Prevention of Pre-eclampsia among Pregnant Women in the Second Trimester in Rural Area

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Abstract

Background: Early identification of women at risk may help in prevention of preeclampsia and complications of this disease. **Aim of study**: the study aimed to assess prevention of preeclampsia among pregnant women in the second trimester. **Subjects and methods**: Design: Descriptive exploratory research design. Setting: The study was conducted at the selected maternal and child health centers affiliated to the Beni-Suef governorate, El-Wasta center that include 24 MCH centers. **Sample:** Purposive sample of 550 pregnant women was used. **Tools:** Two data collection tools were used to carry out the current study namely; Interviewing questionnaire tool, include Part I: concerned with demographic characteristics of the pregnant women. Part II: Assess pregnant women's knowledge about pre-eclampsia Part III: Assess indicators of pre-eclampsia among pregnant women. Part IV: Assess pregnant women's practices about the prevention of pre-eclampsia and risk factors assessment tool. **Results**: 56.8% of the pregnant women have unsatisfactory total knowledge about preeclampsia. Also, 91.8% of the pregnant women have satisfactory total practices regarding preeclampsia. 83.8% of them had normal body mass index as risk factor of preeclampsia and 98.8% of them had edema in their feet as indicator of preeclampsia. **Conclusion**: More than half of the pregnant women have unsatisfactory total knowledge about preeclampsia. Also, most of the pregnant women have satisfactory total practices regarding preeclampsia. Majority of the pregnant women had normal blood pressure as indicator of preeclampsia. Majority of the pregnant women had normal body mass index as risk factor of preeclampsia. **Recommendations**: Providing sufficient training for women regarding pre-eclampsia to enhance their knowledge, providing sufficient training for women regarding pre-eclampsia to enhance their performance.

Keywords: Prevention of preeclampsia, pregnant women, Second trimester.

Introduction

Preeclampsia is a hypertensive disorder that is associated with pregnancy, there is elevation in blood pressure" systolic blood pressure 140 mm Hg and diastolic blood pressure 90 mm Hg" and presence of proteinuria after 20 weeks' should be documented to be persistent over 2 determinations at least 4 hours apart, unless it is greater than or equal to 160 mm Hg systolic or greater than or equal to 110 mm Hg diastolic. This severe elevation may be confirmed in a shorter interval for prompt therapy. Proteinuria is defined as 300 mg of protein in 24 hours or there is protein/creatinine in urine this ratio of 0.3 mg/dL. Urine dipstick can only be used if the other methods are not available ***(Assis et al., 2018).***

Pre-eclampsia is associated with maternal effects that may lead to significant maternal morbidity and even mortality. It includes and not limited to intracerebral hemorrhage, transient blindness, and cardiorespiratory arrest. Permanent neurologic sequelae from brain ischemia or hemorrhage are the most common causes of maternal death, with the maternal mortality rate ranging from 0-14%. Not only pre-eclampsia effect on mother, but also effect on fetus, there is decrease in placental perfusion in pre-eclampsia result

in intrauterine growth restriction of the fetus and oligohydramnios. Perinatal death is primarily related to premature delivery, placental abruption, and intrauterine asphyxia. Fetal morbidity and mortality due to gestational age at the time of eclampsia ***(Coroyannakis & Khalil, 2019).***

There is clinical signs and symptoms of preeclampsia that involve many organs, such as the liver, kidneys, heart, lungs, brain, and systematically involve central nervous system that includes headache, visual disturbances and seizures, on the level of renal system includes proteinuria, oliguria, abnormal kidney tests and hypertension, vascular system includes severe hypertension, cardiorespiratory system includes chest pain, dyspnea, low oxygen saturation and pulmonary edema. Hepatic system includes abnormal liver function, epigastric pain, nausea and hematologic system includes hemorrhage, coagulation impairment, intravascular disseminated coagulation and shock ***(Cripe et al., 2017).***

A woman is at risk for pre-eclampsia if she has no more than one risk factors that involve antiphospholipid syndrome, previous pre-eclampsia, diabetes mellitus type I or II, multiple pregnancy, first pregnancy, familiar history of pre-eclampsia, BMI 35 Kg/m, maternal age <20 or >40 years old, chronic hypertension chronic autoimmune disease, venous thromboembolism, inter-gestational interval 10 years similar to multiple pregnancy and chronic kidney disease ***(Cuesta et al., 2019).***

