Teaching Program on Cardiac disease women's knowledge practice and their pregnancy outcomes.

**Research Design:** The design was quasi-experimental.

**Setting:** Conducted at the antenatal inpatient department and antenatal outpatient clinics on Maternity and Child at Minia University Hospital.

**Tools:** The first tool is the Structured Interview Questionnaire Sheet; the second tool is the Self-reported Practice Checklist the third tool is a Self-reported Attitude on cardiac disease; and the fourth tool is pregnancy outcomes.

**Results:** This study main findings revealed that 100% of the studied women had an unsatisfactory level of knowledge and practice regarding cardiac disease in the pre-test, while after the application of the teaching program, it was noted that there was high variation enhancement in their knowledge as well as practice related to cardiac disease, compared to pre-test ( $p < 0.001$ ). In addition, statistically significant improvements in pregnancy results among the study group post applying the teaching program compared to the control group ( $p < 0.001$ ).

**Conclusion:** The implementation of teaching program for pregnant women with cardiac disease was effective and showed significant improvements in the overall pregnant women's knowledge and practice about cardiac disease. Also, there were statistically significant improvements in pregnancy outcomes among the study group after applying the teaching program compared to the control group.

**Recommendation:** Continue the educational program and Special Standardized Booklet provided for pregnant women about cardiac disease and its management to decrease maternal as well as neonatal mortality and morbidity.

**Keywords:** Cardiac disease, pregnancy outcomes, teaching program.

### **Introduction**

Cardiovascular disease continues to be the primary reason for morbidity as well as mortality among pregnant women each year [1]. Pregnancy-related cardiac illness increases the risk of major morbidity, involving heart failure, stroke, and cardiac arrhythmia, additionally to maternal death. Neonatal morbidity and mortality from fetal growth retardation and prematurity are significantly elevated, indicating that the fetus is not spared. Twenty to twenty-eight percent of pregnancies in women with heart disease result in an adverse neonatal outcome [2].

Consultation and cooperation with a cardiologist who is familiar with the physiological alterations brought on by pregnancy are typically necessary for cardiac disorders. In

the previous 20 years, we have gained a better awareness of pregnancy risk and how to treat pregnant women with heart disease [3].

The first step in creating a risk index to forecast the possibility of maternal cardiac problems using maternal clinical examination and echocardiographic information collected via the baseline antepartum visit was described by the multicenter CARPREG (Cardiac Disease in Pregnancy Study) [4]. Throughout a typical pregnancy, the mother's cardiovascular system experiences numerous alterations that put physiological stress on the heart [5].

Nurses have a crucial role in overseeing the care of females with cardiac conditions via pregnancy as well as childbirth. This involves closely monitoring labor's progress and

promptly identifying potential complications to accomplish optimal results for both the woman and the neonate [6]. during labor and delivery, the nurse plays an important role in the healthcare team, particularly in high-risk cases. Hemoglobin and arterial oxygen saturation are regularly included in assessing a patient in labor with cardiac issues. Assessment of maternal blood pressure and cardiac function. Continuous fetal heart rate monitoring (FHM) is typically advised as the standard of care for pregnant women in labor who have cardiac issues [6].

Pregnant mothers are motivated to adopt healthy practices in their daily lives through education that employs effective teaching strategies. Teaching mothers about cardiac disease care and improving the nurse's role can lead to better knowledge, practice, and outcomes for both the women and the fetus via the pregnancy period [7].

### Significance of the study

The World Health Organization (WHO) approximates that cardiovascular disease affects approximately 1-4% of pregnant women globally. The incidence of maternal death in South Africa is increasing, with heart status actually responsible for forty-one percent of indirect fatalities [8].

Obstetricians face a challenging task when it comes to managing pregnant females with cardiac disease in Egypt. The factors that contribute to the delay in taking action to reduce the risks and complications of the disease include a lack of awareness among the general public about the essential of antenatal follow-up, low involvement of nurses' staff in antenatal units, a lack of effective communication between various specialties, and a reduce of easily accessible facilities for communication in government hospitals. Thus far, the studies conducted in Egypt have primarily focused on the medical aspects of cardiac disease during pregnancy [9].

In Egypt, the incidence of pregnant females with cardiac disease was 9.3%, according to a study conducted by [9]. In Egypt, 16% of maternal fatalities result from cardiovascular conditions occurring during pregnancy. Cardiac disease via pregnancy ranks as the 4<sup>th</sup> most prevalent reason for maternal death, as indicated by the given percentage [10].

From 2020 to 2021, cardiac disease was the primary reason for death during pregnancy in the USA, accounting for 15.5% of all pregnancy-related deaths [11]. Between 2008 and 2019, the United Kingdom experienced a significant raising in the rate of maternal deaths related to cardiac disease, with the number rising from 1.0 to 2.3 per 1,000 pregnancies [12]. Cardiac disease in pregnancy has been the primary reason for indirect maternal deaths in Australia for nearly half a century [13], and it is frequently responsible for maternal deaths occurring later in pregnancy.

