


## Original Article

# Awareness of preeclampsia and its associated factors among antenatal women in India: a cross-sectional study

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Received: 18 Jan 2026 Accepted: 28 Jan 2026 Published: 11 Feb 2026

### Article Info

#### Keywords:

Pre-eclampsia  
Health Knowledge  
Pre-natal Care  
Antenatal Women  
Awareness

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#### How to Cite This Article:

Singla N, Sonia. Awareness of preeclampsia and its associated factors among antenatal women in India: a cross-sectional study Prev Care Nurs Midwifery J. 2026;16(1):36-44.

### Abstract

**Background:** Preeclampsia affects 2–8% of pregnancies and remains a serious threat to maternal and neonatal health. It typically develops after 20 weeks of gestation, presenting with hypertension and proteinuria, and may lead to immediate fetal complications as well as long-term cardiovascular risks for the mother. Increasing maternal awareness is essential for timely intervention and the avoidance of adverse outcomes.

**Objectives:** This study aimed to assess the level of awareness of preeclampsia and to determine associated factors among antenatal women.

**Methods:** This cross-sectional study was conducted on 50 antenatal women in the antenatal outpatient department of a tertiary care hospital in Ludhiana, Punjab, India, from February 2020 to October 2020. Participants were selected through convenience sampling. Data were collected using a researcher-made questionnaire. Data analysis was performed using an independent t-test and ANOVA in SPSS version 26.

**Results:** The mean (SD) awareness score was 19.93 (6.12) out of 40. More than half of the antenatal women had desirable awareness (54%). Participants' awareness levels were significantly associated with parity ( $p = 0.03$ ), number of live births ( $p = 0.045$ ), and prior knowledge of the condition ( $p < 0.001$ ).

**Conclusion:** This study found that the majority of antenatal women demonstrated a desirable level of awareness; however, their knowledge was influenced by parity and prior health information. Strengthening targeted educational interventions for primigravida women and those without previous obstetric experience is crucial for early detection and effective management of preeclampsia, ultimately improving maternal and neonatal safety outcomes.

#### Implications for Nursing and Midwifery Preventive Care

- Midwives should prioritize experience-based education over demographic assumptions to bridge the health literacy gap regarding preeclampsia.
- Integrating clear, targeted education into prenatal visits is vital for helping women recognize symptoms early and take preventive action.



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## Introduction

Hypertensive disorders of pregnancy (HDP) represent a complex group of medical conditions characterized by a blood pressure reading of 140/90 mmHg or higher, typically confirmed by two measurements taken at least four hours apart [1]. Although a typical pregnancy is a physiological process lasting approximately 40 weeks, HDP, and specifically preeclampsia, introduces significant pathological complications. Preeclampsia is defined by the onset of hypertension after 20 weeks of gestation, often accompanied by proteinuria (albuminuria) or edema, stemming from a complex etiology involving impaired remodeling of uterine spiral arteries and trophoblast infiltration during placental formation [2].

In India, the burden of HDP is substantial, with preeclampsia affecting 8% to 10% of all pregnancies [1,3]. It significantly increases maternal and perinatal morbidity and mortality and affects 2% to 8% of births globally [3]. Preeclampsia remains a major global health challenge. Estimates from 2016 suggest that it was responsible for nearly 46,000 maternal deaths and approximately 500,000 fetal losses each year, with the burden falling most heavily on resource-limited settings [4].

The state of Punjab presents a unique and concerning paradox. According to the 2024 Punjab State Health Department audit, the state's maternal mortality ratio (MMR) stands at 90, which, while an improvement from previous years, is still higher than the national average [5,6]. These figures underscore a persistent public health challenge that has not diminished despite advancements in obstetric medicine.

The consequences of failing to manage these disorders are severe for both mother and child. Maternal morbidities include convulsions, placental abruption, pulmonary edema, acute renal failure, and HELLP syndrome [2,4]. For the neonate, preeclampsia is a leading driver of prematurity, low birth weight, and prolonged stays in the neonatal intensive care unit (NICU) [3]. This disparity is striking. Women in developing nations are 14 times more likely to die from maternal complications than those in developed nations [4]. Therefore, early

detection and prompt intervention are the primary defenses against these fatal outcomes.

