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Assessment of Nurses' Knowledge and Competence in Managing Preeclampsia at Maternity Teaching Hospital in Sulaimani city

Amani Fadhil Abbas[1], Peshwaz Abdulrahman Ahmed[1], Nazera Salam Mena Qadir[1], Khanda Gharib Aziz[2]

[1]Department of Maternal Neonate Nursing, College of Nursing, University of Sulaimani, Sulaimani City, Kurdistan Region, Iraq, [2]Department of International Trade, College of Law and Administrative, Halabja University, Halabja City, Kurdistan Region, Iraq

ABSTRACT

Background: Preeclampsia is one of the most commonly reported complications during pregnancy, affecting approximately 2–15% of all pregnancies. It is characterized by the onset of hypertension after 20 weeks of gestation, accompanied by proteinuria, generalized edema, or evidence of organ dysfunction. This condition poses a serious threat to both maternal and fetal health, significantly increasing the risk of morbidity and mortality. According to the Centers for Disease Control and Prevention, "the number of pregnant women with high blood pressure has been increasing, with cases doubling from 1.8% in 2008 to 3.7% in 2021" reported in the United States. Risk factors for preeclampsia included race, advanced maternal age, obesity, null parity, multifetal pregnancy, and co-existing medical disorders. Managing preeclampsia is important because it can lead to complications for both the mother and baby. **Aim:** This study aimed to assess nurses' knowledge and competence in managing preeclampsia at the Maternity Teaching Hospital in Sulaimani City. **Materials and Methods:** A cross-sectional descriptive study was conducted at Maternity Teaching Hospital in Sulaimani city, Iraq, from January 5, 2024, to June 13, 2024. The study included 25 nurses working in the emergency care unit and labor room of the Obstetrics and Gynecology Department. A questionnaire format was created according to the aim of the study and delivered by a team of five experts, consisting of two parts. Part one: The sociodemographic characteristics of the nurses, and the second part assessed their knowledge and practices regarding the management of preeclampsia data were collected through a structured face-to-face questionnaire and analyzed using the Statistical Package for the Social Sciences version 24. **Results:** The majority of nurses were over 35 years old, with a mean age of 36 (standard deviation = 12.86). In terms of education, most nurses held a diploma (48%), and 64% were married. Around 56% of nurses reported participating in workshops or programs related to preeclampsia in the obstetrics field. When asked to define eclampsia, 80% of the nurses answered correctly, and the same percentage correctly identified the best anticonvulsant for managing preeclampsia. Overall, the nurses demonstrated a fair level of knowledge in managing preeclampsia. No significant association was found between age and knowledge level, suggesting age did not influence knowledge or competency in managing preeclampsia. **Conclusion and Recommendations:** Based on the study's findings, the nurses demonstrated a fair level of knowledge in managing preeclampsia, especially in treatment and prevention. To improve patient care and reduce maternal and fetal risks, addressing the gaps in nurses' knowledge through regular training courses and educational programs is essential. These efforts will enhance their qualifications and ensure better care for women with preeclampsia.

Index Terms: Preeclampsia, Maternity Hospital, Nurses' Competence and Knowledge

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1.INTRODUCTION

Hypertensive disorders during pregnancy pose a substantial threat to both maternal and fetal health. Among these conditions, preeclampsia is one of the most prevalent and clinically significant, affecting approximately 2–15%

Corresponding author's e-mail: Amani Fadhil Abbas, Department of Maternal Neonate Nursing, College of Nursing, University of Sulaimani. amany.abas@univsul.edu.iq

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of pregnancies globally. Preeclampsia is classified as a hypertensive disorder that develops after 20 weeks of gestation and is typically accompanied by proteinuria or generalized edema. It may also involve hematologic abnormalities such as thrombocytopenia, or signs of end-organ dysfunction including renal impairment, elevated liver enzymes, pulmonary edema, and neurological symptoms such as cerebral or visual disturbances. If left untreated or if it progresses to a severe form, preeclampsia can lead to serious maternal and fetal complications [1]. Multisystem involvement and impaired uteroplacental perfusion can result in adverse outcomes such as intrauterine growth restriction (IUGR), preterm birth, and increased perinatal morbidity and mortality. In severe cases, preeclampsia may become life-threatening for both the mother and fetus [2].

