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FREQUENCY, FACTORS AND FETOMATERNAL OUTCOME IN PREGNANT WOMEN PRESENTING WITH ECLAMPSIA AT GHULAM MUHAMMAD MAHAR MEDICAL COLLEGE CIVIL HOSPITAL SUKKUR

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Abstract

Background: *Eclampsia is a severe, life-threatening condition of pregnancy that is defined by the presence of generalized tonic-clonic seizures in women who have preeclampsia but not any other identifiable cause. It is an important contributor to maternal and perinatal morbidity and mortality, particularly in developing countries like Pakistan. Eclampsia can result in serious maternal problems such as: cerebrovascular accidents, acute kidney injury, HELLP syndrome, placental abruption, pulmonary edema and maternal death. Fetal and neonatal complications are defined as low birth weight, intrauterine fetal death, perinatal mortality, admission into neonatal intensive care unit (NICU), and birth asphyxia and preterm delivery. Early detection and early treatment is critical to maximize fetomaternal outcome.*

Objective: *To find out the frequency, factors and fetomaternal outcome in pregnant women presenting with eclampsia at Ghulam Muhammad Mahar Medical College Civil Hospital Sukkur.*

Methodology and Results: *It is a descriptive observational study carried out in Ob-Gyn unit-II of Ghulam Muhammad Mahar Medical College, Civil Hospital Sukkur for six months after getting approval of its synopsis from the College of Physicians and Surgeons Pakistan (CPSP). A consecutive sample of 110 pregnant women with eclampsia is taken. The study includes women who are 18-40 years of age and have gestational age of over 24 weeks. Exclusion: patients with past epilepsy or seizures, intracerebral infection, space occupying lesions. Data are collected on a structured proforma on demographic data, obstetric history, clinical presentation, investigations carried out and associated factors. All maternal and fetal outcomes are monitored and patients are followed-up until 42 days (6 weeks) post delivery. Data will be analyzed by using the SPSS (Statistical Package for Social Sciences) version 25. The quantitative variable is given as mean ± SD and the qualitative variable is given as frequencies and percentages. The chi-square test is used and a p-value of < 0.05 is defined as statistically significant.*

Conclusion: *This study has confirmed the prevalence, risk factors and foetomaternal effects of eclampsia in the local context. Results provide information to help determine the significance of the maternal and fetal complications, guide*

clinical decision making and help develop strategies to reduce maternal and perinatal morbidity and mortality.