Due to a lack of awareness, inadequate follow-up, and the higher cost of healthier eating, pregnant women frequently do not take part in programs aimed at improving their lifestyles. According to studies, pregnant women with low levels of education were more likely to experience risky situations like premature birth or neonatal death [7]. While routine prenatal care and blood pressure monitoring are vital, their effectiveness is limited if patients cannot recognize the symptoms that necessitate urgent care between scheduled visits. Despite the clear importance of awareness, there is currently a significant knowledge gap regarding the specific level of knowledge and the unique determinants of awareness among pregnant women in the Punjab region. This lack of localized data hinders the development of targeted educational interventions necessary to reduce maternal and neonatal mortality in this specific population.

## Objectives

This study aimed to assess the level of knowledge regarding preeclampsia among pregnant women attending a tertiary care hospital in Ludhiana, Punjab, India, and to identify the sociodemographic and clinical factors associated with this awareness.

## Methods

### Study design and setting

A cross-sectional study was conducted from February 2020 to October 2020 to assess the level of awareness regarding preeclampsia and its associated factors among antenatal women. The study was conducted in the antenatal outpatient department (OPD) of a tertiary care hospital in Punjab, India, which serves a diverse population of patients from both urban and rural areas.

### Study participants

The target population comprised antenatal women attending the OPD of DMC & Hospital, Ludhiana.

### Inclusion criteria

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- Women in their second or third trimester of pregnancy
- Women who voluntarily participate and provide written consent.

### Exclusion criteria

- Women with confirmed intrauterine death (IUD) according to medical records and ultrasonography.
- Women with overt cognitive impairments, determined by their inability to understand the purpose of the study or provide informed consent.

### Sample size and sampling

The sample size was determined using Cochran's formula:  $n = Z^2pq/e^2$ . Due to varying maternal awareness levels reported in regional literature, a prevalence (p) of 50% was utilized to maximize variability and ensure a conservative estimate [8,9,10]. With a 95% confidence interval ( $Z = 1.96$ ) and a 5% margin of error ( $e = 0.05$ ), the formula yielded a requirement of 384 participants for a full-scale study. However, as this research was a pilot study, a sample of 50 antenatal women was selected. Participants were selected using a convenience sampling technique based on their availability and willingness to participate during the study period.

### Data collection tool

The data collection tool was a researcher developed questionnaire based on established clinical guidelines and an extensive review of obstetric literature. To ensure accessibility, it was administered in Hindi, Punjabi, or English, according to participant's preference

The instrument was organized into three sections:

#### *Section 1: Socio-Demographic Profile*

The first section focused on the baseline information of the participants, including age, marital status, family type, religion, dietary habits, educational level, occupation, socioeconomic status, and previous exposure to information regarding preeclampsia, including the specific sources of that information.

#### *Section 2: Maternal Profile*

This section focused on the participants' obstetric history, including gestational age, personal history of preeclampsia diagnosis.

#### *Section 3: Preeclampsia Awareness Assessment*

Awareness was evaluated using a structured questionnaire comprising 6 main questions encompassing a total of 40 dichotomous items (sub-questions) [Appendix 1]. Each correct response received 1 mark, with a maximum possible total score of 40. These items covered the definition of preeclampsia, its signs and symptoms, risk factors, prevention strategies, management protocols, and potential complications.

For scoring, each correct response received 1 mark (maximum 40). Scores were classified using modified Bloom's criteria: excellent (31–40), good (21–30), average (11–20), and poor (0–10).

### Validity and reliability

Content validity was assessed by a panel of seven experts. The content validity index (CVI) was 0.86. Reliability was assessed using the test–retest method among five participants, with a one-week interval between the two administrations. The resulting reliability coefficient was 0.88.

### Data collection procedure

Data was collected from 1<sup>st</sup> August to 30<sup>th</sup> August, 2020. After obtaining informed consent, the primary investigator administered the questionnaire via face-to-face interviews to ensure clarity and to accommodate varying literacy levels. Each session lasted approximately 15–20 minutes. To ensure data quality, all questionnaires were reviewed for completeness and accuracy immediately following the interview.

### Statistical analysis

Data were analyzed using SPSS version 26. Normality was assessed using the Shapiro-Wilk test, which indicated a normal distribution ( $p > 0.05$ ). Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize the data. Independent t-test and ANOVA were used to examine associations, with a significance level of  $p < 0.05$ .