The exact cause of preeclampsia remains unclear, but several risk factors increase its likelihood. Women at higher risk include those pregnant for the 1st time, aged 35 years or older, those with a pregnancy interval of more than 10 years, or those with a family history of preeclampsia. Other risk factors include multiple pregnancies, a body mass index (BMI) of 35 kg/m^2 or higher, diabetes, previous hypertensive disorders in pregnancy, vascular disease, and kidney disease [3].

Preeclampsia is often associated with poor placental development or reduced blood flow to the placenta, which can lead to irregular blood pressure regulation in the mother. Nurses play a crucial role in identifying risk factors by taking detailed medical and family histories during a pregnant woman's first visit. They also educate expectant mothers on the dangers of preeclampsia and the importance of antenatal care. Women who do not receive proper prenatal care are seven times more likely to experience fatal complications from preeclampsia than those who do [4].

The management of preeclampsia involves a multidisciplinary approach aimed at ensuring maternal and fetal safety while minimizing complications. The strategy depends on the severity of the condition, gestational age, and the clinical status of both the mother and fetus. In mild cases, management includes close monitoring of blood pressure, regular assessment of symptoms, and ongoing evaluation of fetal growth and well-being. Lifestyle modifications, rest, and frequent prenatal visits are often recommended. In more severe cases, hospitalization may be required to manage complications, stabilize blood pressure, and conduct continuous fetal monitoring. Pharmacologic interventions such as antihypertensive medications and magnesium sulfate may be used as part of the management plan to reduce the risk of seizures and other severe outcomes. In certain cases, corticosteroids are administered to enhance fetal lung maturity if early delivery is anticipated. The timing of delivery is carefully determined based on clinical findings, with the goal of optimizing outcomes for both mother and child [5].

Nurses play a key role in ensuring timely diagnosis, patient education, and comprehensive maternal care, ultimately improving pregnancy outcomes. Nurses have a critical role in identifying and managing preeclampsia. They monitor blood pressure, assess symptoms (e.g., headaches, vision changes, and swelling), conduct urinalysis for protein, and educate pregnant women on warning signs and preventive measures. Early detection can prevent severe complications, as untreated preeclampsia increases the risk of maternal and fetal mortality. Uninformed nurses may fail to recognize danger signs, delaying treatment and leading to preterm birth, fetal growth restriction, or maternal organ damage [4].

Recent studies have highlighted a global rise in pregnancy-related hypertension, including preeclampsia, due to factors such as advanced maternal age, increasing obesity rates, and lifestyle changes. Although advancements in maternal-fetal medicine have improved outcomes in some regions, many healthcare systems still face challenges related to early detection and management of preeclampsia. In particular, nurses play a crucial role in antenatal care, yet studies suggest gaps in their knowledge and preparedness to manage this condition effectively [6]. Despite the importance of nursing competencies in improving maternal and fetal outcomes, limited research has explored nurses' knowledge and practices regarding preeclampsia in maternity hospital in Sulaimani city of Iraq. This study aims to fill that gap by assessing the knowledge and competency of nurses in managing preeclampsia, thereby identifying areas for targeted training and improvement.

2. MATERIALS AND METHODS

2.1. Design

A cross-sectional descriptive study was conducted between January 5th and June 13th, 2024, to assess nurses' knowledge and competence of nurses in nurses in managing preeclampsia at Maternity Teaching Hospital in Sulaimani City.

2.2. Study Sample

A purposive (non-probability) sampling method was used to select 25 nurses working specifically in the intensive care unit (ICU) and labor room departments at the Maternity Teaching Hospital in Sulaimani City. These nurses were directly involved in the care and management of pregnant women,

particularly those with preeclampsia, making them the most relevant group for the purpose of this study. While this targeted approach was appropriate for the study's objectives, it limits the generalizability of the findings to other nursing departments or healthcare settings.

2.3. Inclusion and Exclusion Criteria

For the study, nurses had to fulfill the following criteria: Nurses working in departments that manage pregnant women (e.g., labor room and ICU) and who consented to participate. Exclusion criteria included nurses unwilling to participate or those working in units not directly involved with maternal care (e.g., Premature ICU).

2.4. Data Tools

A questionnaire was created based on the study's objectives and it is consisted of two sections: (1) Sociodemographic information and (2) items assessing knowledge and practices related to the management of preeclampsia and eclampsia. The tool was reviewed by five domain experts. Verbal consent was obtained from all participants before data collection. Data were collected through face-to-face interviews and analyzed using the Statistical Package for the Social Sciences (SPSS) version 24.