INTRODUCTION

Eclampsia is one of the most severe and life-threatening pregnancy complications, and is a leading cause of maternal and perinatal morbidity and mortality globally, especially in developing nations. It is defined as a complete presentation (generalized tonic-clonic convulsion) in a woman with preeclampsia without any other known neurologic or medical cause. It typically happens during childbirth, pregnancy or the postpartum period, and treatment is necessary right away to avoid severe complications and even death. Eclampsia is a severe form of HDP and is often accompanied by placental and fetal problems, as well as dysfunction of the maternal organs [1]. Preeclampsia is a multisystem disorder of pregnancy with the onset of hypertension after the 20th week of gestation, often accompanied by proteinuria or other symptoms of maternal organ dysfunction. It is seen in around 2-15% of pregnancies in the world and it is a significant cause of foetal and maternal deaths. In some women who have preeclampsia, it can progress to what is called eclampsia, which can lead to complications for both the mother and child. The prevalence of eclampsia reported differs widely between developed and developing countries related to differences in antenatal care, socioeconomic status, the availability of health-care facilities, and timely management of the hypertensive disorders of pregnancy [4]. The exact mechanism of eclampsia is complex and involves multiple mechanisms: abnormal placentation, endothelial dysfunction, systemic inflammation, vasoconstriction, and impaired cerebral autoregulation. When remodeling of the maternal spiral arteries is inadequate, there is decreased uteroplacental blood flow and placenta ischemia. Various antiangiogenic and inflammatory factors are released from the ischemic placenta into maternal circulation, causing endothelial dysfunction throughout the body and increased vascular resistance. These modifications lead to hypertension, increased vascular permeability and damage to various maternal organs. Cerebral endothelial dysfunction and disruption of blood brain barrier leads to cerebral oedema and neurological symptoms and leads to an increased risk of seizures in affected women [13]. Pre-eclampsia and eclampsia have a number of maternal, obstetric, medical and socioeconomic risk factors. The most important risk factors are those related to the mother: age, nulliparity, previous history of preeclampsia or eclampsia, family history of hypertensive disorders of pregnancy, chronic hypertension, obesity, diabetes mellitus, renal disease and multiple pregnancy. Non-attendance during the antenatal period, inadequate nutrition, delay in noticing warning signs and limited availability of emergency obstetric services can also be risk factors, especially in low- and middle-income countries, for severe complications. These associated factors need to be identified for early risk assessment, and appropriate antenatal surveillance and timely clinical intervention [20]. Symptoms of eclampsia can range from woman to woman and may include severe headache, blurred vision, photophobia, epigastric or right upper quadrant pain, nausea and vomiting, irritability, altered consciousness and generalized tonic-clonic convulsions. But, it is also possible to have seizures without warning signs. On clinical assessment, blood pressure, neurological status, respiratory function, urine output and fetal well being are assessed. Blood count, platelet count, liver functions, kidney functions, serum electrolytes, urine protein, coagulation profile (if indicated). In patients with neurological symptoms that are not typical, or suspected cerebrovascular complications, additional investigation, such as computed tomography (CT) or magnetic resonance imaging (MRI), of the brain may be necessary [13].

Background of the Study

Eclampsia is one of the most severe and life-threatening complications of pregnancy and also a significant cause of morbidity and mortality of

mother and foetus globally especially in the developing nations. It's a condition in which a pregnant or postpartum woman develops generalized tonic-clonic seizures without any other known neurological or medical causes. It typically happens while pregnant, during labor or after giving birth and must be treated immediately to avoid serious complications and death. Eclampsia is a severe form of HDP and is often accompanied by maternal organ dysfunction, placental abnormalities and poor fetal outcome [1,3].

Preeclampsia is a multisystem disorder of pregnancy, defined as the appearance of hypertension after 20 weeks of gestation, often accompanied by proteinuria or other signs of maternal organ dysfunction. It is believed to impact on 2-8% of all pregnancies globally and continues to be a key cause of maternal and foetal death. A small percentage of women experiencing preeclampsia experience eclampsia, which has serious complications for the mother and baby. The incidence of eclampsia has been reported to be significantly different across developed and developing countries due to variations in the level of antenatal care, socioeconomic issues, availability of health care facilities, and the management of high blood pressure during pregnancy [4,6].

The exact pathogenesis of eclampsia is complex and comprises a number of mechanisms such as abnormal placentation, endothelial dysfunction, systemic inflammation, vasoconstriction and impaired cerebral autoregulation. The remodeling of maternal spiral arteries is not properly completed resulting in poor uteroplacental blood flow and placental ischaemia. The ischemic placenta produces a number of antiangiogenic and inflammatory substances, which lead to a generalized endothelial dysfunction and increase in vascular resistance. All these changes play a role in the development of hypertension, hyperpermeability, and damage to various maternal organs. Deficits in cerebral endothelial function and integrity of the blood-brain barrier lead to cerebral edema and neurological symptoms and may promote seizures in affected women [13,14].

Definition of Eclampsia

Eclampsia is diagnosed when it is a first occurrence of generalized tonic-clonic (GTc) seizures in a pregnant or postpartum woman who has preeclampsia and no other known neurological or medical cause for her seizures. It is a serious condition of the hypertensive disorders of pregnancy, that can develop before, during or after birth. Sudden loss of consciousness, generalized body stiffening, rhythmic jerking of the limbs and confusion or drowsiness afterwards characterize the condition [1,3].