## Result

**Table 1.** Socio-Demographic and Obstetric Profile of Participants (N = 50)

| Variable                          | N  | %  |
|-----------------------------------|----|----|
| Age (in years)                    |    |    |
| Below 20                          | 3  | 6  |
| 21-25                             | 16 | 32 |
| 26-30                             | 26 | 52 |
| 31-35                             | 4  | 8  |
| 36-40                             | 1  | 2  |
| Marital Status                    |    |    |
| Married                           | 49 | 98 |
| Divorced/separated/widowed        | 1  | 2  |
| Habitat                           |    |    |
| Rural                             | 36 | 72 |
| Urban                             | 14 | 28 |
| Type of family                    |    |    |
| Joint                             | 22 | 44 |
| Nuclear                           | 28 | 56 |
| Religion                          |    |    |
| Sikh                              | 37 | 74 |
| Muslim                            | 03 | 6  |
| Hindu                             | 10 | 2  |
| Educational Status (Women)        |    |    |
| Illiterate                        | 1  | 2  |
| Elementary                        | 5  | 10 |
| Secondary                         | 10 | 20 |
| Senior secondary                  | 16 | 32 |
| Graduation & above                | 18 | 36 |
| Occupational Status (Women)       |    |    |
| Non-working                       | 41 | 82 |
| Working                           | 9  | 18 |
| Socioeconomic Status              |    |    |
| Upper Class I                     | 1  | 2  |
| Upper Middle-Class II             | 21 | 42 |
| Lower Middle-Class III            | 25 | 50 |
| Upper Lower Class IV              | 3  | 6  |
| Obstetrical History               |    |    |
| Gravida                           |    |    |
| 1                                 | 30 | 60 |
| 2                                 | 13 | 26 |
| 3                                 | 5  | 10 |
| 4                                 | 2  | 4  |
| Para                              |    |    |
| 0                                 | 32 | 64 |
| 1                                 | 12 | 24 |
| 2                                 | 4  | 8  |
| 3                                 | 2  | 4  |
| Gestational age                   |    |    |
| 2 <sup>nd</sup> trimester         | 22 | 44 |
| 3 <sup>rd</sup> trimester         | 28 | 56 |
| History of Preeclampsia           |    |    |
| Personal Diagnosis (Yes)          | 3  | 6  |
| Family History (Yes)              | 5  | 10 |
| Awareness of Pre-eclampsia        |    |    |
| Ever heard of the condition (Yes) | 15 | 30 |
| Source of Information (n = 15)    |    |    |
| Family members                    | 6  | 12 |
| Friends/Neighbours                | 5  | 10 |
| Health personnel                  | 4  | 8  |

**Table 2** Distribution of Awareness Levels Regarding Preeclampsia (N = 50)

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| Components            | Max Score | M     | SD   | Mean % | Rank |
|-----------------------|-----------|-------|------|--------|------|
| Introduction          | 4         | 2.02  | 1.12 | 50.5%  | 3    |
| Contributing factors  | 9         | 4.06  | 1.93 | 45.1%  | 6    |
| Sign and symptoms     | 8         | 3.86  | 1.49 | 48.3%  | 4    |
| Prevention            | 5         | 2.64  | 1.24 | 52.8%  | 2    |
| Management            | 7         | 4.08  | 1.69 | 58.2%  | 1    |
| Complications         | 7         | 3.24  | 1.48 | 46.3%  | 5    |
| Total Awareness Score | 40        | 19.93 | 6.12 | 49.8%  | -    |

