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Review Article

Preeclampsia: A Narrative Review of Clinical Aspects and Educational Interventions

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Abstract

Pre-eclampsia is a significant complication that may occur during gestation. It elevates blood pressure and harms organs, typically the liver and kidneys. It often commences after 20 weeks of gestation, and if not promptly identified and addressed, it can have severe repercussions for both the mother and the infant. Extensive research in Saudi Arabia has indicated that pregnant women had limited knowledge on the signs, risk factors, and complications associated with pre-eclampsia. This narrative review aims to provide a comprehensive review of the clinical aspects of pre-eclampsia and the efficacy of educational interventions, particularly educational videos, in improving women's knowledge of pre-eclampsia. Audiovisual tools significantly enhance comprehension, engagement, and retention compared to conventional methods such as pamphlets or verbal communication. This review emphasizes how different educational intervention, and instructional videos assist mothers in acquiring knowledge, facilitate early symptom recognition, and enhance pregnancy outcomes.

Keywords: Knowledge about Pre-eclampsia; Educational video; Hypertension; Saudi Arabia; Pregnancy.

1. INTRODUCTION

This literature review begins by explaining the strategy used to search for relevant literature. Then, reviewing literature is essential to identify the extent of current evidence regarding the many aspects of Pre-eclampsia. And mention many studies that covers the level of knowledge and awareness about pre-eclampsia among Saudi women. Also, effect of educational intervention about pre-eclampsia on pregnant women.

2. Search strategy

The researcher used electronic databases to selected articles were published between 2019 and 2024 in the English language. These databases included Google Scholar, PUBMED, MEDLINE, EBSCO were used in the search process in collecting primary articles for this study. Hence, these databases are valuable in searching a wide range of journals that address several academic kinds of literature. Besides, they contain original academic studies that focus on healthy subjects and particularly in the nursing area. Each article included one of the following key terms: Pre-eclampsia, Eclampsia, Gestational Hypertension, Educational Video, Educational session, Knowledge.

3. Pre-eclampsia overview

Pre-eclampsia (PE) is one of the main preventable causes of maternal and newborn death and morbidity in the globe (Ahmed Mohamed *et al.,* 2022). Pre-eclampsia is a form of high blood pressure that typically develops after 20 weeks of pregnancy, even in women who have a history of normal blood pressure. The diagnosis was established based on the presence of hypertension (systolic blood pressure of 140 mmHg and/or diastolic blood pressure of 90 mmHg) accompanied by either proteinuria (greater than 300 mg in a 24-hour sample or 0.1 g/L in at least two random urine samples more than 4 hours apart), elevated liver enzyme (e.g., ALT level>40 IU/L), or kidney dysfunction (creatinine>1 mg/dL) (Ali *et al.,* 2022; Mou *et al.,* 2021; Yang *et al.,* 2021).

3.1. Incidence of pre-eclampsia

The total number of pre-eclampsia cases among Saudi women in 2023 is 4,507 and eclampsia cases 414 (MOH, 2023). Pre-eclampsia affects about 4.6% of pregnancies worldwide, with poor nations having the highest prevalence rates (1.8% to 16.7%) (Mou *et al.,*

2021). Pre-eclampsia is a prevalent complication in approximately 8% of pregnancies worldwide and is responsible for nearly 15% of maternal death cases (Belay Tolu *et al.,* 2020).

3.2. Classification and Degrees of Pre-eclampsia

Pre-eclampsia is categorized by the International Society for the Study of Hypertension in Pregnancy (ISSHP) into three distinct types depending on the gestational age at which clinical manifestation occurs preterm pre-eclampsia (occurring before 37 weeks of gestation), term pre-eclampsia (occurring after 37 weeks of gestation), and postpartum pre-eclampsia (Magee *et al.,* 2022). Also, recently pre-eclampsia categorized based on clinical manifestation pre-eclampsia without severe features is defined as newly elevated blood pressure ≥ 140/90 after 20 weeks' gestation in addition to proteinuria defined as 300 mg or more in a 24-h urine specimen, or a protein/creatinine ratio of 0.3 or more, or 2+ protein on urine dipstick (ACOG, 2020).