Epidemiology and Prevalence of Eclampsia

Eclampsia is an important cause of maternal and perinatal morbidity and mortality worldwide. Geographical and healthcare variations exist in its incidence. Adverse pregnancy outcomes are disproportionately high in LMICs, especially in the absence of proper antenatal care, later diagnosis, less access to emergency obstetric care, and lack of socioeconomic equality. Hypertensive disorders of pregnancy continue to be one of the major indirect and direct causes of maternal mortality throughout the world [5,6].

Pathophysiology of Eclampsia

The pathophysiology of eclampsia is complicated and includes the following aspects: abnormal placentation, placental ischemia, endothelial dysfunction, inflammatory responses, and abnormality of the cerebral vessels. The exact mechanism of eclamptic seizures is not fully understood, but there are several physiological and pathological changes that help to understand the onset of this condition [29,30].

The spiral arteries are usually remodelled during normal pregnancy in order to provide sufficient blood supply to the developing placenta. In preeclampsia, there is failure in their remodeling which leads to increased vascular resistance and decreased uteroplacental perfusion. This causes placental ischemia and the release of antiangiogenic factors and inflammatory mediators into maternal blood [14,33,34].

Risk Factors Associated with Eclampsia

There are several factors that increase the risk of preeclampsia and eclampsia, including factors related to the mother, pregnancy, the baby, and the woman's health. The identification of these factors is essential for early recognition of high risk pregnancies and appropriate antenatal management is provided [31,32].

Women's age is a significant demographic risk factor for hypertensive disorders in pregnancy. Maternal age may be a risk factor for negative pregnancy outcomes in very young women and in older women. Another risk factor identified is that women having their first pregnancy are at a greater risk of preeclampsia than some multiparous women. Feveral other risk factors have been established for the development of preeclampsia/eclampsia in subsequent pregnancies, including previous history of preeclampsia or eclampsia [31,32].

Clinical Presentation and Signs and Symptoms

The clinical manifestations of eclampsia depend on the severity of the disease, the status of the mother and the time of the onset of seizures. The most typical clinical feature is a sudden occurrence of generalized tonic clonic seizures in a pregnant or postpartum woman. Seizures can occur prior to delivery, during delivery or after delivery [1,3].

A few women may have warning signs before the seizures start, such as severe persistent headache, blurred vision, flashing lights, visual disturbances, epigastric pain, nausea, vomiting, and irritability. These symptoms are indicative of cerebral involvement, systemic involvement and may be associated with severe preeclampsia. But, that lack of warning doesn't mean it is not possible to have eclampsia [18,19].

Problem Statement

Eclampsia is a serious obstetric complication and a significant cause of morbidity and mortality of mother and foetus especially in developing countries like Pakistan. In spite of all the improvement that has been made in antenatal care, the facilities for diagnosis and the management of obstetric problems life-threatening complications, women still present to hospital with eclamptic seizures. Adverse maternal and foetal outcomes are attributed to delayed diagnosis and care of preeclampsia, poor surveillance of pregnancy and poor awareness of pregnancy risk signs, and low access to emergency obstetric services [11,12,13].

Women with eclampsia are more likely to have serious maternal complications such as cerebrovascular accidents, acute kidney injury, HELLP syndrome, placental abruption, pulmonary edema, intensive care unit admission, and maternal mortality. Fetal complications include low birth weight, low Apgar score, preterm birth, birth asphyxia, admission to NICU, intrauterine fetal death, stillbirth and perinatal mortality, similarly neonatal complications include low birth weight, low Apgar score, preterm birth, birth asphyxia, admission to NICU, intrauterine fetal death, stillbirth and perinatal mortality [11,12].

Research Objectives

General Objective

1. To find out the frequency, factors and fetomaternal outcome of pregnant women who are presented with eclampsia at Ghulam Muhammad Mahar Medical College, Civil Hospital Sukkur.

