Awareness of Pre-eclampsia and Measurement of Risk Factors in Women from the Western Region of Saudi Arabia: A Cross-sectional Study

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Abstract
Objectives: This study aimed to assess the awareness of and risk factors for developing preeclampsia among women in Saudi Arabia.
Materials and Methods: In this cross-sectional study, women from the western region of Saudi Arabia were investigated from September, 2022 to December, 2022. To this end, the data were collected using a validated and reliable questionnaire. The survey was distributed to the general population via social media, shopping centers, outpatient clinics, and inpatient wards of King Abdulaziz University Hospital.
Results: The study sample consisted of 541 women ages 18–50, who were not involved in the medical field. Only 11.7% of the participants had risk factors for pre-eclampsia, whereas the rest did not have any risk factors. These findings indicated that the participants were at low risk of developing preeclampsia, but they had poor knowledge of and limited general information about this disorder (e.g., its signs and symptoms, risk factors, and complications).
Conclusions: Women in the western region of Saudi Arabia faced lower risk of developing preeclampsia. However, they had poor knowledge of preeclampsia, which highlighted the need to increase their awareness of it.
Keywords: Preeclampsia, Pregnant women, Proteinuria, First pregnancy, Maternal age, Obesity, Chronic hypertension, Saudi Arabia

Introduction

Preeclampsia, a condition of pregnancy, is characterized by proteinuria and de novo hypertension, or a new onset of hypertension and significant end-organ dysfunction with or without proteinuria after 20 weeks of gestation or postpartum in women without previous hypertension (1). Preeclampsia consists of several hypertensive disorders during pregnancy that may be exceedingly dangerous to both the mother and her developing fetus (2).

The International Pregnancy Hypertension Society defines preeclampsia as substantial proteinuria (at least 0.3 g, or >30 mg/mmol) in a 24-hour urine collection and hypertension with a minimum of 140/90 mm Hg in two independent measurements within four hours of one another. In previously normotensive women, the protein/creatinine ratio increases dramatically after 20 weeks of pregnancy and then it subsides six weeks after the birth (3).

Up to 10% of pregnancies worldwide are affected by hypertensive-related disorders, which include 3-5% of all pregnancies affected by preeclampsia (4). The prevalence of preeclampsia in Saudi Arabia is approximately 5.37 per 10 000 females (5). The 2019 National Institute for Health

and Care Excellence guidelines (6) state that women with maternal conditions, such as a first pregnancy, an extreme maternal age (i.e., having a baby before the age of 18 or at an advanced age), a personal or family history of preeclampsia, obesity (i.e., body mass index [BMI] >35 kg/m²), gestational diabetes, a multiple pregnancy, or a pre-existing illness (e.g., chronic hypertension) are at risk for preeclampsia (7-12). Antiphospholipid antibody syndrome, systemic lupus erythematosus, thrombophilia, assisted reproductive technologies (e.g., in vitro fertilization), and obstructive sleep apnea are additional risk factors for developing preeclampsia (13).

Despite the high occurrence of preeclampsia, the available preventive medications only slightly decrease the risk of developing it, and the risk factors for preeclampsia identified thus far are insufficient to predict its occurrence. Preterm birth, intrauterine growth restriction, placental abruption, discomfort caused by the fetus, and fetal death in utero are potential outcomes of pre-eclampsia, which is also major cause of maternal morbidity (14). Numerous complications of preeclampsia can harm both the mother and the fetus.