M = Mean; SD = Standard Deviation

**Table 3.** Association of Awareness Scores with Selected Variables (N=50)

| Variable                        | n (%)   | M (SD)       | F/t value<br>p                   |
|---------------------------------|---------|--------------|----------------------------------|
| Prior Knowledge of preeclampsia |         |              |                                  |
| No                              | 35 (70) | 18.00 (5.45) | t=3.812<br><0.001**              |
| Yes                             | 15 (30) | 24.43 (5.21) |                                  |
| GPLAS status (Gravida)          |         |              |                                  |
| 1                               | 30(60)  | 18.30 ± 6.10 | F=3.298NS<br>p=0.290             |
| 2                               | 13(26)  | 24.15 ± 4.98 |                                  |
| 3                               | 05(10)  | 18.60 ± 4.27 |                                  |
| 4                               | 02(04)  | 19.5 ± 6.36  |                                  |
| Parity                          |         |              |                                  |
| 0                               | 32 (64) | 18.53 (5.97) | F=3.22*<br>p=0.030*              |
| 1                               | 12 (24) | 24.33 (5.15) |                                  |
| 2                               | 04 (8)  | 17.70 (4.22) |                                  |
| 3                               | 02 (4)  | 19.50 (6.30) |                                  |
| Live Births                     |         |              |                                  |
| 0                               | 34 (68) | 18.56 (5.87) | F=3.32<br>p=0.045*               |
| 1                               | 12 (24) | 23.58 (5.03) |                                  |
| 2                               | 04 (8)  | 20.25 (7.54) |                                  |
| Gestational Age                 |         |              |                                  |
| 2nd trimester                   | 22(44)  | 18.05± 5.46  | t=3.86 <sup>NS</sup><br>p=0.500  |
| 3rd trimester                   | 28(56)  | 21.36± 6.23  |                                  |
| Age (in years)                  |         |              |                                  |
| Below 20                        | 3 (06)  | 16.33 (1.53) | F=0.996NS p=0.420 <sup>NS</sup>  |
| 21-25                           | 16 (32) | 19.56 (6.89) |                                  |
| 26-30                           | 26 (52) | 20.54 (5.78) |                                  |
| 31-35                           | 04 (08) | 22.00 (6.16) |                                  |
| 36-40                           | 1 (02)  | 11.00 (0.00) |                                  |
| Educational status of (women):  |         |              |                                  |
| Illiterate                      |         |              | F=0.656 <sup>NS</sup> p=0.626    |
| Elementary                      | 1(02)   | 22.00±0.00   |                                  |
| Secondary                       | 5(10)   | 16.00±5.61   |                                  |
| Senior Secondary                | 10(20)  | 20.40±7.35   |                                  |
| Graduation and above            | 16(32)  | 19.62±5.62   |                                  |
| Habitat                         |         |              |                                  |
| Rural                           | 36(72)  | 19.89±6.13   | t=0.21 <sup>NS</sup><br>p=0.980  |
| Urban                           | 14(28)  | 19.93±6.17   |                                  |
| Socio-economic status:          |         |              |                                  |
| Upper Class I                   | 1(02)   | 22.0±0.00    | F=2.007 <sup>NS</sup><br>p=0.126 |
| Upper Middle-Class II           | 21(42)  | 22.1±6.164   |                                  |
| Lower Middle-Class III          | 25(50)  | 18.48±5.88   |                                  |
| Upper Lower Class IV            | 3(06)   | 15.67±2.157  |                                  |

\*p < .05. \*\*p < .001, NS Non-significant

### Socio-demographic and Obstetric Profile

The socio-demographic characteristics of the 50 antenatal women are summarized in Table 1. Most participants were aged 26–30 years (52.0%) and were married (98.0%). Most resided in rural areas (72.0%) and belonged to the Sikh religion (74.0%). Regarding education, 36.0% had a graduation degree or higher. Obstetric history revealed that a total of 60% of participants are in their first pregnancy (primigravida). While 30% of women have heard of preeclampsia, 70% reported having no prior knowledge of the condition. Among those with some awareness, the majority received information from social circles (family and neighbors) rather than clinical health personnel.

### Awareness Levels Regarding Preeclampsia

The distribution of awareness scores across different components of preeclampsia is presented in Table 2. The highest mean percentage score was observed in the management component (58.2%), which ranked first. This was followed by prevention (52.8%) and introduction (50.5%). The lowest awareness levels were identified in contributing factors (45.1%). The overall mean (SD) awareness score for the total sample was 19.93 (6.12).

### Associations with Awareness Scores

Given the pilot nature of the study, these inferential findings should be interpreted cautiously. The association between awareness scores and selected variables is shown in Table 3. Significant associations were found between awareness levels and prior knowledge of preeclampsia,  $p < 0.001$ , parity,  $p = 0.030$ , and the number of live births,  $p = 0.045$ . Participants who had previously heard of preeclampsia ( $M = 24.43$ ,  $SD = 5.21$ ) scored significantly higher than those who had not ( $M = 18.00$ ,  $SD = 5.45$ ). No significant associations were found with age, women's education, habitat, socioeconomic status or gestational age ( $p < 0.05$ ).