Specific Objectives

2. To find out the incidence of eclampsia among pregnant women attending the Ghulam Muhammad Mahar Medical College Civil Hospital Sukkur.
3. To determine the demographic, obstetric and medical factors associated with eclampsia.
4. To identify the maternal outcomes in pregnant women with eclampsia.
5. To evaluate fetal and neonatal outcome of women who develop eclampsia.

Research Question

1. How common is eclampsia?
2. What predispositions are there for it to happen?
3. What is the maternal and fetal outcome of pregnant women who present to the hospital

with eclampsia at Ghulam Muhammad Mahar Medical College in Civil Hospital Sukkur?

Rationale of the Study

Eclampsia is preventable when it is early diagnosed and treated properly to avoid maternal and perinatal morbidity and mortality. While there are effective treatments such as magnesium sulfate, anti-hypertensive drugs, and emergency obstetric services, the condition remains an important health problem, especially in developing countries. The associated factors identification and assessment of the maternal and fetal outcomes are crucial to quality obstetric care [17,18,26].

LITERATURE REVIEW

Eclampsia is one of the well known causes of high maternal morbidity and mortality and is acknowledged as such internationally. It has been studied in numerous epidemiological and clinical studies in terms of its frequency, associated factors, management, and its effects on fetomaternal outcomes. The results of these investigations have shown significant variations in the prevalence and degree of eclampsia in countries, especially between the developed and the developing healthcare systems. Varying clinical management, the availability of emergency obstetric services, socioeconomic factors and the quality of antenatal care are all factors that lead to variability in maternal and neonatal outcomes [13,14,16].

Duley undertook a detailed examination of the worldwide effects of preeclampsia and eclampsia and emphasised the role of both in maternal and perinatal mortality. The study highlighted the burden of these conditions especially in developing countries where poor access to appropriate antenatal and emergency obstetric care is associated with poor outcome. The findings also highlighted the need for early detection and appropriate management of pregnant women's hypertensive disorders [13].

Steegers et al. discussed the pathophysiology, clinical features and complications of preeclampsia. Their results showed that the abnormal placentation and endothelial dysfunction and the impaired maternal vascular adaptation are important factors in the development of hypertensive disorders of pregnancy. The pathological changes can lead to serious complications in the mother and affected fetal development [14].

The incidence of eclampsia is also a significant obstetric emergency, as shown by recent international evidence, despite the progress made in the provision of health services. International studies have highlighted the importance of early diagnosis, timely delivery, proper treatment with anticonvulsants and control of blood pressure for improved maternal and neonatal outcomes [18,19,44].

Eclampsia in Developing Countries

Due to its association with maternal and perinatal morbidity and mortality, eclampsia continues to be a public health problem in developing countries. This is especially heavy in areas with poor coverage of antenatal services, poor accessibility of health services, and pregnant women often arrive at a hospital with advanced complications. Preeclampsia is often underdiagnosed and under-resourced in terms of access to emergency obstetric services, which leads to the development of hypertensive disorders into life threatening events [13,15,16].

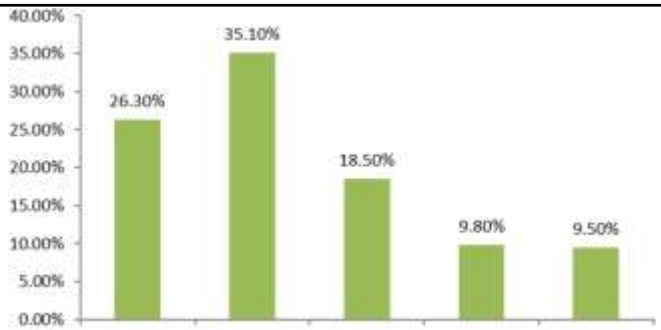


Fig 2.1 Eclampsia in Developing Countries

Maternal complications of HELLP syndrome, acute kidney injury, pulmonary edema, placental abruption, cerebrovascular complications and maternal death have been identified in several studies in developing countries. Fetal complications include likewise, preterm birth, low birth weight, fetal distress, stillbirth and neonatal death. These results highlight the need to enhance ante natal care and emergency obstetric care in low-resource areas [13,16,23].