### Aims of the study

**This study aims to** evaluate the Impact of the teaching Program on cardiac disease women's knowledge, practice, and pregnancy outcomes.

### Research hypotheses

- **H<sub>1</sub>:** Pregnant women who received the teaching program will improve their knowledge and practice of cardiac disease.
- **H<sub>2</sub>:** There will be significant association between

women's knowledge with their practices regarding the care of cardiac disease.

- **H<sub>3</sub>:** There will be significant association between pre-test knowledge and practice scores of women with their selected socio-demographic characteristics regarding care of cardiac disease.
- **H<sub>4</sub>:** Pregnant women who received teaching program will show improvement in their pregnancy outcomes.

### Subject and Methods

**Research Design:** A quasi-experimental research design (two groups pre-test, post-test) was used to achieve the aim of this study.

**Research Setting:** This research was performed at the ante natal inpatient department and ante natal outpatient clinic of Maternity and Child Minia University Hospital (MCMUH).

**Sample:** A Purposive sample was taken in this study. The total sample was 60 pregnant women (30 women case group 30 women control group).

### Inclusion criteria

Cardiac disease Pregnant women with grades I and II, Cardiac disease Pregnant women in the 2<sup>nd</sup> and 3<sup>rd</sup> trimester, and women who are willing to participate.

### Data Collection Tools

The data was gathered via three tools.

### Tool I: Structured Interview Questionnaire Sheet

The researcher created it post reading the relevant literature. Its objective was to evaluate the women's understanding of heart disease. It was divided into three sections:

- **Part 1:** Socio-demographic characteristics of the subjects as: (age, residence, educational level as well as previous knowledge).
- **Part 2:** Pregnancy history, which includes (past history, current history, and medical history).
- **Part 3:** The knowledge assessment tool was constructed by [14] and adjusted by the researcher depending on an extensive literature review to assess women's knowledge regarding cardiac disease pre- and post-teaching program. The questionnaire had 24 questions. The first four questions asked about cardiac disease definition, signs and symptoms of cardiac disease, grades of cardiac disease, and types of cardiac disease. The second five questions asked about risk factors that increase the occurrence of cardiac disease and what the effect of family history, being overweight, stress, hypertension, and smoking on the risk of occurrence the cardiac disease. The 3<sup>rd</sup> five questions asked about complications and dangerous times in cardiac disease in pregnant women, and the last ten questions asked about diagnosis and treatment of cardiac disease.

### Scoring System

The women's responses were scored as well as calculated. All correct and complete answers were counted as one score, and all incorrect answers were counted as Zero as the total knowledge score and divided into sixty percent, or

more mean satisfactory knowledge score, and low sixty percent mean unsatisfactory knowledge score<sup>[15]</sup>.

### **Tool II: Self-reported practice checklist**

It was adopted from<sup>[16, 17]</sup> and changed by the researcher. It contains three parts, and this was collected pre- as well as post teaching program. The first part of Women's practice regards the aspect of care; it involves many items about 1) nutrition, 2) exercise, 3) sexual activity, 4) the danger signs via pregnancy, 5) Protection from infection and breastfeeding, the second part contains checklist to teach women how to give herself Subcutaneous Injection such as (clexane and Heparin), Third part contains checklist to teach women how to assess pitting edema.

### **Scoring System**

For the first part, women's "answered practices were scored (one) for the "satisfactory reported practices as well as (Zero) for "unsatisfactory" reported practices. Summed the statements of practices, as well as total score level, were classified into the following: equal fifty percent or more if satisfactory practices and less than fifty percent if unsatisfactory practice. For the second and third parts, each done correctly was coded (one) score; done incorrectly and not done was coded (Zero) score summed the items of practices for the second and third parts separately, and the total score level was classified into the next; equal fifty percent or more if satisfactory practices and less fifty percent if unsatisfactory practices, Summed the statements of practices of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> part and final score level were classified into the next; equal fifty percent or more if satisfactory practices and less fifty percent if unsatisfactory practices<sup>[18]</sup>.

### **Tool III: Pregnancy outcomes assessment tool**

It was created from<sup>[20]</sup> was included (9 items). Which was designed to assess maternal outcomes (4 items) and assessment of neonatal outcomes (5 items). Assessment for maternal results was involved (mode of delivery, gestational age at delivery, maternal consequences during labor, post-partum complications, and maternal death), and assessment for fetal outcomes were included (birth weight, stillbirth, Apgar score, congenital anomalies, fetal complication such respiratory distress syndrome and fetal death<sup>[21]</sup>.