The lack of significance may be due to limited sample size.

## Discussion

This study aimed to address the critical knowledge gap regarding preeclampsia awareness among antenatal women in the Punjab region, as a profound lack of baseline understanding of hypertensive disorders of pregnancy (HDP) has been consistently identified in the literature [2].

Research conducted in the Moga district of Punjab identified that a significant number of antenatal mothers, ranging from 57% to 67%, possess only average knowledge regarding the prevention of preeclampsia, while a notable percentage (22%–24%) have below-average knowledge [11].

The primary finding was that a substantial majority of the women (70%) had never heard of the condition before the study, confirming that even within a tertiary care hospital setting, maternal health literacy on this critical topic remains low. Notably, although so many women had never heard the name "preeclampsia," nearly half still scored "good" on the awareness test. This gap suggests that women are picking up bits and pieces of information, such as recognizing a symptom or knowing they need to check their blood pressure during their doctor visits, even if they do not understand the actual disease. Essentially, they have gathered fragmented facts through experience rather than having a clear, complete understanding of what the condition really is and how dangerous it can be.

A pivotal finding of this research is the significant association between awareness levels and parity and number of live births.

This suggests that knowledge is primarily gained through lived experience and repeated interactions with the healthcare system during previous pregnancies, rather than through proactive primary education. This mirrors findings by Wilkinson and Cole [12], who noted that experienced mothers often possess higher health literacy regarding obstetric complications.

Conversely, the lack of association with formal education level is a critical finding because it shows that having a degree does not automatically mean a person understands pregnancy risks [13].

It suggests that schools are not teaching practical health skills, which makes it even more important for nurses and midwives to provide clear, expert counseling to every patient, regardless of their formal education.

While this study primarily focused on awareness, the demographic and clinical data reinforce several key risk factors. In this study population, the prevalence of a preeclampsia diagnosis was reported at 6% ( $n = 3$ ), while a family history of the condition was present in 10% ( $n = 5$ ) of the participants, primarily involving first-degree relatives such as mothers and sisters. These findings are particularly significant when aligned with established literature. For instance, while 52% of the sample fell into the 26–30 age range, literature suggests that women over 35 face a fourfold increase in preeclampsia risk due to age-related cardiovascular changes [14]. Furthermore, 60% of the participants were primigravida. Given that primiparous women are at triple the risk for developing preeclampsia, their significantly lower awareness scores represent a high-risk "education gap" that must be prioritized in preventive care [15].

### Strengths and limitations

A key strength of this study is its identification of modifiable factors, such as parity and information sources, that influence women's awareness of preeclampsia. The study also offers an initial baseline for the Punjab population, filling an important gap in regional maternal health literature. In addition, the instrument showed good reliability, and the findings revealed that women who were aware of preeclampsia often relied on informal sources like family and friends rather than healthcare providers, highlighting a meaningful information gap.

This pilot study has several limitations. The small sample size limits statistical power and raises the risk of type II error, meaning some true associations may not have been detected. The test–retest reliability assessment was based on a very small subsample ( $n = 5$ ), which restricts confidence in the instrument's stability. The single-center convenience sampling also limits generalizability, and the reliance on self-

reported data introduces the possibility of recall bias. Larger, multi-center studies are needed to confirm these findings.

### Conclusion

This pilot study showed that while many pregnant women have heard something about preeclampsia, most do not fully understand what the condition means or why it is dangerous. Women who had been pregnant before were generally more aware, suggesting that personal experience plays a greater role than formal education or routine antenatal counseling. These findings point to a clear need for more accessible, practical, and consistent health education provided by nurses and midwives. Special attention should be given to first-time mothers and women who have had little exposure to health information. Strengthening communication during antenatal visits can help close this knowledge gap, support early recognition of warning symptoms, and promote safer pregnancy outcomes for both mothers and babies.

### Ethics Consideration

The study was ethically approved by the Institutional Ethics Committee (IEC) of Dayanand Medical College & Hospital (IEC no. DMCH/R&D/2020/85). All procedures were conducted in accordance with the principles of the Declaration of Helsinki and ICMR guidelines. Informed consent was obtained from all participants, and data remained anonymous.