2.5. Validity and Reliability of the Study Instrument

The study tool used to assess nurses' knowledge and competence in managing preeclampsia at Maternity Teaching Hospital in Sulaimani City was reviewed for content and face validity by a panel of five experts from Maternity and Neonatal Care Nursing, Pediatric Nursing, and Community Nursing. Based on their feedback, some minor revisions were made. The tool's reliability was confirmed with a Pearson correlation coefficient of 0.88. A pilot study with 10 nurses was conducted and included in the final analysis, as no modifications were made to the questionnaire, and they met the study's inclusion criteria. Thus, the inclusion was considered methodologically appropriate and contributed to the overall validity and robustness of the study findings.

2.6. Data Collection

Data were collected by interviewing each participant individually using a specially designed questionnaire in February 2024. Each interview lasted about 15 minutes. Verbal consent was obtained, and nurses agreed to participate in the study.

2.7. Data Analysis

SPSS for Windows, version 24, was used to analyze the data. Frequency, percentage, and Chi-square tests were used to evaluate any significant association between variables. *P* value of 0.05 was used as the cutoff for statistical significance and 0.001 for high statistical significance.

3. RESULTS

Table 1 shows that the age distribution of nurses is fairly balanced nurses, with 24% under 25 years, 36% between 25 and 35 years, and 40% over 35 years. The mean age of the nurses was 35.56 years, with a standard deviation of 12.86, indicating a diverse range of ages. Regarding education, 48% hold a Diploma in Nursing, 24% have a Master's degree or higher, 16% are midwifery school graduates, and 12% hold a Bachelor's degree, reflecting diverse qualifications. Marital status data reveal that 64% of nurses are married, 36% are single, and none were widowed in this sample.

Table 2 shows that 48% of the nurses have over 10 years of experience, reflecting a highly experienced group, while 28% have <5 years, and 24% have between 5 and 10 years. The average professional experience of the nurses was approximately 12.72 years (Mean = 12.72, standard deviation [SD] = 11.39), suggesting a mix of new and experienced nurses. In the obstetric unit, 48% of nurses have <5 years of experience, 24% have 5–10 years, and 28% have over 10 years, with an average of around 9 years (Mean = 9.02, SD = 10.59). This indicates a relatively lower level of experience in this specialized area, indicating less experience in this area. In addition, 56% of nurses reported having attended workshops or training programs related to preeclampsia, while 44% had not participated in such programs.

TABLE 1: Distribution of study samples according to demographic characteristics

Socio demographic data	Frequency	Percentage
Age of nurse (years)		
<25	6	24.0
25–35	9	36.0
>35	10	40.0
Mean±SD	35.56≅36±12.86	
Level of education in nursing		
Midwifery school	4	16.0
Diploma in nursing	12	48.0
Bachelors in nursing	3	12.0
Master degree and above	6	24.0
Marital status		
Married	16	64.0
Single	9	36.0
Widowed	0	0.0
Total	25	100.0

SD: Standard deviation

TABLE 2: Distribution of study samples according to profession background

Items	Frequency	Percentage
Years in the nursing profession		
<5	7	28.0
5–10	6	24.0
>10	12	48.0
Mean±SD	12.72≅13±11.39	
Years working [experience] in the obstetric unit		
<5	12	48.0
5–10	6	24.0
>10	7	28.0
Mean±SD	9.02≅9 ± 10.59	
Attending workshops or programs related to preeclampsia		
Yes	14	56.0
No	11	44.0
Total	25	100.0

SD: Standard deviation

TABLE 3: Distribution of study samples according to their knowledge in recognizing the correct definition of preeclampsia

Items	Frequency	Percentage	Total score
Hypertension of at least 140/90 mmHg recorded on at least two separate occasions and at least 4 h apart and in the presence of at least 300 mg protein in a 24-h collection of urine	20	80.0	20
Hypertension of at least 140/90 mmHg recorded on at least two separate occasions and at least 4 h apart without protein in urine	5	20.0	Results
Normal blood pressure with the presence of at least 300 mg protein in a 24 h collection of urine	0	0.0	Good
Total	25	100.0	

Table 3 shows that 80% of the nurses correctly identified preeclampsia as hypertension of at least 140/90 mmHg on two separate occasions, along with at least 300 mg of protein in a 24-h urine collection. However, 20% incorrectly defined preeclampsia as hypertension without proteinuria. None of the nurses (0%) mistakenly identified preeclampsia as normal blood pressure with protein in the urine. This demonstrates a high level of accurate knowledge about the definition of preeclampsia among most of the nursing staff.