### **Supportive material Health education guideline Booklet**

The researcher updated a comprehensive literature review, and then the final result was made into a handout (booklet). That was given to the woman via the teaching session and was kept for later use; this booklet included all necessary information about cardiac diseases, such as (definitions, classifications, signs as well as symptoms, risk factors, types, consequences of cardiac disease, ante-natal follow-up, lifestyles such as a healthy diet, exercise, rest, stress management, practice and precautions during labor, post-partum period, breastfeeding and contraceptive method, checklist to teach woman subcutaneous injection and how to assess pitting edema. It was written in straightforward Arabic and accompanied by various descriptive photographs to improve Cardiac disease women's Awareness and their pregnancy outcomes.

### **Validity and Reliability**

To evaluate the questionnaire's clarity, relevance, comprehensiveness, comprehension, applicability, and convenience of use, five obstetrics and gynecology doctors and nursing professors piloted it. The instruments have been modified as needed. In order to determine reliability, the tools' internal consistency was examined using Cronbach's alpha test, which yielded results of 0.841 for the knowledge tool and 0.791 for the practice tool.

### **Administrative design**

The dean of the faculty and the director of the hospital gave their formal approval and agreement prior to the pilot trial and the full study. The faculty of nursing's ethical committee gave its approval to the research idea.

### **Pilot Study**

The current study tools were evaluated in terms of their clarity, validity, and the time required to be used in a pilot study that was carried out on ten percent of pregnant women (six women) in the environment that was just described. The necessary adjustment was carried out after the pilot project findings were analyzed. The pilot sample was incorporated into the primary sample for the investigation.

### **Data collection Procedure**

Four phases were used to accomplish the current study: preparatory, assessment, implementation, and evaluation.

#### **1. Preparatory phase**

- This stage involves the researcher creating the study aids and the instructional program after conducting a thorough analysis of recent relevant literature. Arabic was the language used to write it. The essential facts about heart disease and its treatment were covered in the lesson plan.
- The general aim of the teaching program is to enhance women's knowledge, practice, and pregnancy outcomes regarding cardiac disease. Teaching aids that were used included visual materials such as photos and a personal laptop; dolls were used. The booklet was ready and written in simple Arabic language backed up by illustrative images used to facilitate the process of teaching after returning home.

#### **2. Assessment phase (the pre-test)**

- Participants' patients were sourced from Minia University's maternity and pediatric antenatal inpatient department and antenatal outpatient clinic following formal approval from the College of Nursing's ethical study council.
- The researcher started the assessment phase by introducing herself, greeting each woman, and explaining the objectives, nature, time, and activities of the research. She also informed the women that sharing in the research was voluntary and that they could withdraw at any time. Finally, she obtained oral consent from the patients to share in the study.
- The researcher explained the assessment tool question and provided an overview to the women after they agreed to participate in the study.
- In order to evaluate the patient's demographics, medical histories, and women's understanding of heart disease,

the researcher used a structured interviewing questionnaire (Tool I), which took 20 to 25 minutes to complete. The researcher next evaluated the women's practices in terms of subcutaneous injection, pitting edema assessment, and informatics aspects of care using a simulation model (Tool II) (Pre-test). The filling time (Tool II) was between 10 and 15 minutes.

### 3. Implementation phase conducting education program

- The researcher gathered the sample during three days/week in two shifts (morning and evening) from the starting of the research. The research was performed in the duration from January 2023 through October 2023. The researcher went to an ante natal inpatient ward and an antenatal outpatient clinic from 9:00 a.m. to 1:00 p.m.
- In this phase, post assessing the women's knowledge as well as practice (pre-test), The teaching program of this study was implemented through four sessions for each group (1 to 2 pregnant women), two sessions for knowledge and two sessions for practice.
- The teaching program was applied individually for each patient on four sessions.
- The first session ranged between 30-40 minutes; the researcher explained the Arabic booklet. Regarding the explanation of the concept, causes as well as risk factors, various types, and complications of cardiac disease via pregnancy.
- The second session ranged between 30-40 minutes; the researcher explained follow up and antenatal schedule visits, diagnosis as well as management of cardiac disease via the pregnancy.
- In the third session, the researcher used dolls, PowerPoint videos, and pictures to teach women how to inject their self-anticoagulation drugs such as calexane or heparin ampules.
- In the fourth session, the researcher used doll PowerPoint videos and pictures to teach women how to measure or assess pitting edema.
- The length of the last third and fourth sessions, different according to women's responses, lasted for around 30-60 minutes.
- The face-to-face approach accomplishes the purposeful aim and gives the women the chance to pose questions, have discussions, and achieve a high degree of understanding.
- Various instructional strategies were employed, such as discussions in small groups, demonstration & re-demonstration on simulation mode (leg doll, Abdominal doll), and using videos. Also, an Arabic booklet with images was given to every woman. Motivation, as well as reinforcement during a session, were used to enhance women's learning; at the end of the sessions, (10 minutes) were assigned for the pregnant women to make sure the women received the most benefits possible by asking any questions and

getting feedback.