Significance of the study

In Egypt, maternal mortality ratio is reported to be 45 per 100000 live births according to WHO. The incidence of hypertensive disorders in pregnancy is estimated to range between 3%-10% among all pregnancies. In Egypt 4.2% had pregnancy induced hypertension, 3.8 % had preeclampsia and eclampsia was 0.3%. Incidence of preeclampsia was reported in women aged more than 40 years ***(Gabal and Abousaif, 2017).***

Aim of the study

The aim of this study is to assess prevention of preeclampsia among pregnant women in the second trimester through:

1. Assessing pregnant women's knowledge about pre-eclampsia.
2. Assessing the risk factors of pre-eclampsia among pregnant women.
3. Assessing indicators of pre-eclampsia among pregnant women.
4. Assessing pregnant women's practices about the prevention of pre-eclampsia.

Research questions:

1. What is the pregnant women's knowledge about of pre-eclampsia?
2. What are the risk factors of pre-eclampsia among pregnant women?
3. What are the indicators for pre-eclampsia among pregnant women?
4. What are the pregnant women's practices for prevention of pre-eclampsia?
5. Is there a relation between knowledge of pre-eclampsia among pregnant women and their practices for prevention of pre-eclampsia?

Subjects and Methods

Research design:

A descriptive exploratory research design was used to achieve the aim of the current study.

Setting:

The current study was conducted at the selected maternal and child health centers affiliated to the Beni-Suef governorate, El-Wasta center that include 24 MCH centers. 25 % of them were selected randomly namely; Kiman Elaros, Etwab, Maymoun, Ebwat, Enfast and Elatf medical center. The Family Medicine Center includes a general outpatient clinic, a family planning clinic and a dental clinic, and children’s vaccinations unit. These centers provided services for women and their children such as measuring blood pressure, weight and height, do laboratory

investigations, and giving Tetanus injections, children vaccination pregnancy follow up, outpatient clinics, family planning and pharmaceutical services.

Subjects:

Purposive sample was used for this study. The total sample size of the pregnant women is estimated according to the statistical records of management of health center from 2016 to 2017. The total number of pregnant women in these medical centers was 4927 during the year, 10% was selected. Total sample size was 550 pregnant women.

Data collection tools:

Two data collection tools were used to carry out the current study namely; Interviewing questionnaire tool, and risk factors assessment tool.

First Tool: Interviewing questionnaire tool:

It was written in sample Arabic language after reviewing the related literature, it was included four parts:

- **Part I: Demographic characteristics of the pregnant women** such as; age, educational level, occupation of the pregnant women, family monthly income, number of family members, and number of rooms, crowded (>2 residents/room), uncrowded (1-2 residents/room)

- **Part II: Obstetric and gynecological history of the pregnant women**: such as; number of gravidas, number of abortions, number of parities, types of delivery, and presences of chronic diseases ***(Wotherspoon et al., 2017)***.

- **Part III: Pregnant women's knowledge regarding pre-eclampsia** included meaning, signs and symptoms, manifestation, causes, types, management, and prevention of pre-eclampsia, medcal investigations, chronic diseases that can cause preeclampsia, obesity and preeclampsia and predisposing factors of preeclampsia ***(Ebrahem, 2015).***

❖ **Scoring system:**

Women responses were scored two for the complete correct answer, one for the partially correct answer and zero for incorrect answer. Mean and standard deviation was calculated and then converted into percent score. The knowledge was considered satisfactory if percent score was 60% or more and unsatisfactory if less than 60%

Part V: Pregnant women's practices about the prevention of pre-eclampsia included following up, nutrition, rest and comfort, and anxiety and stress ***(Wataganara et al., 2018).***

❖ **Scoring system:**

Practices scoring systems were “done” and “not done” which scored one and zero respectively. The scores of the items were summed up and the total divided by the number of items, giving a mean score for the part. These scores were converted to percent score. Total score of women practices considered adequate if total percent score was 60% or more and inadequate if the total percent score was less than 60%.

- **Part IV: Indicators of pre-eclampsia among pregnant women** includes headache, presences of edema, edema site, oliguria protein in urine, and presence of chronic disease ***(Kiondo et al., 2017)***.