Pre-eclampsia with severe features is defined by blood pressure (BP) ≥160 mmHg systolic or ≥110 mmHg diastolic, measured at least 4 hours apart after 20 weeks of gestation, or BP ≥160 mmHg systolic or ≥110 mmHg diastolic after 20 weeks requiring acute treatment. It can also be diagnosed with BP ≥140 mmHg systolic or ≥90 mmHg diastolic when accompanied by laboratory and/or symptom criteria, including thrombocytopenia (platelets $<100\times10^9$/L), transaminitis (AST/ALT levels twice the normal value), or acute kidney injury (doubling of the patient's baseline creatinine or >1.1 mg/dL). Additional severe features include intractable headache, persistent vision changes, severe right upper quadrant pain, and pulmonary edema (Magee *et al.,* 2022).

3.3. Pathophysiology of pre-eclampsia

Pre-eclampsia develops in two stages: placental abnormalities in the first trimester, followed by "mother syndrome" in the second and third trimesters characterized by an excess of anti-angiogenic factors (Rana *et al.,* 2019). PE involves heightened immune response, trophoblast apoptosis, reduced trophoblast infiltration, altered placental morphology like spiral artery remodeling, decreased uterine perfusion pressure (RUPP) and placental ischemia or hypoxia (Saif *et al.,* 2021).

3.4. Manifestations of pre-eclampsia

A variety of organs and systems may be affected by pre-eclampsia. The central nervous system, cardiovascular system, liver, and kidney are the most highly affected organs and systems (Chang *et al.,* 2023).

❖ **Cardiovascular system**

Cardiac output rises by 30% to 50% during the initial two trimesters of a normal pregnancy, then stabilizes around 20 weeks. The increase of cardiac output is achieved by an elevation in heart rate, a 50% rise in plasma volume, and, to accommodate the heightened intravascular capacity, transitory left ventricular eccentric hypertrophy. These modifications completely restore postpartum conditions (Pankiewicz *et al.,* 2019).

❖ **Central nervous system:**

Neurological symptoms have been recognized as high-risk features of eclampsia for thousands of years. Neurological complications are the direct cause of many maternal deaths due to pre-eclampsia, particularly in LMICs, and include eclampsia (seizures), visual scotomata, cortical blindness, arterial ischaemic stroke, cerebral venous sinus thrombosis, subarachnoid and intracerebral hemorrhage, reversible cerebral vasoconstriction syndrome, and posterior reversible encephalopathy syndrome (Miller & Vollbracht, 2021).

❖ **Hepatic dysfunction**

Hepatic dysfunction in pre-eclampsia is defined as transaminases levels that are two times higher than the normal range and persistent severe right upper quadrant or epigastric tenderness (Wilkerson & Ogunbodede, 2019). Aspartate aminotransferase is usually higher than alanine aminotransferase in pre-eclampsia, as aspartate aminotransferase is related to periportal necrosis. Pre-eclampsia also causes elevation in lactate dehydrogenase and alterations in hepatic synthetic function, resulting in abnormalities in prothrombin time, partial thromboplastin time, and fibrinogen (ACOG, 2020).

❖ **Renal dysfunction**

Serum creatinine levels more than 1.1 mg/dl or a double rise from baseline are indicators of renal impairment in pre-eclampsia (Wilkerson & Ogunbodede, 2019). Electrolyte abnormalities occur as urinary calcium decreases due to increased tubular calcium reabsorption. Reduction in intravascular volumes in pre-eclampsia increases sodium and free-water retention (ACOG, 2020).

3.5. Risk factors of pre-eclampsia include

❖ **MATERNAL AGE**

The largest risk of pre-eclampsia is observed in women aged 18 to 24 and 40 to 54 years. Both adolescent and older women were subjected to a heightened risk during pregnancy (Sheen *et al.,* 2020). Factors such as primiparity and lack of access to prenatal care, together with obstetric and immunological considerations, may put mothers under the age of 20 at a higher risk. Also, late-onset pre-eclampsia (≥34 weeks of gestation) is more commonly linked to mothers whose age is less than 20 years (Robillard *et al.,* 2022).

❖ **Pre-existing maternal medical conditions**

Chronic renal disease, chronic hypertension, diabetes mellitus, systemic lupus erythematosus (SLE), and antiphospholipid syndrome are the recognized high-risk factors that are generally similar among ISSHP and

NICE26 guidelines (Magee *et al.,* 2022 & Webster *et al.,* 2019)**.**

❖ **Obesity**

According to (Poniedziałek-Czajkowska *et al.,* 2023), women who have a "apple silhouette" and a high body mass index (BMI) are more likely to develop pre-eclampsia. A body mass index (BMI) more than 30 kg/m2 and the use of assisted reproductive technologies are both considered high-risk by the ISSHP (Magee *et al.,* 2022).