Pre-eclamptic women are at risk of developing

eclampsia, severe kidney or liver failure, hepatic rupture, pulmonary edema, cerebral hemorrhage, and disseminated intravascular coagulation (15). Preeclampsia also increases the risk of a later development of the cardiovascular diseases in addition to the pregnancy's immediate life-threatening complications in woman (16). Women with early-onset preeclampsia have a 9–10-fold higher risk of dying from cardiovascular diseases than those with late-onset preeclampsia, who have a 2-fold higher risk (17). Preeclampsia also raises the risk of placental abruption, unfavorable neonatal outcomes, and fetal or neonatal death. These outcomes usually follow an iatrogenic premature delivery and include admissions to neonatal intensive care units, respiratory distress syndrome, bronchopulmonary dysplasia, retinopathy of prematurity, necrotizing enterocolitis, and neurodevelopmental delays (18). Earlier studies have found a relationship between maternal preeclampsia and childhood and adult chronic diseases in children, such as obesity, diabetes, hypertension, and abnormal neurodevelopment. This relationship is attributed to the unfavorable intrauterine environment during preeclampsia (19,20).

According to a recent report of the World Health Organization, cerebral hemorrhage—likely the outcome of severe hypertension—is the primary cause of mortality in women with preeclampsia, which is estimated to be a direct cause of 70 000 maternal deaths worldwide each year (21).

Preeclampsia has a high mortality rate, and up to 7% of all pregnant women are diagnosed with preeclampsia (22). Given the above discussion and the critical need to address preeclampsia, this study aimed to investigate and mitigate the impact of preeclampsia in the western part of Saudi Arabia. Preeclampsia is a potentially life-threatening condition that poses significant risks to both pregnant women and their unborn children. By assessing preeclampsia awareness and identifying women at high risk of this condition, this study further aimed to shed light on a critical aspect of women's health in this region. Insufficient awareness and comprehension of preeclampsia may result in a delayed diagnosis and suboptimal management. Moreover, it is crucial to comprehend the prevalent risk factors for preeclampsia within this particular population to customize effective preventive measures and healthcare strategies.

Materials and Methods
Study Design/Setting
This cross-sectional survey was conducted in the western region of the Kingdom of Saudi Arabia from September, 2022 to December, 2022.

Study Population and Participant Selection
Population size of the participants meeting the inclusion criteria was over 20 000 participants, with margin of error of 5% and confidence interval of 95%. Therefore, the sample size was estimated to be 385 participants; however, a larger pool of responses was successfully collected from 541 participants.

A non-probability sampling method was employed in this study, and the participants were selected based on their availability and willingness to participate. This approach, known as convenience sampling, is commonly used in studies where the access to the target population is limited or when the researchers rely on individuals readily available for participation. Although this method may lack the representativeness of the random sampling, it was inescapably adopted in this study due to practical constraints.

All females from the western region, aged between 18-50, and not involved in the medical field were included in the study. Females from other regions of Saudi Arabia, younger than 18 or older than 50 years of age, and involved in the medical field were excluded from it.

In the analysis, missing data was addressed through imputation. The potential confounders considered in the analysis were socio-economic status, access to health care, and availability of prenatal care.

Questionnaire Administration and Data Collection
Socio-demographic data about the participants' history of preeclampsia and their knowledge of it were collected using a translated version of a validated questionnaire (23). It should be noted that the questionnaire was translated by adopting an accurate translation method which entailed a cultural adaptation of the questionnaire's content. To this end, first, the original questionnaire was translated into the target language by professional translators who were also well-versed in medical terminology and concepts. Then the first draft of the translation was reviewed by a panel of experts to ensure the linguistic accuracy and maintenance of the questionnaire's integrity. To identify any discrepancies or inconsistencies between the original and translated versions of the questionnaire, a back-translation was performed by a separate group of bilingual experts fluent in both target and source languages. To ensure the cultural relevance and appropriateness, the questionnaire was then culturally adapted to the target population. This involved making necessary adjustments to language, phrasing, and content to ensure that it resonated with the participants in the new cultural context. Throughout this process, the translated and culturally adapted questionnaire was carefully validated to ensure its reliability and validity for the target population.