Second Tool: Risk factors assessment:

To measure blood pressure, weigh, height, body mass index, presence of edema, edema site, oliguria protein in urine for the pregnant women ***(Tabi et al., 2016)***.

Tools validity:

Face and content validity of the study tools was assessed by jury group consisted of three experts (Professors) in community nursing from faculties of nursing. Jury group members judge tools for comprehensiveness, accuracy and clarity in language. Based on their

recommendation's correction, addition and / or omission of some items was done.

Tools Reliability:

The study tool was tested for its internal consistency by Cronbach's Alpha. It was 0.783 for the Interviewing questionnaire sheet, and 0.82 for risk factors assessment.

Pilot study:

Pilot study was carried out on 10% of the total study sample (50 pregnant women) to evaluate the applicability, efficiency, clarity of tools, assessment of feasibility of field work, beside to detect any possible obstacles that might face the investigator and interfere with data collection. Necessary modifications were done based on the pilot study findings such as (omission of some questions from tool) in order to strengthen their contents or for more simplicity and clarity. The pilot sample was excluded from the main study sample.

Field work:

Data collection of the study was started at the beginning of January 2019, and completed by the end of March 2019. The investigator attended at the selected maternal and child health center because these health units are outlets for pregnant women, affiliated to the Beni-Suef governorate that include; Kiman Elaros, Etwab, Maymoun, Ebwat, Enfast and Elatf medical center. Three days per week from 9am to 2pm for the pregnant women is estimated according to the statistical records of management of health center from 2016 to 2017. The total number of pregnant women in these medical centers was 4927 during the year, 10% was selected randomly in this study. Total sample size was 550 pregnant women.

The investigator first explained the aim of the study to the pregnant women and reassures them that information collected was treated confidentiality and that it was used only for the purpose of the research. The investigator meted women pregnant of MCH centers, and the investigator asked the participants and wrote their answers, the investigator take 15 minutes for each tool to complete the sheet with pregnant women

Administrative Design:

An official letter requesting permission to conduct the study was directed from the dean of the faculty of nursing Ain Shams University to the selected maternal and child health center because these health units are outlets for pregnant women, affiliated to the Beni-Suef governorate that include (Kiman Elaros, Etwab, Maymoun, Ebwat, Enfast and Elatf medical center) to obtain their approval to carry out this study. This letter included the aim the study and photocopy from data collection tools in order to get their permission and help for collection of data.

Ethical Considerations:

Prior study conduction, ethical approval was obtained from the scientific research ethical committee of the faculty of nursing, Ain Shams University. The researcher met director of the selected maternal and child health center because these health units are outlets for pregnant women, affiliated to the Beni Sueif governorate that include (Kiman Elaros, Etwab, Maymoun, Ebwat, Enfast and Elatf medical center) to clarify the aim of the study and take their approval. The researcher also met the pregnant women to explain the purpose of the study and obtain their approval to participate in the study. They were reassured about the anonymity and confidentiality of the collected data, which was used only for the purpose of scientific research. The subjects' right to withdraw from the study at any time was assured.

Statistical analysis:

Data entry and statistical analysis were done using (SPSS) statistical software package. Quality control was at the stage of coding and data entry. Data were presented using descriptive statistics in the form of frequencies and percentage for qualitative variables; mean and standard deviation for quantitative variable. Qualitative categorical variables were compared Chi-

square (X2) test; the hypothesis that the row and column variables are independent, without indicating strength or direction of the relationship, Analysis of variance (ANOVA) test. Statistical significance was considered at (P-value <0.05).

Results

Table (1): show that, 39.1 % of the pregnant women's ages ranged from 20 < 30 years. 38.6 % of them read and write, 24.8 % of the pregnant women were working, 59.7% of the pregnant women were having governmental work. 84.0 % of them have adequate monthly income, 38.6 % of the pregnant women having more than four members in their family and 71.8 % of them have more than three rooms.

Table (2): show that, 58.4% of pregnant women had partially correct answers regarding management of preeclampsia, 86.8% of pregnant women had correct answer regarding the main signs of preeclampsia, while 81.4% of them had partially correct answers regarding prevention of preeclampsia.

Table (3): show that, 87.8% of pregnant women had satisfactory practice level regarding health care follow up practices and 83.8% of them had satisfactory practice level regarding nutrition related practices. Table (10) show that, 69.2% of pregnant women had satisfactory practice level regarding rest and comfort. Moreover, 91.8% of the pregnant women have satisfactory total practices regarding preeclampsia. 56.6% of them reported suffering from anxiety and stress.