### 4. An evaluation phase the post-test

#### Each woman underwent assessment four times

- Using tools I and II, the first evaluation (pre-test) was conducted prior to the start of the educational program to gauge the women's understanding and behavior around heart disease for the control and research groups.
- Immediately following the execution of the study group's educational program, a second-time evaluation (post-test) was conducted using tools I (part three) and II (parts two and three) to assess the influence of the teaching program on the women's knowledge and practice about heart disease.
- After two months, a third evaluation (post-test) was conducted for the study group using tools I (part three) and II to assess the influence of the training program on the women's understanding and behavior related to heart disease.
- Tool III was used for the fourth evaluation of the affect of the instruction program on the pregnancy outcomes of the study and control groups following delivery.
- The pre-test as well as post-test results, which were taken immediately and two months later, as well as the outcomes following delivery, were compared to evaluate the women's knowledge as well as practices related to the heart illness and the outcomes of their pregnancies in order to determine the impact of the health education program.

#### Ethical consideration

The study is formally approved when the pregnant women who are willing to participate have been informed of its significance, nature, and goal. There were no health hazards, privacy was taken into consideration during data collection, and all women had the freedom to refuse to participate and/or withdraw from it at any period without providing a reason. Participants received guarantees that all of their data would be treated with the utmost confidentiality.

#### Statistical analysis

The statistical package SPSS, version 26 (IBM; Armonk, New York, USA), was used to organize, tabulate, present, and analyze the data. The Shapiro-Wilk tests were used to determine whether the data was normal. The mean and standard deviation (SD) were used to display numerical data. The parametric data was statistically analyzed using the student t-test. For non-parametric data analysis, the Mann-Whitney test was employed. Numbers and percentages were utilized to represent categorical data, and statistical analysis was done using the Fisher exact test or the chi-squared test. In order to compare numerical variables, correlations were created for the study. For this investigation, a significance level of  $p < 0.05$  was chosen.

#### Results



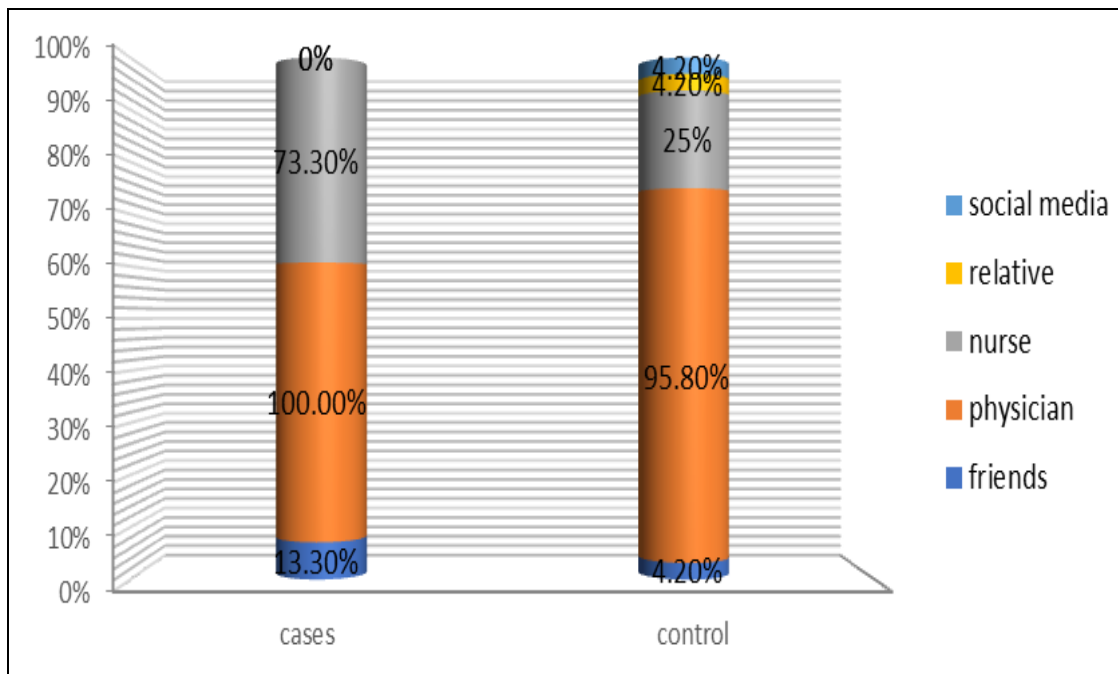
**Table 1:** Distribution of study samples related to their socio-demographic characteristics