Table 4 assesses nurses' knowledge of preeclampsia care, including risk factors, symptoms, complications, magnesium toxicity signs, and treatments. Each participant was evaluated on a 0–1 scale. Among the 25 nurses, scores below 50% indicated poor knowledge, 50–74% signified fair knowledge, and 75% or higher reflected good knowledge.

Table 4 regarding the risk factors for preeclampsia: The majority of nurses (80%) correctly identified chronic hypertension as a risk factor for preeclampsia ("Good"), while awareness was lower for autoimmune diseases (36%"Poor") and first-time pregnancy (28%"Poor"). Knowledge of diabetes as a risk factor was also limited (44%, "Poor"). In contrast, many recognized blood clotting disorders (60% "Fair") and previous preeclampsia (72% "Fair"). Awareness was higher for family history (72% "Fair"), multiple pregnancies (64% "Fair"), and high BMI (84% "Good'). Age was well recognized by 88% of participants ("Good") and preeclampsia before 20 weeks was identified by 56% ("Fair").

Table 5 assesses nurses' knowledge of preeclampsia symptoms. Based on the predefined classification (Good: ≥75%, Fair: 50–74%, and Poor: <50%), nurses demonstrated strong knowledge of preeclampsia symptoms, with (84% "Good") correctly identifying persistent frontal headaches, recognizing sudden swelling (88% "Good"), and identifying seizures (84% "Good"). Blurry vision was recognized by (76% "Fair") also oliguria (68% "Fair"). However, knowledge of epigastric pain was significantly lower, with only (40% "Poor") identifying it correctly. This highlights a need for further education on less noticeable but important symptoms.

Table 6 assesses nurses' knowledge of preeclampsia complications based on the predefined classification (Good: ≥75%, Fair: 50–74%, and Poor: <50%). Nurses demonstrated strong knowledge of seizures (84% "Good."), renal failure (84%"Good."), intracranial hemorrhage (84% "Good."), intrauterine death (96% "Good."), and IUGR (92% "Good."), However, awareness was moderate for other complications, including pulmonary edema (60% "Fair"), placental abruption (68% "Fair"), and HELLP syndrome (52% "Fair"). This suggests that while nurses are highly knowledgeable about the most severe complications, there is an opportunity to enhance their understanding of other risks, particularly pulmonary edema and HELLP syndrome, which require prompt recognition and management to prevent maternal and fetal morbidity.

TABLE 4: Distribution of study samples according to their knowledge toward preeclamptic women care (Risk factors for preeclampsia)

Knowledge of nurses toward preeclamptic women care	Frequency	Percentage	Total score	Results
History of chronic high blood pressure				
No	5	20.0	20	Good
Yes	20	80.0	9	Poor
Autoimmune disease				
No	16	64.0	9	Poor
Yes	9	36.0		
Being pregnant for 1st-time				
No	18	72.0	7	Poor
Yes	7	28.0		
History of diabetes				
No	14	56.0	11	Poor
Yes	11	44.0		
Blood clotting disorder thrombophilia				
No	10	40.0	15	Fair
Yes	15	60.0		
Having preeclampsia during an earlier pregnancy				
No	7	28.0	18	Fair
Yes	18	72.0		
Having a family history of preeclampsia				
No	7	28.0	18	Fair
Yes	18	72.0		
Carrying twins, triplets, or more babies at one time				
No	9	36.0	16	Fair
Yes	16	64.0		
Body mass index of 35 or more				
No	4	16.0	21	Good
Yes	21	84.0		
A pregnant person's age				
No	3	12.0	22	Good
Yes	22	88.0		
Preeclampsia typically develops before 20th week of pregnancy				
No	11	44.0	14	Fair
Yes	14	56.0		

(Contd...)

TABLE 4: (Continued)

Knowledge of nurses toward preeclamptic women care	Frequency	Percentage	Total score	Results

TABLE 5: Distribution of study samples according to their knowledge toward preeclamptic women care (Other signs and symptoms of preeclampsia in addition to hypertension and proteinuria are)

Knowledge of nurses toward preeclamptic women care	Frequency	Percentage	Total score	Results
Frontal head ache that do not go away after taking pain medication				
No	4	16.0	21	Poor
Yes	21	84.0		
Epigastric pain (Right side abdominal pain)				
No	15	60.0	10	Poor
Yes	10	40.0		
Blurry vision, light sensitivity, or seeing spots				
No	6	24.0	19	Fair
Yes	19	76.0		
Sudden swelling in the hands and face (edema)				
No	3	12.0	22	Good
Yes	22	88.0		
Seizures				
No	4	16.0	21	Good
Yes	21	84.0		
Oliguria (<500 mL of urine in 24 h)				
No	8	32.0	17	Fair
Yes	17	68.0		

TABLE 6: Distribution of study samples according to their knowledge toward preeclamptic women care (Complications of preeclampsia include which of the following?)