Table (4): show that, 27.2% of the pregnant women had headache, 34.8% of the pregnant women suffered from edema, and 98.8% of them had edema in their feet. Also, finding shows that, 31.4% of the pregnant women had oliguria, 20.8% of the pregnant women had protein in urine, and only 8.2% of the pregnant women had chronic diseases.

Table (5): show that, 84.8% of the pregnant women had normal blood pressure, 89.6% of them had normal body weight, 87.4% of them had normal height, and 83.8% of them had normal body mass index. Also, finding shows that, 34.8% of the pregnant women suffered from edema, 98.8% of them had edema in their feet, and 20.8% of them had protein in urine.

Table (6): shows that, there is a highly statistically significant correlation between total knowledge of the pregnant women and their total practice (P-value <0.05).

Table (1): Demographic characteristics of pregnant women (n=550).

Demographic characteristics of pregnant women	No.	%
1. Age		
18 < 20 years	134	26.7
20 < 30 years	195	39.1
30 - 40 years	171	34.2
Mean ± SD	26 ± 8.61	
2. Educational level		
- Illiterate	77	15.4
- Read and write	193	38.6
- Basic education	128	25.6
- University and more	102	20.4
3. Occupation		
- Working	124	24.8
- Not working	376	75.2
▪ **Job (n= 124)**		
• Governmental work	74	59.7
• Private work	28	22.6
• Free work	22	17.7
4. Family monthly income		
- Adequate for family	420	84.0
- Not adequate	80	16.0
5. Number of family members		
- Two	128	25.6
- Three	49	9.8
- Four	130	26.0
- More than four	193	38.6
6. Number of rooms		
- One	6	1.2
- Two	4	0.8
- Three	131	26.2
- More than three	359	71.8
7. **Index Crowded**		
- Un crowded (1-2 residents/room)	193	38.6
- (>2 residents/room)	307	61.4

Table (2): Distribution of pregnant women's knowledge regarding preeclampsia (n=550).

Pregnant women's knowledge regarding preeclampsia	Correct		Partially correct		Incorrect	
	No.	%	No.	%	No.	%
1. Preeclampsia detection medical investigations	352	70.4	12	2.4	136	27.2
2. Meaning of preeclampsia	114	22.8	20	4	366	73.2
3. Manifestations of preeclampsia	230	46	104	20.8	166	33.2
4. Causes of preeclampsia	202	40.4	243	48.6	55	11
5. Types of preeclampsia	169	33.8	13	2.6	318	63.6
6. Risk factors of preeclampsia	137	27.4	146	29.2	217	43.4
7. Chronic diseases that can cause preeclampsia	153	30.6	164	32.8	183	36.6
8. Predisposing factors of chronic diseases	186	37.2	122	24.4	192	38.4
9. Management of preeclampsia	202	40.4	292	58.4	6	1.2
10. Obesity and preeclampsia	259	51.8	0	0	241	48.2
11. The main signs of preeclampsia	434	86.8	0	0	66	13.2
12. Prevention of preeclampsia	93	18.6	407	81.4	0	0

Table (3): Distribution of pregnant women according to total practices regarding preeclampsia (n=550).

Main practice categories	No.	%
• Follow up practice	439	87.8
• Nutrition	419	83.8
• Rest and comfort	346	69.2
• Anxiety and stress reported practice	283	56.6
Total practices	459	91.8

Table (4): Distribution of pregnant women regarding presence of preeclampsia indicators (n=550).

Preeclampsia indicators	No.	%
1. Headache		
- Yes	136	27.2
- No	364	72.8
2. Presence of edema		
- Yes	174	34.8
- No	326	65.2
3. Edema site (n=174)		
- Feet	494	98.8
- Feet and face	6	1.2
4. Oliguria		
- Yes	157	31.4
- No	328	68.6
5. Protein in urine		
- Yes	104	20.8
- No	396	79.2
6. Presence of chronic diseases		
- Yes	41	8.2
- No	459	91.8

Table (5): Distribution of pregnant women according to their risk factors (n=550).