Socio-demographic characteristics (Part-I)		Study Group (N= 30)		Control (N=30)		P-Value
		N	%	N	%	
Age	Less than 25	6	(20%)	4	(13.3%)	0.815
	25-35	19	(63.3%)	22	(73.3%)	
	More than 35	5	(16.7%)	4	(13.3%)	
Residence	Urban	6	(20%)	11	(36.7%)	0.152
	Rural	24	(80%)	19	(63.3%)	
Educational level	Illiterate	7	(23.3%)	13	(43.3%)	0.027**
	Read and write	1	(3.3%)	5	(16.7%)	
	Diploma	16	(53.3%)	10	(33.3%)	
	University education	6	(20%)	1	(3.3%)	
	Others	0	0%	1	(3.3%)	
Mother Occupation	Housewife	29	(96.7%)	29	(96.7%)	>0.999
	Employed	1	(3.3%)	0	0%	
	Unemployed	0	0%	1	(3.3%)	

Analyzed by chi-square test \*\*Fisher test ; Mann Whitney test  
\*p-value is considered statistically significant at < 0.05

Table 1 shows that 63.3% of the study group and 73.3% of controls were aged from 25-35 years. 80% of the study group & 63.3% of controls lived in rural areas. 96.7% of the study group & 96.7% of the controls were housewives. There is a statistically significant difference between the

study group and controls regarding educational level ( $p < 0.005$ ). The majority of the study group (53.3%) have diploma, while the majority (43.3%) of controls were illiterate.



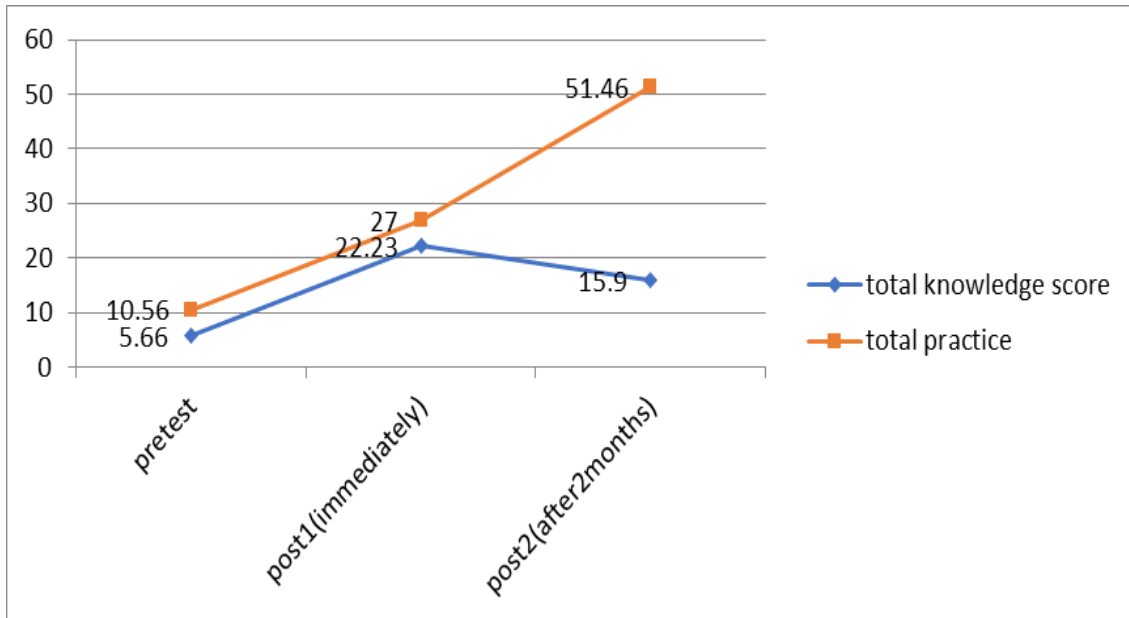
**Fig 1:** Source of information among study group and controls about cardiac disease

Fig 1 shows that friends were the source of knowledge in 13.3% of the study group & 4.2% of controls, from physicians in 100% of the study group & 95.8% of the control, from nurses in 73.3% of the study group & 25% of controls, from relatives; only in 4.2% of controls. None of the study group, compared to 4.2% of the control, knew from social media.

Fig 2 shows that the teaching program was effective in increasing the scores of knowledge and practice among the studied women; although the knowledge scores declined

after 2 months, they remained satisfactory compared to the pre-test scores.

Table 2 Reveals that there is a relation between the educational level of the mother and the total practice score in the pre-test stage ( $p < 0.042$ ) the higher the educational level of the mother, the higher become the practice score. Also, there is a relation between the residence and the total practice score ( $p < 0.029$ ) urban residence is associated with high practice score.