Knowledge of nurses toward preeclamptic women care	Frequency	Percentage	Total score	Results
Seizures				
No	4	16.0	21	Good
Yes	21	84.0		
Renal failure				
No	4	16.0	21	Good
Yes	21	84.0		
Pulmonary edema				
No	10	40.0	15	Fair
Yes	15	60.0		
Intracranial hemorrhage				
No	4	16.0	21	Good
Yes	21	84.0		
Intrauterine death				
No	1	4.0	24	Good
Yes	24	96.0		
Intrauterine growth restriction				
No	2	8.0	23	Good
Yes	23	92.0		
Placental abruption				
No	8	32.0	17	Fair
Yes	17	68.0		
HELLP syndrome				
No	12	48.0	13	Fair
Yes	13	52.0		
Yes	22	88.0		

Table 7 assesses nurses' knowledge regarding magnesium toxicity symptoms based on the predefined classification (Good: ≥75%, Fair: 50–74%, and Poor: <50%). It shows that nurses demonstrated a good understanding of magnesium toxicity symptoms, with high recognition rates for difficulty speaking or moving (84% "Good"), weakness (76% "Good"), and respiratory compromise (88% "Good."). Blurry vision (72% "Fair") and unresponsiveness (72%"Fair") were classified as moderate awareness. Although (64% "Fair")of nurses identified loss of deep tendon reflexes as a symptom, highlighting the need for further education on less obvious yet clinically critical symptoms to ensure early detection and prevent severe complications associated with magnesium toxicity.

Table 8 assesses nurses' knowledge regarding treatments for preeclampsia. Based on the predefined classification (Good: ≥75%, Fair: 50–74%, and Poor: <50%), it indicates

TABLE 7: Distribution of study samples according to their knowledge toward preeclamptic women care (Which of these are signs and symptoms of magnesium toxicity)

Difficulty speaking or moving	Frequency	Percentage	Total score	Results
No	4	16.0	21	Good
Yes	21	84.0		
Blurry vision				
No	7	28.0	18	Fair
Yes	18	72.0		
Weakness				
No	6	24.0	19	Good
Yes	19	76.0		
Unresponsive				
No	7	28.0	18	Fair
Yes	18	72.0		
Loss of deep tendon reflexes				
No	9	36.0	16	Fair
Yes	16	64.0		
Respiratory compromise				
No	3	12.0	22	Good
Yes	22	88.0		

that nurses demonstrated strong knowledge regarding the treatment of preeclampsia. A high percentage (80% "Good") recognized bed rest as a main treatment. Moreover, (96% "Good") understood the importance of a multidisciplinary team. Furthermore, (76% "Fair") correctly identified delivery of the fetus as the definitive treatment. This is particularly important, as timely delivery remains the only definitive treatment to halt disease progression and reduce maternal and fetal risks.

Table 9 assesses nurses' knowledge regarding the immediate measures of magnesium toxicity. It outlines that the majority of nurses (92%) correctly identified stopping the magnesium sulfate infusion as the essential intervention, demonstrating good knowledge. However, only (8%) recognized the need for an indwelling urinary catheter, and none (0%) identified the administration of calcium gluconate. This is concerning, as calcium gluconate is the primary antidote for magnesium toxicity and is essential for reversing life-threatening complications.

Table 10 highlights nurses' knowledge of the drug of choice for managing eclamptic fits. The majority of nurses (88%) incorrectly identified Calcium-likely referring to calcium gluconate-as the drug of choice, which is in fact the antidote for magnesium toxicity, not for treating eclamptic seizures.

Magnesium sulfate is the internationally recommended first-line medication for preventing and treating eclamptic seizures. Only 4% correctly selected Magnesium, while another 4% chose potassium, and another 4% selected electrolyte. This suggests a significant misunderstanding among nurses regarding the correct medication for managing eclamptic fits.