Risk factors	No.	%
1. Blood pressure		
- Normal	424	84.8
- Abnormal	76	15.2
2. Weight		
- Normal	448	89.6
- Abnormal	52	10.4
3. Hight		
- Normal	437	87.4
- Abnormal	63	12.6
4. BMI		
- Normal	419	83.8
- Abnormal	81	16.2
7. Presence of edema		
- Yes	174	34.8
- No	326	65.2
5. Edema site (n=174)		
- Feet	494	98.8
- Feet and face	6	1.2
6. Oliguria		
- Yes	157	31.4
- No	328	68.6
7. Protein in urine		
- Yes	104	20.8
- No	396	79.2

Table (6): Correlation between total knowledge of pregnant women and their total practices (n=550).

		Total knowledge	Total practice
Total knowledge	R	1	.202
	P	--	0.000**
Total practice	R	.202	1
	P	0.000**	--

(**) Highly statistically significant correlation at P-value <0.05

Discussion

Pre-eclampsia is associated with maternal effects that may lead to significant maternal morbidity and even mortality. It includes and not limited to intracerebral hemorrhage, transient blindness, and cardiorespiratory arrest. Permanent neurologic sequelae from brain ischemia or hemorrhage are the most common causes of maternal death, with the maternal mortality rate ranging from 0-14%. Not only pre-eclampsia effect on mother, but also effect on fetus, there is decrease in placental perfusion in pre-eclampsia result in intrauterine growth restriction of the fetus and oligohydramnios ***(Behjat et al., 2017).***

A woman is at risk for pre-eclampsia if she has no more than one risk factors that involve antiphospholipid syndrome, previous pre-eclampsia, diabetes mellitus type I or II, multiple pregnancy, first pregnancy, familiar history of pre-eclampsia, BMI 35 Kg/m, maternal age <20 or >40 years old, chronic hypertension, chronic autoimmune disease, venous thrombo-embolism, intergestational interval 10 years similar to multiple pregnancy and chronic kidney disease ***(Beygi et al., 2018).***

So, the current study aimed to assess prevention of preeclampsia among pregnant women in the second trimester through: assessing pregnant women's knowledge about pre-eclampsia, assessing the risk factors of pre-eclampsia among pregnant women, assessing indicators of pre-eclampsia among pregnant women, and assessing pregnant women's practices about the prevention of pre-eclampsia

Regarding demographic characteristics of pregnant women, regarding demographic characteristics, the current study revealed that, less than two fifth of the pregnant women's ages ranged from 20 <30 years, more than one third of them read and write, and also more than one third having more than four members in their family. Less than one quarter of the pregnant women were working. this study was in agreement with ***Eze et al. (2018)*** who conducted a study entitled "Determination, knowledge and prevalence of pregnancy-induced hypertension/eclampsia among women in Tanzania" and found that more than two fifth of pregnant women could read and write, and majority of them ranged from 20 to 30 years. Also, this result was in congruence with **Savage & *Hoho, (2016)*** who conducted a study entitled "Knowledge of pre-eclampsia in women living in Afrcia" and found that three quarters of pregnant women were not working, and only one quarter of them were working at governmental work.

Regarding demographic characteristics, the current study revealed that, more than half of them were having governmental work. Majority of them have adequate monthly income, and less than three quarter of them have more than three rooms. this study was accordance with ***Parsa et al. (2019)*** who conducted a study entitled "Improving the knowledge of pregnant women using a pre-eclampsia in America" and found that, majority of pregnant women have adequate monthly income, and had governmental work. Conversely, this result was in disagreement with ***Sheikh et al. (2016)*** who conducted a study entitled "Health care provider

knowledge and routine management of pre-eclampsia in Pakistan" and found that majority of pregnant women had two rooms in their home.

Also, regarding pregnant women's knowledge about prevention of preeclampsia, the current study revealed that more than half of pregnant women had partially correct answers regarding management of preeclampsia, majority of pregnant women had correct answer regarding the main signs of preeclampsia, while majority of them had partially correct answers regarding prevention of preeclampsia

Similarity, this result was supported with ***Rebahi et al. (2018)*** who conducted a study entitled "Risk factors for eclampsia in pregnant women with preeclampsia" and found that majority of women had correct answers about management of preeclampsia. Also, this result was in agreement with ***Sciatti & Orabona, (2020)*** who conducted a study entitled "A window of opportunity on cardiovascular prevention: preeclampsia and fetal growth restriction" and found that majority of women had partially correct answers regarding prevention of preeclampsia. . From the researcher point of view, this result was might be due to pregnant women were interested to keep on their life from any dangers during pregnancy period.