The questionnaire consisted of closed-ended questions with dichotomous answers ("yes, no" or "true, false"), and the questions were designed to determine whether the respondents had knowledge and awareness of preeclampsia in terms of its symptoms, risk factors, and consequences. The first section of the questionnaire was intended to gather the socio-demographic data, while its second section included the questions relating to the

participants' knowledge of preeclampsia, covering aspects such as signs and symptoms (10 items), risk factors (15 items), maternal and fetal complications (10 items), and general information about preeclampsia (7 items). This comprehensive approach was employed to ensure a thorough assessment of the participants' knowledge and perceptions of preeclampsia.

Validation of the Questionnaire

A rigorous validation process was followed to validated the questionnaire used in this study, which was based on the positive and significant item-total correlation. This correlation was calculated using Pearson correlation coefficients, which measured the relationship between the score of each individual item and the sum of scores on the entire questionnaire. A significant correlation coefficient (in this case, 0.01) indicates that each item on the questionnaire contributes meaningfully to the overall measurement of the construct under study. This validation step ensures that the questionnaire accurately measures what it is intended to assess.

Internal Reliability

In addition to validation, the internal reliability of the questionnaire was assessed using Cronbach's alpha. Cronbach's alpha is a statistical measure that indicates how consistently the items in a questionnaire or scale measure the same underlying construct. A high Cronbach's alpha score suggests that the items are reliably capable of measuring the intended construct. This step is crucial to ensure that the questionnaire consistently measures preeclampsia awareness and its related factors.

Bias
Sampling Bias

A non-probability sampling method—convenience sampling method, in particular—was employed in this study. Therefore, bias may have creeped into the study because it may not have represented the entire population accurately. If the participants had been more interested in the topic, more educated, or more accessible, they may have participated in the study more willingly.

Recall Bias

When collecting information about the participants' past experiences or knowledge, there is always a risk of recall bias since the participants may not remember or report their past experiences or knowledge accurately. Although there were possible chances of such biases, an attempt was made in our study to effectively minimize them.

Statistical Analysis

Several statistical techniques and tests were used to analyze the data generated by the questionnaire. In sum, Pearson's correlation was performed to examine the questionnaire's construct validity; Cronbach's alpha was used to assess the questionnaire's internal reliability; descriptive statistics were employed to analyze the demographic data expressed as frequencies and percentages; and frequencies, percentages, means, and standard deviations were calculated to answer the research questions. The level of statistical significance was set at $P < 0.05$.

Low (60%), moderate (60-80%), and high (80-100%) scores on the knowledge section of the questionnaire were expressed as percentages.

Results
Demographic Characteristics of the Participants

Our sample consisted of 541 non-medical women from western region and aged between 18–50 years, with mean age of 34.5 years and standard deviation of 8.7 years. As for the participants' marital status, 64.9% of them were married, 22.9% were single, 8.7% were divorced, and only 3.5% were widowed. As for their education level, 54.7% of them had university degrees, 32.9% had high school diploma, and only 1.3% were illiterates. As for their blood group, the most common blood group among them was O+ (reported for 31.2% of them), followed by A+ (reported for 21.8% of them) and B+ (reported for 16.8% of them), while the lowest percentages of blood groups were O- (reported for 3.9% of them) and AB- (only reported for 3.0% of them).

Preeclampsia General Knowledge

According to our study results regarding the severity of pre-eclampsia, 34.3% of the participants believed that pre-eclampsia was very severe, 26.6% believed it was severe, and only 6.8% believed it was not severe, while 32.2% of them failed to determine the severity of pre-eclampsia.

It was found that 65.6% of the participants argued someone was likely to experience pre-eclampsia during 20 weeks of gestation, while the rest (34.4%) argued someone was likely to experience pre-eclampsia before 20 weeks of gestation. Majority of the participants (61.6%) had knowledge of pre-eclampsia, which was considered moderate knowledge; 53.6% of them knew about the effectiveness of blood tests in diagnosing pre-eclampsia, which was considered low knowledge; and 46.6% of them knew about the referral of high risk women to high-risk pregnancy specialists, which was considered low knowledge. On the other hand, small number of the participants (19.6%) knew that aspirin prevented or lowered the risk of pre-eclampsia in high risk women and only 12.8% of them knew steroids were used for dealing with pre-eclampsia, which were considered low knowledge of pre-eclampsia.