**Fig 2:** The effect of the teaching program on total knowledge & practice score among the studied women

**Table 2:** The relation between the socio-demographic characteristics of the studied women (study group) and the total knowledge& practice score pre-program

Socio-Demographic Characteristics	Total Knowledge Score		Total Practice Score	
	Mean ±SD	P value	Mean ±SD	P value
<b>Age</b>				
<25	6.16±2.48	0.787	4.5±3.01	0.513
25-35	5.63±2.52		2.89±2.94	
>35	5.2±2.58		2.6±2.79	
<b>Residence</b>				
Urban	7.83±3.76	0.093	4.16±3.12	0.029*
Rural	5.12±1.72		2.91±2.87	
<b>Educational level</b>				
Illiterate	4.57±2.07	0.192	1.71±2.42	0.042*
Read and write	5±0		9±0	
Diploma	5.37±1.96		2.62±2.33	
University	7.83±3.25		5.33±3.07	
Others	0±0		0±0	
<b>Mother Occupation</b>				
Housewife	5.58±2.45	0.243	3.06±2.91	0.258
Employed	8±0		6±0	
unemployed	0±0		0	

\* Analyzed by independent t-test and ANOVA test  
 \*P-value is considered statistically significant at <0.05

**Table 3:** Distribution of the women regarding their pregnancy (maternal) outcomes among study and control groups

Pregnancy Outcomes		Study Group, N%	Control, N%	P-Value
<b>Maternal outcome</b>				
Gestational age at delivery	(>37 weeks)	21(70%)	4(13.3%)	<0.001*
	(<37 weeks)	9(30%)	26(86.7%)	
Mode of delivery	Normal	20(66.7%)	30(100%)	0.001*
	Instrumental	0	0	
	Cesarean section	10(33.3%)	0	
	Emergency C section	0	0	
Maternal complications during Labor	No complication	27(90%)	2(6.7%)	<0.001**
	Heart failure	1(3.3%)	8(26.7%)	
	arrhythmia episode	1(3.3%)	11(36.7%)	
	Pulmonary embolism	1(3.3%)	0	
	Hypertensive crisis	0	9(30%)	
	Mitral stenosis	0	0	
	other	0	0	
Post-partum Maternal complications	No complication	25(83.3%)	2(6.7%)	<0.001*
	Post-partum hemorrhage	5(16.7%)	28(93.3%)	
	Maternal death	0	0	
	others	0	0	

\* Analyzed by chi square test \*\*fisher test \*p-value is considered statistically significant at < 0.05

Table 3 illustrates that the nursing teaching program was effective in improving maternal outcomes and reducing the incidence of preterm labor; 70% of the gestational age of the study group was >37 weeks, while 86.7% of the controls were <37 weeks. 66.7 % of the study group had normal vaginal delivery compared to 100% of the controls. The program was effective in reducing maternal complications

during labor; 3.3% only had heart events, 3.3% had arrhythmia, and only 3.3% had pulmonary embolism, while in the control group, 36.7% of the patients had life-threatening arrhythmia. 16.7% of the study group had post-partum hemorrhage compared to 93.3% of the controls and there were highly statistically significant differences between the study and control groups as P-Value < 0.001\*.

**Table 4:** Distribution of the women regarding their pregnancy (Fetal) outcomes among study and control groups

Pregnancy outcomes	Study Group, N%	Control, N%	P-Value	
<b>Fetal outcome</b>				
Birth weight (g) at delivery	<1000	2(6.7%)	6(20%)	<0.001**
	1000–1500	1(3.3%)	22(73.3%)	
	1500–2500	10(33.3%)	2(6.7%)	
	>2500	17(56.7%)	0	
Low Apgar score	Low	12(40%)	25(83.3%)	0.001*
	Normal	18(60%)	5(16.7%)	
Fetal morbidity	No morbidity	19(63.3%)	1(3.3%)	<0.001**
	RDS	11(36.7%)	28(93.3%)	
	anomalies	0	1(3.3%)	
Stillbirth	No	30(100%)	28(93.3%)	0.492
	Yes	0	2(6.7%)	
Neonatal death	No	30(100%)	27(90%)	0.237
	Yes	0	3(10%)	

\* Analyzed by chi square test \*\*fisher test \*p-value is considered statistically significant at < 0.05

Table 4 illustrates that the nursing program was effective in improving the fetal outcome and reducing fetal mortality; 56.7% of the birth weight of the delivered babies of the study group was >2.5kg, while 73.3% of the controls were 1- 1.5kg there were highly statistically significant

differences between the study and control groups as p-value < 0.001\*. 40% of the babies of the study group compared to 83.3% of control were considered with low Apgar score. 36.7% of the babies in the study group had RDS compared to 93.3% of the controls.