### Acknowledgements

The authors would like to thank the staff of the Antenatal OPD and the study participants for their cooperation.

### Conflict of Interest

The authors declare no conflict of interest.

### Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### Authors' Contributions

Singla N: Conceptualization, Data Collection, Writing, Original Draft, Review and editing.  
Sonia: Data Analysis, Writing, Review & Editing.

### Artificial Intelligence Utilization

The authors used Grammarly (version 1.0) to improve language. The authors reviewed and edited the text and take full responsibility for the final content.

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**Appendix 1:** Structured Questionnaire to Assess Awareness of Preeclampsia (40 Items)

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**Instructions:** Below is a list of statements about preeclampsia. Indicate which of the following is correct by ticking (✓) the appropriate column.

| Item     | Statement  | Yes | No |
|----------|--|-----|----|
| <b>1</b> | <b>Which of the following is true about preeclampsia?</b>                                    |     |    |
| a)       | Preeclampsia is characterized by high blood pressure (140/90 mmHg or more) with proteinuria. |     |    |
| b)       | Preeclampsia can occur before the 20th week of pregnancy in a previously normotensive woman. |     |    |
| c)       | Preeclampsia is a serious health issue.  |     |    |
| d)       | Preeclampsia when complicated with convulsions is known as eclampsia.                        |     |    |
| <b>2</b> | <b>Which of the following are contributory factors for preeclampsia?</b>                     |     |    |
| a)       | Singleton pregnancy  |     |    |
| b)       | Evil spirits   |     |    |
| c)       | A history of high blood pressure before conception   |     |    |
| d)       | Maternal age more than 35 years  |     |    |
| e)       | Insomnia   |     |    |
| f)       | Overweight   |     |    |
| g)       | Family history of hypertension   |     |    |
| h)       | High sugar levels  |     |    |
| i)       | Heredity   |     |    |
| <b>3</b> | <b>Which of the following signs/ symptoms may be experienced in preeclampsia?</b>            |     |    |
| a)       | Severe headache  |     |    |
| b)       | High blood pressure  |     |    |
| c)       | Increased urine output   |     |    |
| d)       | Visual disturbance   |     |    |
| e)       | Sudden swelling of the ankles or feet  |     |    |
| f)       | Severe back pain   |     |    |
| g)       | Presence of protein in urine   |     |    |
| h)       | High temperature during pregnancy  |     |    |
| <b>4</b> | <b>Which of the following may help to prevent preeclampsia and its serious risks?</b>        |     |    |
| a)       | Eating calcium-rich diet (e.g., fish, milk)  |     |    |
| b)       | Antioxidants like Vitamin E and C  |     |    |
| c)       | Regular antenatal check-up for early detection of rapid weight gain                          |     |    |
| d)       | Measuring blood sugar levels every day   |     |    |
| e)       | Use of drugs that prevent blood clot formation in high-risk women                            |     |    |
| <b>5</b> | <b>Which of the following are part of the management of preeclampsia?</b>                    |     |    |
| a)       | Bed rest   |     |    |
| b)       | Hospital admission in severe preeclampsia  |     |    |
| c)       | High protein diet  |     |    |
| d)       | Reduced fluid intake   |     |    |
| e)       | Early delivery if blood pressure is persistently high  |     |    |
| f)       | Use of diuretics (e.g., Lasix)   |     |    |
| g)       | Return visit 6–8 weeks after delivery  |     |    |
| <b>6</b> | <b>Which of the following are complications of preeclampsia?</b>                             |     |    |
| a)       | Convulsions  |     |    |
| b)       | Fetal death  |     |    |
| c)       | Higher than average birth weight   |     |    |
| d)       | Shock  |     |    |
| e)       | Recurrence of preeclampsia in subsequent pregnancy   |     |    |
| f)       | Memory loss after birth  |     |    |
| g)       | Postpartum hemorrhage  |     |    |

### Scoring Criteria

| Level of Awareness | Score | Percentage |
|--------------------|-------|------------|
| Excellent          | 31–40 | 76%–100%   |
| Good               | 21–30 | 51%–75%    |
| Average            | 11–20 | 26%–50%    |
| Poor               | 0–10  | ≤25%       |

**Maximum score:** 40 | **Minimum score:** 0

**Scoring:** Correct response = 1 mark | Incorrect response = 0 mark