❖ **Obstetric history**

The probability of having pre-eclampsia is increased in primiparous women (Mayrink *et al.,* 2019). Pre-eclampsia is believed to be caused by immunological maladaptation and a maternal alloimmune reaction triggered by the rejection of paternal antigens on the fetal allograft (Collier *et al.,* 2021). This response is more pronounced during the first pregnancy. Therefore, first-time mothers have a higher likelihood of developing pre-eclampsia (Robillard *et al.,* 2022).

3.6. Complications of pre-eclampsia

❖ **Impact on maternal**

Pre-eclampsia induces placental vascular insufficiency, resulting in epigenetic and pathological changes in both maternal and fetal systems. The onset of pre-eclampsia significantly affects the cardiovascular system. In the short term, severe pre-eclampsia can result in heart dysfunction and sever hypertension, and is also linked to peripartum cardiomyopathy (Behrens *et al.,* 2019). The development of HDP markedly elevates the likelihood of sustained hypertension during the postpartum phase and throughout a patient's lifetime, leading to the development of an illness at an earlier age compared to individuals without a history of pre-eclampsia (Behrens *et al.,* 2019).

❖ **Impact on fetal**

Adversely impacts fetal growth restriction by i mpairing spiral artery remodeling and trophoblast invasi on, thereby diminishing nutrition delivery to the baby (Lu & Hu, 2019). Infants exposed to pre-eclampsia had reduced weight, height, and MI in comparison to controls from normotensive pregnancies at the age of 2 years. However, discrepancies persist about the influence of pre-eclampsia on newborn motor and cognitive development or the reverse (Thong *et al.,* 2022).

10. Management and treatment of pre-eclampsia

❖ **Antihypertensive medications**

Medications such as nifedipine, methyldopa, and labetalol are frequently prescribed orally to pregnant women with hypertension (Easterling *et al.,* 2019). Pregnant women with hypertension can safely and effectively use nifedipine, methyldopa, or labetalol (van de Vusse *et al.,* 2022). While all three drugs nifedipine, labetalol, and methyldopa are effective, the study found that nifedipine was more often successful in achieving the target blood pressure *et al.,* 2019).

❖ **Magnesium Sulfate**

Magnesium sulfate (MgSO4) is an essential therapeutic intervention and is administered prophylactically to women with severe pre-eclampsia who are at risk of developing eclampsia (Huang *et al.,* 2020). Magnesium sulfate is widely recognized as an efficacious intervention for the prophylaxis of seizures in women with pre-eclampsia and eclampsia. Recent investigations have validated its effectiveness and broadened its suggested use beyond neurological disorders. A 2024 review highlighted the necessity of providing magnesium sulfate to patients displaying any severe characteristics of pre-eclampsia, not alone those with neurological symptoms (De Oliveira *et al.,* 2024).

❖ **Delivery and Termination of Pregnancy**

It is advised that patients diagnosed with pre-eclampsia with severe characteristics at or beyond 34 weeks gestation undergo with delivery following maternal stabilization, without waiting for steroid therapy. For patients under 34 weeks gestation diagnosed with severe pre-eclampsia, appropriate stabilization of maternal and fetal health should commence, with therapy often continuing in either inpatient or outpatient settings expectantly. This is mostly founded on professional advice and personalized treatment plans between the patient and the provider (Fu *et al.,* 2019).

3.7. Prevention of pre-eclampsia

❖ **Diet Management**

The nutritional elements that have demonstrated efficacy in diminishing the risk of pre-eclampsia. This include maintaining maternal weight, adhering to a fiber-rich diet, utilizing probiotics, taking multivitamins and multimineral supplements, administering prophylactic doses of antioxidant vitamins such as vitamin C or E, and avoiding raw foods and a high-sodium diet (Perry *et al.,* 2022).

❖ **Exercise**

Physical activity may be crucial in the prevention of pre-eclampsia. Restricting weight gain during pregnancy and altering metabolic risk factors with consistent physical activity establishes advantageous metabolic circumstances for fetal development. Moreover, it is cost-effective, easily accessible, and, barring any contraindications, safe for both the mother and fetus. For this preventive measure to be effective, it must be implemented early in pregnancy and, for overweight and obese women, recommended as a crucial component of pregnancy preparation (Poniedziałek-Czajkowska *et al.,* 2023).