Preeclampsia Risk Factors

Table 1 shows the frequency distribution of the participants' responses to the first dimension (i.e., measurement of the risk factors for pre-eclampsia) as well as the frequency/percentage of their answers to the statements. According

to the study results, only 11.7% of the participants faced the risk factors for pre-eclampsia while majority of them (79.6%) faced no risk factors for it, which was suggestive of the fact that they generally had a lower risk of getting this disorder.

Table 1 reveals that the most common risk factor for pre-eclampsia among participants is being older than 35 years old, affecting 48.2% of individuals. The second most common risk factor is never having been pregnant, affecting 31.6% of participants. Being overweight is the third most common risk factor, affecting 20% of individuals. Other risk factors include a history of stillborn or delivering a dead fetus (12.8%), previous diagnosis of diabetes (12.2%), and obesity (12.0%). These results indicate that participants have a relatively low risk for pre-eclampsia.

The least common risk factors for pre-eclampsia among participants included "hypertension and antiphospholipid syndrome, chronic kidney disease, pregnancy or giving birth to a baby with Patau syndrome, and systemic lupus erythematous" suffered by 5.9%, 5.5%, 4.3%, and 3.5% of the participants, respectively.

Knowledge of Signs and Symptoms

Table 2 presents the frequency distribution of the participants' responses to the second dimension (i.e., knowledge of signs and symptoms of pre-eclampsia) as well as the frequency/percentage of their answers to the statements. According to our study results, only 23.9% of the participants had knowledge of the pre-eclampsia's signs and symptoms, but they generally had limited knowledge of its signs and symptoms.

According to this table, the most common signs and symptoms of pre-eclampsia were "the collection of fluid (edema) in lower limbs and upper limbs" known by 34.8% of the participants, followed by "the decreased fetal movement" known by 29.9% of them and "the protein in urine" known by 28.1% of them, which were all considered low knowledge of its signs and symptoms.

On the other hand, the least common signs and symptoms of pre-eclampsia were "back pain" known by 12.8% of the participants and "chest pain" known by only 9.1% of them, which were considered low knowledge of its signs and symptoms.

Knowledge of Risk Factors of Preeclampsia

The study results showed that only 32.6% of the participants had knowledge of risk factors for pre-eclampsia, and that they generally had low knowledge of risk factors for this disorder.

According to Table 2, moreover, the most common risk factors for pre-eclampsia were "unhealthy lifestyle" known by 60.4% of the participants, which was considered moderate knowledge of its risk factors, followed by "obesity" known by 50.1% of them, "hypertension" known by 49.4% of them, "diabetes" known by 44.0% of them, and "a history of pre-eclampsia" known by 42.9% of them, which were all and considered low knowledge of risk factors for pre-eclampsia.