Regarding pregnant women according to total practices, the current study revealed that majority of pregnant women had satisfactory practice level regarding health care follow up practices and had satisfactory practice level regarding nutrition related practices. Also, more than two thirds of them had satisfactory practice level regarding rest and comfort. Moreover, majority of the pregnant women have satisfactory total practices regarding preeclampsia. More than half of them reported suffering from anxiety and stress**.**

In the same line, this result was in congruence with ***Rolnik et al. (2017)*** who conducted a study entitled "Early screening and prevention of preterm preeclampsia" and found that majority of the pregnant women has satisfactory practices regarding preeclampsia. Conversely, this result was in disagreement with ***Skeith et al., (2020)*** who conducted a study entitled "Understanding and preventing placenta-mediated pregnancy complications" and found that majority of the pregnant women has unsatisfactory practices regarding preeclampsia. From the investigator point of view, this result was might be due to pregnant women had good skills to prevent preeclampsia.

Regarding pregnant women about presence of preeclampsia indicators, the current study revealed that more than one quarter of the pregnant women had headache, more than one third of the pregnant women suffered from edema, and majority of them had edema in their feet.

This result was accordance with ***Alqudah et al. (2018)*** who conducted a study entitled "Risk of pre-eclampsia in women taking metformin: a systematic review and meta-analysis" and found that majority of women had headache and edema in pregnancy period. Also, this result was supported with ***Agrawal et al. (2017)*** who conducted a study entitled "Prevalence of and risk factors for eclampsia in pregnant women" and found that half of the pregnant women suffered from edema in their feet. From the investigator point of view, this result was might be due to accumulation of fluids in the lower limp that appeared in the swelling of legs.

Part VI: Risk factors of pregnant women with preeclampsia, regarding pregnant women according to their risk factors, the current study revealed that majority of the pregnant women had normal blood pressure, had normal body weight, had normal height, and had normal body mass index.

This result was in agreement with ***Hürter et al. (2019*)** who conducted a study

entitled "Prevention of pre-eclampsia after infertility treatment: Preconception mineralization of risk factors" and found that majority of the pregnant women had normal blood pressure, and had normal body mass index. Conversely, this result was in disagreement with ***Khanum, Naz & de Souza, (2018)*** who conducted a study entitled "Prevention of pre-eclampsia and eclampsia" and found that three fifth of the pregnant women had hypotension during pregnancy. From the investigator point of view, this result was might be due to pregnant women keep on their bodies during pregnant period.

Regarding correlation between total knowledge of pregnant women and their total practices, the current study revealed that there is a highly statistically significant correlation between total knowledge of the pregnant women and their total practices.

This result was accordance with ***Fratidhina et al. (2019)*** who conducted a study entitled "Knowledge, attitudes, and behavior of pregnant women in preventing of pregnancy complication" and found there is a highly statistically significant correlation between total knowledge of the pregnant women and their total practice. Conversely, this result was in disagreement with ***Wilkinson & Cole, (2018)*** who conducted a study entitled "Preeclampsia knowledge among women" and found that there is a highly statistically significant correlation between total knowledge of the pregnant women and their total practices.

Conclusion

The current study concluded that nearly half of the pregnant women have satisfactory knowledge about preeclampsia. Majority of the pregnant women have satisfactory practices regarding preeclampsia, More than one quarter of the pregnant women had headache, more than one third of the pregnant women suffered from edema, and majority of them had edema in their feet as indicators of preeclampsia. Majority of the pregnant women had normal blood pressure, normal body weight, normal height, and normal body mass index as risk factors of preeclampsia. There is a highly statistically significant correlation between total knowledge of the pregnant women and their total practices (P-value <0.05).

Recommendation

In the light of results of this study, the following recommendations were suggested:

- Providing sufficient training for women regarding pre-eclampsia to enhance their knowledge and practices.
- Providing sufficient training for women regarding pre-eclampsia to reduce problems of pre-eclampsia during pregnancy period, enhance health needs of pregnant women and provide health education for pregnant women how avoid pre-eclampsia during pregnant period.
- Further studies should be conducted in different settings.

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