❖ **Vitamin D**

Vitamin D exhibits a significant correlation with pre-eclampsia. Reduced maternal vitamin D levels

elevate the risk of pre-eclampsia. Vitamin D supplementation may serve as a potential intervention strategy to reduce one of the leading causes of maternal death globally (AlSubai *et al.,* 2023). Vitamin D may contribute to vascular function, decrease inflammation, and promote placental growth during pregnancy (Moghib *et al.,* 2024).

❖ **Consumption of Ajwa Dates**

Pregnant women at risk for pre-eclampsia may benefit from the daily consumption of seven Ajwa dates, which might lower mean artery pressure (MAP) and Roll Over Test (ROT) results, potentially preventing the condition (Royani *et al.,* 2019).

❖ **Folic Acid**

High-dose folic acid supplements administered three months before to conception and continued until delivery may decrease the risk of pre-eclampsia in pregnant women (Zheng *et al.,* 2020).

❖ **Low-Dose Aspirin**

Aspirin reduced the incidence of early pre-eclampsia by 62% in pregnant women at elevated risk for the condition. Low-dose aspirin reduces pre-eclampsia, decreasing postpartum bleeding, fetal growth restriction, preterm birth, and cesarean section (Mendoza *et al.,* 2023). Aspirin is advised before to 16 weeks of gestation to reduce the risk of pre-eclampsia and premature delivery (Hastie *et al.,* 2021). Aspirin administration at any ages of pregnancy resulted in a 30% decrease in the incidence of pre-eclampsia (Clymer *et al.,* 2020).

4. Pre-eclampsia awareness and knowledge Among Saudi women

Four studies that examined Saudi women's knowledge and awareness of pre-eclampsia were found in this literature review. There is a lack of understanding or gaps in specific areas of pre-eclampsia knowledge, as all studies have shown. Alshayeb *et al.,* (2024) conducted a cross-sectional study to assess the knowledge and awareness of pre-eclampsia among women in Saudi Arabia. The study includes 390 women aged 18 to 60. The findings indicated that a significant 66.7% of the sample in Saudi Arabia lacked sufficient knowledge on pre-eclampsia. Employment, enrollment in higher education, and a familial predisposition to pre-eclampsia are all associated with elevated levels of awareness.

Similarly, cross-sectional study conducted by Radwan *et al.,* (2023) in Jeddah, Saudi Arabia. This study aims to assess the knowledge and awareness of pre-eclampsia among Saudi women aged 18 to 49. This survey included 385 Saudi women. This study indicates that numerous Saudi women of childbearing age lack sufficient knowledge and awareness regarding pre-eclampsia.

Moreover, A cross-sectional study conducted in Saudi Arabia by Mohammed Bahkali *et al.,* (2024). The objective of this study was to determine the extent of knowledge among Saudi Arabian women about pre-eclampsia and the associated risk factors. The study included 541 women aged 18 to 50. The findings indicate that only 11.7% of participants exhibited indicators of potential pre-eclampsia risk. The findings indicated a lack of sufficient knowledge regarding pre-eclampsia overall.

Furthermore, Observational cross-sectional study conducted in the Al Baha region of Saudi Arabia by Osman *et al.,* (2022). To ascertain the level of awareness among women in the Al Baha region of Saudi Arabia regarding pre-eclampsia and the associated factors. The research samples comprise 485 pregnant women. The study's findings indicated that the majority of participants were familiar with pre-eclampsia; however, they lacked a comprehensive understanding of its specific symptoms, risk factors, and consequences.

5. Impact of various educational interventions on pregnant women's knowledge of pre-eclampsia

The four studies mentioned the beneficial effects of diverse educational interventions in improving women's awareness and understanding of pre-eclampsia. These interventions facilitated prompt medical care seeking and significantly diminished maternal and neonatal morbidity and mortality related to pre-eclampsia.

Quasi-experimental design conducted by Hussien *et al.,* (2024) in Egypt. Utilized purposive sampling to choose 102 pregnant women for the study. The objective of the study was to determine the impact of a comprehensive educational program on women's knowledge, risk perception of cardiovascular disease, self-efficacy, and adherence to healthy lifestyle practices. The study's results indicated that the complete training program significantly enhanced the comprehension of women with pre-eclampsia.

Similarly, Quasi-experimental design conducted by Mahmoud *et al.,* (2023) at the Antenatal Outpatient clinics of the New Obstetrics and Gynecology Hospital in Mansoura, Egypt. The study sample includes 96 women diagnosed with pre-eclampsia. The study aimed to determine how educational sessions altered pre-eclamptic women's knowledge on pre-eclampsia. In summary, the study's findings indicated that the women who participated in the intervention possessed significantly greater knowledge than before. Conducting educational seminars for women at risk of preeclampsia is an effective method to enhance their understanding of the issue.