On the other hand, the least common risk factors for

Table 1. Participant Risk Factor Measurement to Develop Pre-eclampsia

Statements	Yes		No		I don't know		Interpretation
	No.	%	No.	%	No.	%	
1. Are you older than 35 years?	261	48.2%	280	51.8%	0	0.0%	Low
2. Is your BMI more than or equal to 25 before pregnancy? (overweight)	108	20.0%	308	56.9%	125	23.1%	Low
3. Is your BMI equal to or more than 30 before pregnancy? (obese)	65	12.0%	333	61.6%	143	26.4%	Low
4. Have you ever been pregnant before?	171	31.6%	370	68.4%	0	0.0%	Low
5. Are you from the black race?	44	8.1%	497	91.9%	0	0.0%	Low
6. Have you ever been or are you currently pregnant with twins?	38	7.0%	459	84.8%	44	8.1%	Low
7. Did you suffer previously from pre-eclampsia?	40	7.4%	459	84.8%	42	7.8%	Low
8. Are you diagnosed with or suffering from hypertension?	32	5.9%	454	83.9%	55	10.2%	Low
9. Are you diagnosed with diabetes?	66	12.2%	436	80.6%	39	7.2%	Low
10. Are you diagnosed with antiphospholipid syndrome?	32	5.9%	449	83.0%	60	11.1%	Low
11. Are you diagnosed with systemic lupus erythematous?	19	3.5%	483	89.3%	39	7.2%	Low
12. Do you have chronic kidney disease?	30	5.5%	463	85.6%	48	8.9%	Low
13. Do you have family history of pre-eclampsia? (maternal side)	33	6.1%	436	80.6%	72	13.3%	Low
14. Have you ever given birth to a dead fetus? (stillborn)	69	12.8%	472	87.2%	0	0.0%	Low
15. Have you ever been pregnant or given birth to a baby with patau syndrome (trisomy 13)?	23	4.3%	454	83.9%	64	11.8%	Low
16. Did you experience placental abruption in any of your pregnancies?	35	6.5%	461	85.2%	45	8.3%	Low
17. Have you ever used assisted reproduction technology?	35	6.5%	461	85.2%	45	8.3%	Low
18. Have you ever experienced pre-eclampsia in your current or previous pregnancies?	36	6.7%	479	88.5%	26	4.8%	Low
Total	1137	11.7%	7754	79.6%	847	8.7%	Low

Table 2. Knowledge of Signs and Symptoms of Preeclampsia

Signs and symptoms of pre-eclampsia	Yes		No		I don't Know		Knowledge Level
	N	%	N	%	N	%	
1. High blood pressure (during pregnancy)	115	21.3%	141	26.1%	285	52.7%	Low
2. Is protein in the urine a sign of pre-eclampsia?	152	28.1%	109	20.1%	280	51.8%	Low
3. Is persistent headache a sign of pre-eclampsia?	111	20.5%	133	24.6%	297	54.9%	Low
4. Is chest pain a sign of pre-eclampsia?	49	9.1%	155	28.7%	337	62.3%	Low
5. Is abdominal pain a sign of pre-eclampsia?	129	23.8%	130	24.0%	282	52.1%	Low
6. Is the collection of fluid (edema) in the lower limbs and upper limbs a sign of pre-eclampsia?	188	34.8%	123	22.7%	230	42.5%	Low
7. Is blurred vision a sign of pre-eclampsia?	140	25.9%	118	21.8%	283	52.3%	Low
8. Is back pain a sign of pre-eclampsia?	69	12.8%	175	32.3%	297	54.9%	Low
9. Are nausea and vomiting signs of pre-eclampsia?	162	29.9%	134	24.8%	245	45.3%	Low
10. Is decreased fetal movement a sign of pre-eclampsia?	176	32.5%	98	18.1%	267	49.4%	Low
Total	1291	23.9%	1316	24.3%	2803	51.8%	Low

pre-eclampsia included "twin pregnancy" known by 17.9% of the participants, "multiple births" known by 16.1% of them, and "using artificial reproduction technology" known by 13.5% of them, which were all considered low knowledge of its risk factors.

Knowledge of Preeclampsia Complications

The study results indicated that only 27.3% of the participants had knowledge of pre-eclampsia's complications, which were suggestive of the fact they generally had low knowledge of its complications.

According to the table, the most common complications of pre-eclampsia were "fetal death" known by 42.1% of the participants, followed by "preterm birth/NICU admission" known by 38.4% of them and "intrauterine growth restriction/oligohydramnios" known by 34.8% of them, which were all considered low knowledge of its complications.

On the other hand, the least common complications of pre-eclampsia included "hemolysis" known by 21.1% of the participants, "low platelets" known by 21.1% of them, and "heart disease" known by "19.8%" of them, which were all considered low knowledge of its complications.

Results Summary

Our sample consisted of 541 non-medical women from western region and aged 18–50 years, with mean age of 34.5 years and standard deviation of 8.7 years.