**Table 5:** Correlation between knowledge, total practice in pre-test stage

Factor	Practice Score	
	R	P
Knowledge score	0.533	0.002*

P-Value is considered statistically significant at < 0.05

Table 5, this represents that there is moderate positive correlation between knowledge score and practice score in the pre-test stage (r=0.533, P=0.002).

**Discussion**

The actual research aimed to evaluate the impact of the teaching Program on cardiac disease women’s knowledge, practice, and their pregnancy outcomes. The impact of cardiovascular diseases on pregnant women is a growing concern, as these conditions pose significant risks to both maternal as well as fetal. Health Education and awareness programs have the potential to play an essential role in improving the knowledge, practice, and health outcomes for these women.

Regarding the socio-demographic characteristics of the women in this study, it was found that less than two-thirds of the study group and below three-quarters of the control group were aged 25-35 years. This finding aligns with [22]. Who investigated pregnancy results among women with cardiac disease and reported a higher occurrence of pregnancy-related cardiac problems in this age range. They attributed this to both increased reproductive activity and elevated cardiovascular risk. Furthermore [23]. Who agree with the current result and revealed that over half of

pregnant mothers within this age group .However, [24], in their study of pregnancy outcomes in women with heart disease at a tertiary referral center in Northern India, observed a greater prevalence of cardiac conditions in older pregnant women. These contrasting findings suggest that regional healthcare availability and lifestyle factors may contribute to age-related differences in pregnancy-related cardiac risk.

Additionally, a significant proportion of participants in both the study as well as control groups were housewives, a result consistent with the findings of [25], who explored urban-rural variation in the cardiac disease pregnancy-regard adverse outcomes. Their research indicated that housewives, particularly those in rural settings, face heightened risks of adverse pregnancy outcomes. This suggests that socio-economic factors, particularly in rural areas, play a pivotal role in health-seeking behaviors and access to prenatal care. The rural residence of many participants in this study further underscores the limited access to specialized healthcare, particularly for managing pregnancy complicated by cardiac conditions. Educational levels also revealed significant variation between the study as well as control groups. A larger proportion of women in the study group held a diploma,

while a greatest percentage of the control group was illiterate. This result aligns with the research conducted by [26], who reported that higher education levels are connected with elevation awareness of pregnancy-related cardiac risks and better health-seeking behaviors. Education thus plays a critical role in shaping health outcomes via the pregnancy, particularly in the context of managing pre-existing conditions such as heart disease.

Concerning the sources of information about cardiac disease among pregnant women in this study, it was found that physicians were the primary source of knowledge for both the study group as well as the control group. The entire study group, along with the majority of the control group, relied on physicians for information regarding cardiac conditions. This finding reflects the well-established role of physicians as the most trusted source of medical advice, particularly in high-risk pregnancies. It underscores the critical importance of physician-patient communication in the management of cardiac health during pregnancy. This result is consistent with findings from [27], who reported that over 90% of pregnant women preferred consulting physicians for information related to cardiac conditions during pregnancy.

In addition, this finding is supported by [28], who emphasized that while physicians are the primary source of cardiac health information, nurses also play a vital role in raising awareness about maternal cardiac conditions, particularly in clinical settings. However, this trend contrasts with findings by [29], who noted the growing role of social media as a source of pregnancy information. Although social media is emerging as a resource, it remains secondary to professional healthcare advice, especially for complex conditions like cardiac disease.

Concerning the overall impact of the teaching program on the total knowledge and practice scores of the studied pregnant women, the current study demonstrated a highly statistical variation enhancement in all three areas post-intervention ( $p < 0.001$ ). This finding echoes the results of [30], who reported significant improvements in knowledge, attitude, and self-care practice management among pregnant women with cardiac conditions following an educational program. Their research reinforced the idea that increased knowledge and skills contribute directly to more positive attitudes and better health practices.

The results of the actual study are corroborated by the research of [31], which looked at how pregnant women's knowledge and self-care behaviors were affected by an educational intervention. Their research also showed notable gains in knowledge as well as practice scores post-intervention, confirming the value of focused health education in enabling expectant mothers to take charge of their chronic health.

In contrast, [32] found minimal changes in knowledge levels despite educational efforts, suggesting that external factors such as cultural beliefs and personal experiences may play a significant role in shaping health behaviors. This discrepancy indicates the complexity of educational interventions and the importance of considering contextual factors that may influence their success in different populations.

The current study explored the relation between the socio-demographic data of the pregnant women in the study group

and their total knowledge as well as practice scores regarding cardiac disease pre-educational intervention. A significant relation was found between the educational level of the women and their total practice scores in the pre-test stage ( $P = 0.042$ ), with higher educational levels correlating with better practice scores. Additionally, there was a significant connection between the participants' residence and their practice scores ( $P = 0.029$ ), with urban dwellers showing higher practice scores compared to rural participants. These findings suggest that socio-demographic factors, particularly education and residence, play a crucial role in shaping health practices related to managing cardiac conditions during pregnancy.