Table 11 assesses nurses' knowledge regarding the immediate nursing actions after a convulsion. It shows that the majority of nurses (80%) correctly identified the importance of ensuring airway patency, administering oxygen, and checking vital signs and fetal heart rate, demonstrating "Good" knowledge. While a portion of the nurses selected "sending blood and urine for testing" (20%) as priority actions, and none (0%) of the participants selected "Document the Event of eclamptic fit." It is important to note that immediate post-convulsion nursing actions should first focus on maintaining airway patency, administering oxygen, and assessing vital and fetal signs. Failure to document the event or perform laboratory evaluations may hinder follow-up care, but these are secondary to initial stabilization.

Table 12 shows the distribution of study samples according to their knowledge about nursing actions after the administration of magnesium sulfate. The correct nursing action, which includes the assessment of vital signs, patellar reflex, and

TABLE 8: Distribution of study samples according to their knowledge toward preeclamptic women care (Treatments for preeclampsia)

Knowledge of nurses toward preeclamptic women care	Frequency	Percentage	Total score	Results
One of the main treatments for preeclampsia is bed rest				
No	5	20.0	20	Good
Yes	20	80.0		
The most successful outcomes are attained with a robust team of physicians, nurses, pharmacists, and healthcare aids, with goal of providing the best possible care and improving maternal and fetal outcomes				
No	1	4.0	24	Good
Yes	24	96.0		
The definitive treatment of preeclampsia is the delivery of the fetus				
No	6	24.0	19	Good
Yes	19	76.0		

TABLE 9: Distribution of study samples according to their knowledge about magnesium toxicity

Items What are the immediate measures in case of magnesium toxicity?	Frequency	Percentage	Total score
Stop magnesium sulfate infusion/administration	23	92.0	23
Insert an indwelling urinary catheter	2	8.0	Results
Give calcium gluconate	0	0.0	Good
Total	25	100.0	

TABLE 10: Distribution of study samples according to their knowledge about management of eclamptic fit

Items What is the drug of choice for the management of eclamptic fit?	Frequency	Percentage	Total score
Calcium	22	88.0	22
Potassium	1	4.0	
Magnesium	1	4.0	Results
Electrolyte	1	4.0	poor
Total	25	100.0	

TABLE 11: Distribution of study samples according to their knowledge about immediate nursing actions after a convulsion (eclamptic fit) in a preeclamptic patient

Items	Frequency	Percentage	Total score
Document the event of eclamptic fit	0	0.0	20
Send blood and urine for testing	5	20.0	Results
Ensure airway patency administer oxygen, check vital signs and fetal heart rate	20	80.0	Good
Total	25	100.0	

urinary output, was identified by only 28% of nurses, indicating "poor" knowledge. Meanwhile, 72% of nurses only identified the need to assess vital signs, which is incomplete. None of the nurses identified the need to send blood and urine for testing. Neglecting to monitor patellar reflexes and urinary output increases the risk of missing signs of magnesium toxicity, which can lead to serious complications such as respiratory depression or renal impairment.

Table 13 illustrates the result of the study which indicates that, that factors such as age and level of education did not significantly impact nurses' knowledge of preeclampsia, highlighting a universal need for targeted training.

Table 14 shows the results of the study. Indicating that, there is no statistically significant association between nurses' demographic/workshop-related variables and their knowledge and competence in managing preeclampsia, as all *P*-values were greater than the common alpha 0.05.

Fig. 1 illustrates the distribution of nurses' knowledge levels concerning the management of preeclampsia, based on predefined classifications (Good: ≥75%, Fair: 50–74%, Poor: <50%). Among the 25 participants, 64% demonstrated fair knowledge, while 36% exhibited good knowledge. Notably, none of the nurses were categorized as having poor knowledge, indicating that all participants possessed at least a basic level of competence in managing preeclampsia.

TABLE 12: Distribution of study samples according to their knowledge about nursing actions after administration of magnesium sulfate

Items	Frequency	Percentage	Total score
Assessment of vital signs	18	72.0	7
Assessment of vital signs, and patellar reflex, urinary output	7	28.0	Results
Send blood and urine for testing	0	0.0	Poor
Total	25	100.0	

4. DISCUSSION OF THE RESULTS

Nursing care plays a pivotal role in promoting positive outcomes for both women and fetuses affected by preeclampsia. This study highlights the importance of nurses, as the frontline caregivers responsible for managing preeclamptic patients. The socio-demographic characteristics of the study sample reveal that the majority of nurses were over 35 years old, consistent with findings from [7], which suggests that the experience level of the nurses could influence their approach to care. However, while older nurses may bring more experience, the relationship between age and knowledge was not statistically significant in this study ($P > 0.05$), suggesting that factors beyond age are important for knowledge acquisition.