Our study results revealed that majority of the participants (64.9%) were married, 54.7% of them held university degrees, 31.2% of them had type O+ blood group, 34.3% of them believed pre-eclampsia was very severe, and 65.6% of them believed someone was likely to experience pre-eclampsia during 20 weeks of gestation.

The participants faced lower risk factors for pre-eclampsia since 48.2% of them were older than 35 years, 20% of them were overweight, 31.6% of them had never experienced pregnancy, and 12.8% of them had delivered a dead fetus.

The participants generally had low knowledge of the pre-eclampsia's signs and symptoms since 34.8 of them knew "a collection of fluid (edema) in the lower limbs and upper limbs" was a sign of pre-eclampsia, 29.9% of them knew "a decreased fetal movement" was a sign of it, and 28.1% of them knew "protein in the urine" was a sign of it, which were all considered low knowledge about its signs and symptoms.

Furthermore, the participants generally had low knowledge of pre-eclampsia's risk factors since 60.4% of them knew "unhealthy lifestyle" was a risk factor for pre-eclampsia, 50.1% of them knew "obesity" was a risk factor for it, 49.4% of them knew "hypertension" was a risk factor for it, and 44% of them knew "diabetes" was a risk factor for it, which were all considered low knowledge.

The participants also had low knowledge of pre-eclampsia's complications since 42.1% of them knew "fetal death" was a complication of pre-eclampsia, 38.4% of them knew "preterm birth/NICU admission" was a complication of it, and 34.8% of them knew "intrauterine growth restriction/oligohydramnios" was a complication of it, which were all considered low knowledge.

In addition, the participants generally had low general information about pre-eclampsia since 61.6% of them had prior knowledge about pre-eclampsia, 53.6% of them knew about the effectiveness of blood tests in diagnosing it, and 46.6% of them knew about the referral of high risk women to high-risk pregnancy specialist, which were all considered low knowledge.

Discussion

In the present study, the awareness of preeclampsia among women in the western part of Saudi Arabia, their knowledge of signs and symptoms, risk factors, and complications of preeclampsia, as well as their general knowledge of this pregnancy disorder were examined.

Our study results revealed that women in western Saudi Arabia lacked the required knowledge of preeclampsia. Although 61.6% of the participants had prior knowledge

of preeclampsia, their responses to the survey's questions regarding the knowledge of different preeclampsia's parameters were suggestive of a low level of awareness, with only 34.8% of participants having general knowledge of the disorder. Majority of the participants were married (64.9%) and well-educated (54.7%), 8.7% were divorced, and 3.5% were widowed. This composition of the sample suggested that single women or women with a lower educational level may have had an even lower knowledge of preeclampsia.

As discussed in the introduction section, an advanced age is one of the risk factors for preeclampsia (6). Since 48.2% of the participants were older than 35 years, the advanced age was one of the most prevalent risk factors in our sample. The second most common risk factor was nulliparity which was observed in 31.6% of the participants. Multiple studies have confirmed that nulliparity is an important risk factor for preeclampsia and, in the present study, primiparous women had a 1.4 to 5.5-fold higher chance of developing preeclampsia (24).

Only 23.9% of the participants were familiar with preeclampsia's signs and symptoms, a slightly higher percentage (32.6%) were familiar with its risk factors, and 27.3% had adequate knowledge of its complications. Therefore, only a small percentage of the participants had prior knowledge of different aspects of preeclampsia.

Similarly, previous research has also revealed low awareness of preeclampsia among the participants. A study conducted in the United States, for example, found that only 14% of the patients were able to define preeclampsia accurately (25). A Ghanaian study reported that only 11.4% of their participants had adequate knowledge of preeclampsia (26), and a Malaysian study determined that only a small number of the mothers (18.4%) had sufficient knowledge of the disorder 27. Two other studies reported that 59% and 60% of the women from Tanzania were detected to lack general knowledge about preeclampsia (28,29).

Taking into account these results and due to the inadequate knowledge, women are less likely to seek medical advice if they encounter symptoms of preeclampsia. Employing effective measures to increase the awareness of preeclampsia, therefore, is crucial to prevent and manage it in a timely manner.