This result aligns with the study by [33], who highlighted the significant impact of demographic variables such as education and residence on health practices, similar to the correlation observed in the current study. Similarly, [34] found a strong correlation between educational level and health practices in pregnant women with heart disease, emphasizing that women with higher educational attainment were more likely to engage in effective health practices.

However, contrasting findings were reported by [9], who did not find a significant connection between educational level and health practices among pregnant women with cardiac conditions. Their research suggested that while education may be an important factor, other variables such as health literacy, access to healthcare, and individual motivation might also influence health behaviors, highlighting the multifaceted nature of health practices.

In terms of pregnancy outcomes between the study as well as control groups, the present study demonstrated the effectiveness of the nursing teaching program in improving maternal outcomes and reducing the incidence of preterm labor. Low three-quarters of the study group reached a gestational age of over 37 weeks, while most of the control group had preterm births at less than 37 weeks. Additionally, two-thirds of the study group had normal vaginal deliveries compared to 100% of the control group having preterm deliveries, with statistically significant variation between the groups ( $p < 0.001$ ). These findings suggest that the nursing education program significantly enhanced maternal outcomes, likely due to increased awareness, self-management skills, and better pregnancy navigation in women managing their cardiac conditions.

These results are supported by [35], who examined the effect of nursing educational interventions on maternal outcomes in women with high-risk pregnancies, including cardiac disease. Their study similarly demonstrated that women who received structured nursing education experienced significantly better maternal outcomes, including reduced rates of preterm labor and fewer complications such as arrhythmia and post-partum hemorrhage. The authors emphasized the critical role of education in helping women manage their cardiac conditions during pregnancy.

Moreover, the results agree with [36], who found that nursing teaching programs significantly improved maternal outcomes for women with cardiac disease. Their study reported a substantial reduction in adverse outcomes, such as preterm labor and life-threatening maternal complications, in the intervention group. These consistent findings across studies underscore the importance of structured educational interventions in promoting positive



maternal outcomes and improving the management of cardiac conditions during pregnancy.

The current study demonstrated that the nursing educational program was effective in enhancing fetal outcomes and reducing fetal mortality. More than half of the babies delivered in the study group had a birth weight greater than 2.5 kg, compared to less than three-quarters of the control group, whose infants weighed between 1 and 1.5 kg. The variation between the study and control groups was statistically significant ( $p < 0.001$ ). Additionally, two-fifths of the babies in the study group had low Apgar scores, in contrast to the majority of the control group. Moreover, more than one-third of the study group's babies experienced respiratory distress syndrome (RDS) compared to the majority of the controls.

These findings are approved by the study<sup>[37]</sup>, which showed that women who participated in structured nursing programs had babies with higher birth weights and significantly lower rates of neonatal complications, including low Apgar scores and RDS. Similarly,<sup>[38]</sup> found that maternal education positively influenced neonatal outcomes, leading to higher birth weights and fewer complications such as RDS.

In examining the correlation between knowledge as well as total practice scores regarding cardiac disease among pregnant women in the pre-test stage, this study found a moderate positive correlation between knowledge and practice scores ( $r = 0.533$ ,  $P = 0.002$ ). This finding is consistent with the results of<sup>[39]</sup>, who reported a similar moderate-to-strong positive correlation between knowledge and practice scores. This underscores the importance of knowledge acquisition as a critical factor in improving health practices among pregnant women with cardiac conditions.

### Conclusion

#### The current study's findings led to the following conclusions

Implementation of the teaching program for pregnant women with cardiac disease was effective and showed significant improvements in pregnant women's knowledge as well as practice pre- as well as post-implementation of the teaching program. Also, there were statistically significant improvements in pregnancy outcomes among the study group after applying the teaching program compared to the control group.

### Recommendations

#### The present study's findings suggest the following recommendations

- Giving a health teaching handout about cardiac disease and its related care on discharge plans, particularly for those who are illiterate. To raise the knowledge practice of cardiac disease women regarding these issues.
- Providing a training-oriented program about cardiac disease and its related care for women before the decision of pregnant and giving them help and assistance to care for themselves and their newborn
- A special Standardized Booklet regarding cardiac disease and its management should be available in the antenatal department.
- Continue the educational program for pregnant women about cardiac disease and its management to decrease

maternal as well as neonatal mortality and morbidity.

- Continue the educational program for nurses about cardiac disease and its related care.
- Educate the mothers on the importance of prenatal care visits and follow-up. Therefore, any problems can be identified early and treated.

### For further research

More research should be applied in other settings to generalize the findings.

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