Regarding educational attainment, 48% of the nurses in this study held a nursing diploma. This finding aligns with Mohamed *et al.* [8], who reported a similar trend among nurses working in obstetrics and gynecology departments. In contrast, Khatun *et al.*, [9] found that more than half of the nurses in their study held a bachelor's degree, reflecting a higher academic qualification among their sample. Although our study did not find a statistically significant association between education level and knowledge ($P > 0.05$), differences in formal education could influence theoretical

TABLE 13: The association between knowledge of nurses toward preeclamptic women care and socio-demographic characteristics

Socio demographic data	Fair		Good		*P*-value
	Frequency	Percentage	Frequency	Percentage	
Age of nurse (years)					
<25	4	25.0	2	22.2	0.797
25–35	5	31.3	4	44.4	
>35	7	43.8	3	33.3	
Level of education in nursing					
Midwifery school	3	18.8	1	11.1	0.939
Diploma in nursing	7	43.8	5	55.6	
Bachelors in nursing	2	12.5	1	11.1	
MA degree and above	4	25.0	2	22.2	
Marital status					
Married	11	68.8	5	55.6	0.509
Single	5	31.3	4	44.4	
Total	16	100.0	9	100.0	

TABLE 14: The association between knowledge of nurses toward preeclamptic women care and some information data

Items	Fair		Good		*P*-value
	Frequency	Percentage	Frequency	Percentage	
Years in the nursing profession					
<5	5	31.3	2	22.2	0.699
5–10	3	18.8	3	33.3	
>10	8	50.0	4	44.4	
Years working [experience] in the obstetric unit					
<5	8	50.0	4	44.4	0.669
5–10	3	18.8	3	33.3	
>10	5	31.3	2	22.2	
Attending workshops or programs related to preeclampsia					
Yes	8	50.0	6	66.7	0.42
No	8	50.0	3	33.3	
Number of workshops or courses attended					
Yes	6	37.5	3	33.3	0.835
No	10	62.5	6	66.7	

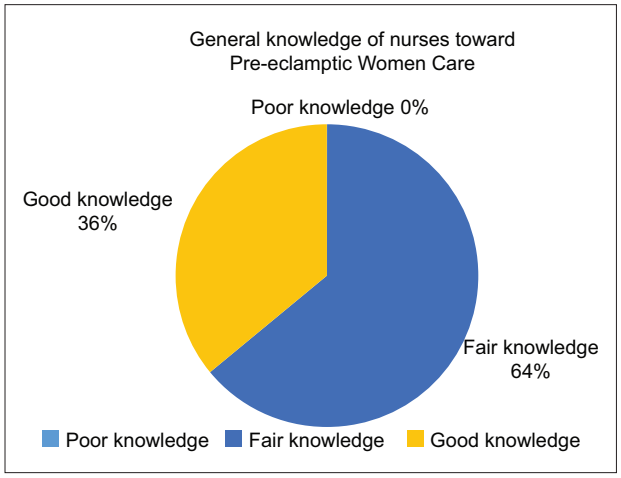

Fig. 1. Overall knowledge level of nurses regarding the management of preeclampsia.

understanding, critical thinking, and evidence-based decision-making factors that are crucial in managing preeclampsia. This highlights the need for further research into how education level affects the quality of maternal care.

Experience is another key factor influencing knowledge and care delivery. Over half of the nurses in this study had <5 years of experience, a finding consistent with Abd El Monem *et al.*[10], who observed similar trends among nurses in Khartoum. While this suggests that newer nurses may lack sufficient clinical exposure, it also offers an opportunity to improve training and mentorship programs, ensuring that less experienced nurses receive targeted support. However, it is also important to consider that variations in knowledge may be influenced by additional factors such as institutional policies, staffing levels, workload, and the availability of resources, all of which could affect nurses' ability to acquire and apply clinical knowledge effectively.

In terms of training, the majority of nurses (56%) had attended workshops or courses related to preeclampsia. However, this finding contrasts with Mkumbo and Moshi [11], who found that 77.7% of participants had not received any formal training. This discrepancy may be due to differences in the healthcare settings or the availability of professional development opportunities. Regardless, it underscores the need for consistent and continuous education programs for all nurses working with preeclamptic patients, regardless of prior training.