A study conducted in 2018 found significant improvement in the knowledge of preeclampsia after using various educational methods (e.g., graphic cards and videos) to educate the participants about the disorder (30). In another study, the patients using a graphics-based educational tool were found to demonstrate superior knowledge of preeclampsia compared to the patients only receiving standard materials or no education (31). People in Saudi Arabia use the internet to gain information and patient education materials about preeclampsia, which are also available in approximately half of all academic departments and their associated medical centers.

Therefore, it is necessary to enhance the content of such materials and decrease the jargon in preeclampsia patient-education materials (32). Further education decreases the adverse events by enabling women to recognize symptoms, resulting in earlier diagnoses and management which, in turn, decreases the morbidity and mortality (33).

To reduce and even eliminate the possibility of creeping biases into the present study, an attempt was made to adopt appropriate measures to minimize the potential sources of bias, such as the randomization of the order of survey questions and the application of multiple data collectors to reduce the observer bias.

The data collected in this study may have been externally validated on our selected population by other researchers since rigorous data collection/analysis procedures were followed and well-established measurement instruments were used in our study.

Limitations

This study had some limitations. First, only the women from the western region of Saudi Arabia were examined in our study; therefore, our findings may not have been generalizable to the women from other regions of the country. Second, the survey announcement and questionnaire were accessible only through an online forum; thus, participants with unknown biases may have been included in the sample (34). Third, the study's cross-sectional design precluded the observations over time and, therefore, our results may not have facilitated identifying important trends or making causal inferences (35). Fourth, despite the advantages of the closed-ended dichotomous questions (i.e., they are easy to understand, quick to complete, and easy to grade, analyze, and present in charts or graphs), they imposed some disadvantages on the present study. A response to a closed-end question cannot convey the respondent's depth of knowledge because not all answers are covered by it (especially by a dichotomous question with only two options). Although a respondent's knowledge of a symptom can be quantified, the range and level of his/her knowledge remains unknown.

In conclusion, women's awareness regarding preeclampsia is fundamental to the effective prevention and management of preeclampsi. Moreover, women from the western region of Saudi Arabia were found in urgent need of receiving education about preeclampsia. It was suggested that all pregnant women should receive information about the signs and symptoms of preeclampsia during the prenatal care visits in order to ensure a safe pregnancy and overall outcomes. To this end, it was recommended that the comprehensive information about preeclampsia's signs and symptoms should be offered during prenatal care visits, thereby ensuring safer pregnancies and better outcomes.

For future research and interventions, specific strategies may have been formulated and pursued as follows:

- Community workshops: Organize workshops and

information sessions on preeclampsia in collaboration with healthcare providers to reach a broader audience.

- Awareness campaigns: Implement targeted awareness campaigns through various media channels, both online and offline.
- Mobile apps: Develop mobile applications that provide pregnant women with easy access to information about preeclampsia and its management.
- Healthcare provider Training: Enhance the knowledge of healthcare professionals in the region about preeclampsia, enabling them to better inform and guide pregnant women.

These strategies, when combined, may have significantly contributed to increasing preeclampsia awareness and improving maternal health outcomes in the western region of Saudi Arabia.

Conclusions

Women in the western region of Saudi Arabia faced lower risk of developing preeclampsia; however, they had a poor knowledge of this disorder, which highlighted the urgent need of increasing their awareness of it.

Authors' Contribution

Conceptualization: Nedaa Mohammed Bahkali.
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Conflict of Interests

Authors declare that they have no conflict of interests.

Ethical Issues

All participants were informed of the study process and procedure, and an informed consent was obtained from all of them. Confidentiality of the participants was protected by anonymizing their data and identities. Ethical approval was obtained from Unit of Biomedical Ethics Research Ethics Committee (REC), King Abdulaziz University (NCBE Registration No: HA-02-J-008; Reference number: 480-22).

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