Moreover, quasi-experimental design was used by Ahmed Mohamed *et al.,* (2022) at Minia University Hospital for Maternity and Child to evaluate the impact

of self-care guidelines on women's knowledge and awareness of early signs and symptoms of pre-eclampsia. Purposive sampling was used to select 100 pregnant women for the study sample. The study's primary conclusions indicated that a higher knowledge score correlated with reduced severity and fewer signs and symptoms observed in the posttest.

In addition, in a Jordanian public hospital, a randomized controlled experiment was carried out Alnuaimi et al.,,, (2020). To examine the impact of a pre-eclampsia intervention program on the knowledge and pregnancy outcomes of Jordanian women at high risk for pre-eclampsia. They selected 113 pregnant women at elevated risk for pre-eclampsia using purposive sampling. Following completion of the educational program, the interventional group's average ratings for pre-eclampsia awareness significantly differed from those of the control group. The two groups had a significant disparity in average diastolic blood pressure and Apgar scores at both the first and fifth minutes.

6. Impact of educational video on pregnant women's knowledge of pre-eclampsia

Educational videos are essential in raising pre-eclampsia awareness among pregnant women, according to the results of the following four studies. These videos make it easier for women to understand complicated medical information. Quasi-experimental design conducted by Reda *et al.,* (2024) at Shohada Hospital in the Menoufia government, Egypt. The study included 120 pregnant women at risk for pre-eclampsia. The objective of the study was to ascertain the impact of video-assisted training sessions on the attitudes, behaviors, and knowledge of pregnant women at risk for pre-eclampsia. The findings of the study indicated that the pre-video-assisted program Pregnant women exhibited significant levels of inadequate knowledge (51.7%), detrimental practices (89.2%), and negative attitudes (47.5%). Post-intervention, sixty percent of pregnant women exhibited substantial knowledge, eighty-eight percent demonstrated correct practices, and seventy percent maintained a positive demeanor. There was a significant difference ($p < 0.001$) in women's overall knowledge, habits, and attitudes regarding pre-eclampsia before and after the intervention.

Similarly, A quasi-experimental study conducted by Hermawati *et al.,* (2024) in Indonesia Investigated the effect of animated videos on the knowledge and motivation regarding pre-eclampsia prevention among pregnant women. Sixty-two individuals were randomly selected for the trial and divided into two groups: the intervention group and the control group. The findings indicated a substantial enhancement in knowledge and motivation levels, evidenced by the mean differences between the pretest and post-test ($p = 0.000$, $p = 0.001$, respectively). The findings indicate that the utilization of animated movies in antenatal education significantly enhances pregnant women's knowledge and motivation to avert pre-eclampsia.

Moreover, a quasi-experimental study conducted by Ernawati *et al.,* (2024) in Indonesia aimed to assess the effectiveness of animated videos in improving pregnant women's knowledge about pre-eclampsia. The study involved 32 randomly selected individuals, and the results indicated a significant increase in their knowledge levels, with a P-value of 0.00 < 0.005. The findings indicate that educational movies can enhance pregnant women's understanding and awareness of pre-eclampsia.

In addition, A quasi-experimental study conducted by Ermiati *et al.,* (2021) in Indonesia. The study investigated the impact of health education through videos and leaflets on pregnant women's knowledge about pre-eclampsia. Seventy-four participants were selected by a method known as quota sampling. The findings indicated that both films and booklets significantly enhanced mothers' understanding of pre-eclampsia, with a p-value of 0.000 (<0.05). The research indicated that both movies and pamphlets were equally effective in educating pregnant women about pre-eclampsia.

7. CONCLUSION

In this review, pre-eclampsia can negatively affect a mother's and her fetus's health, leading to a host of problems for both parties. Therefore, we recommend women enhance their knowledge about pre-eclampsia to effectively manage their blood pressure and avert potentially dangerous outcomes. The researcher found insufficient previous research on the effect of educational videos on pre-eclampsia knowledge among pregnant women in Saudi Arabia during the literature review. It is essential in future studies to extend pregnant women's knowledge on pre-eclampsia. This review corroborates the findings of other international studies regarding educational interventions. The findings may assist professional caregivers in devising strategies to support pregnant women, facilitate the development of educational and recreational programs about pre-eclampsia, and promote further research into diverse methods of instruction and assistance. Conducting educational videos for pregnant women is a very effective way to provide them enough information to properly control and manage their condition.

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