The study also found that 80% of nurses demonstrated good knowledge in identifying preeclampsia, aligning with ElazimElmenshewy *et al.* [12], who noted a similar level of awareness in their study. In terms of magnesium toxicity, 92% of nurses knew the correct immediate action to take, which indicates a strong understanding of this critical area of preeclampsia management. These findings are encouraging, as they reflect a solid foundation of knowledge in key aspects of care. However, statistical analysis indicated no significant correlation between knowledge levels and factors such as education level or years of experience ($P > 0.05$), suggesting that knowledge gaps may be influenced by other variables. Therefore, there is still room for improvement, particularly in broader care practices beyond immediate recognition and response.

Overall, 64% of nurses in this study had a fair knowledge of preeclampsia care, with the remaining 36% demonstrating good knowledge. This result contrasts with the study by

Faris and Faris [13], which reported poor knowledge in their sample. This variation suggests that there is no uniform level of understanding across different settings and highlights the need for targeted interventions to address these knowledge gaps. Fair knowledge may indicate that while nurses possess a basic or moderate understanding, there are gaps in critical areas such as early warning signs, complication management, or medication monitoring that could compromise patient safety and hinder timely interventions.

To improve nurses' knowledge and care for preeclamptic women, several targeted solutions can be implemented based on the study's findings. Given that 64% of nurses demonstrated only fair knowledge of preeclampsia care, standardized training programs are essential to reduce knowledge gaps and address inconsistencies in educational opportunities. Developing evidence-based educational programs focused on the clinical management of preeclampsia will ensure nurses remain up to date with current research and best practices [8]. Furthermore, since over half of the participants had <5 years of experience in obstetric care, mentorship and on-the-job training should be prioritized. Pairing experienced nurses with less experienced ones can provide hands-on guidance, build clinical confidence, and support effective knowledge transfer from senior staff [14]. These strategies are crucial for strengthening the competence of nursing staff and ultimately improving maternal and fetal outcomes.

Another key solution is the implementation of regular assessments and feedback, such as quizzes, simulations, and case-based evaluations, to measure nurses' knowledge and clinical judgment. Given that the majority of nurses in this study demonstrated only fair knowledge, such assessments are vital for identifying specific gaps and guiding targeted follow-up training sessions [15]. For example, if a significant number of nurses show limited understanding of magnesium sulfate toxicity management, focused retraining on that topic should be provided.

Moreover, promoting multidisciplinary collaboration – among nurses, obstetricians, midwives, and other healthcare providers – is essential for delivering holistic care to preeclamptic patients. This approach not only improves communication and decision-making but also reduces the risk of delayed interventions or mismanagement [13]. Given the absence of a significant association between knowledge levels and demographic factors in this study, it is evident that system-level strategies such as team-based care and institutional protocols may play a more influential role in ensuring safe outcomes. By implementing these strategies in response to the identified knowledge patterns, healthcare institutions can build stronger nursing competencies and enhance maternal and fetal outcomes in cases of preeclampsia.

5. CONCLUSION

This study shows that nurses' knowledge about managing preeclampsia needs improvement to ensure better outcomes for both mothers and babies. While some nurses demonstrated a good understanding of key areas such as the definition of preeclampsia and responding to magnesium toxicity, many showed only a fair knowledge overall. Notably, gaps were observed in broader aspects of care, including monitoring complications, interpreting clinical signs, and applying standardized care protocols. Factors such as age, education level, and years of experience appeared to influence knowledge, though not always significantly. To address these issues, it is essential to implement comprehensive training programs, provide mentorship opportunities, conduct regular knowledge assessments, and promote teamwork between nurses and other healthcare professionals. Strengthening these areas will help reduce complications and improve the quality of care provided to women with preeclampsia.

6. ACKNOWLEDGMENT

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7. ETHICAL CONSIDERATIONS

The ethical committees of the College of Nursing and the College of Medicine at the University of Sulaimani approved the study. Formal authorization was then obtained from the Director of Health in Sulaimani and the administration of the Maternity Teaching Hospital. Before data collection, nurses were informed about the study's purpose, their right to confidentiality, and the voluntary nature of their participation. Verbal consent was obtained with assurances that their responses would remain anonymous and confidential. Participation was voluntary, and nurses had the right to withdraw at any time during the data collection period.

8. CONFLICTS OF INTEREST

The author affirms that they have no conflicts of interest.

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