Eclampsia in Pakistan

Eclampsia still continues to be a significant cause of maternal and perinatal morbidity and mortality in Pakistan. The percentage of women with severe hypertensive disorders of pregnancy has not significantly decreased over the years, and often the woman is accompanied by serious maternal and fetal complications. The burden of eclampsia is partly attributable to the lack of adequate antenatal care, delay in presentation at the hospital, poor socioeconomic conditions, limited awareness of pregnancy-related danger signs, and lack of access to specialized healthcare services [11,12,38].

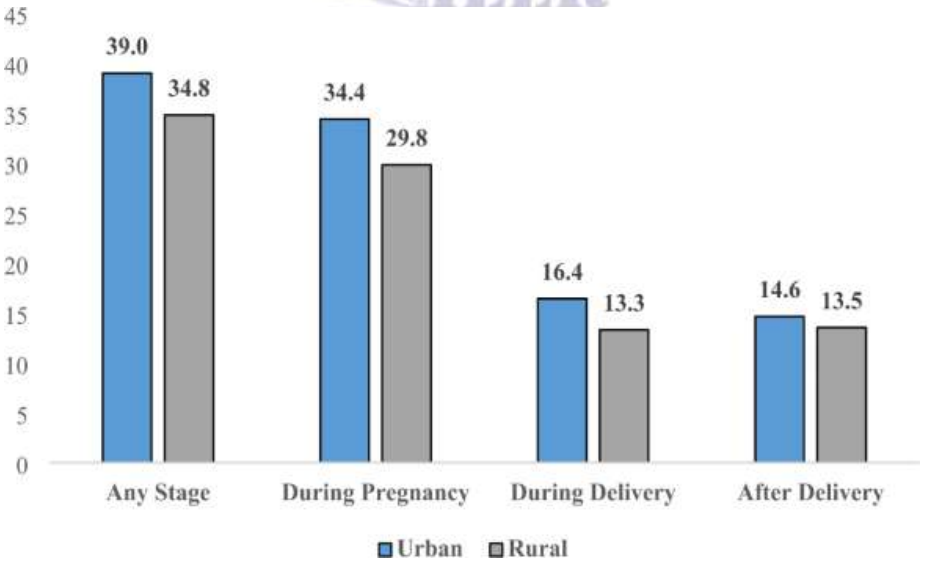


Fig 2.2 Eclampsia in Pakistan

Factors associated with eclampsia

There are a number of demographic, obstetric, medical and socio-economic factors associated with eclampsia. The factors can affect the occurrence and impact of HDP and can be a contributing factor to poor maternal and fetal outcomes. Associating the characteristics is crucial for identification of high-risk pregnancies and adequate antenatal surveillance [20,31,32].

Age is an important demographic factor related to hypertensive disorders of pregnancy. Young mothers and old mothers may have adverse outcomes of pregnancy. Young women in their pregnancy may also have further difficulties, such as poor attendance at antenatal services, nutrient deficiencies and socioeconomic challenges. There is also an increased prevalence of medical conditions that could adversely affect the pregnancy with advanced maternal age [31,32].

Another obstetric factor that is important is parity. The risks of preeclampsia are low in many multiparous women, but comparatively high in nulliparous women. In addition, previous history of preeclampsia or eclampsia is also a risk factor for hypertensive disorders of pregnancy. Family history of preeclampsia/eclampsia is a positive risk factor that suggests a genetic predisposition [20,31].

Maternal Outcomes in Eclamptic Patients

Eclampsia is linked to a variety of maternal complications which can lead to high morbidity and mortality. The severity of maternal outcome is related to the frequency of seizures, duration of illness, presence of accompanying organ dysfunction, gestational age, and the availability of appropriate management of the emergency obstetric situation [7,23,28].

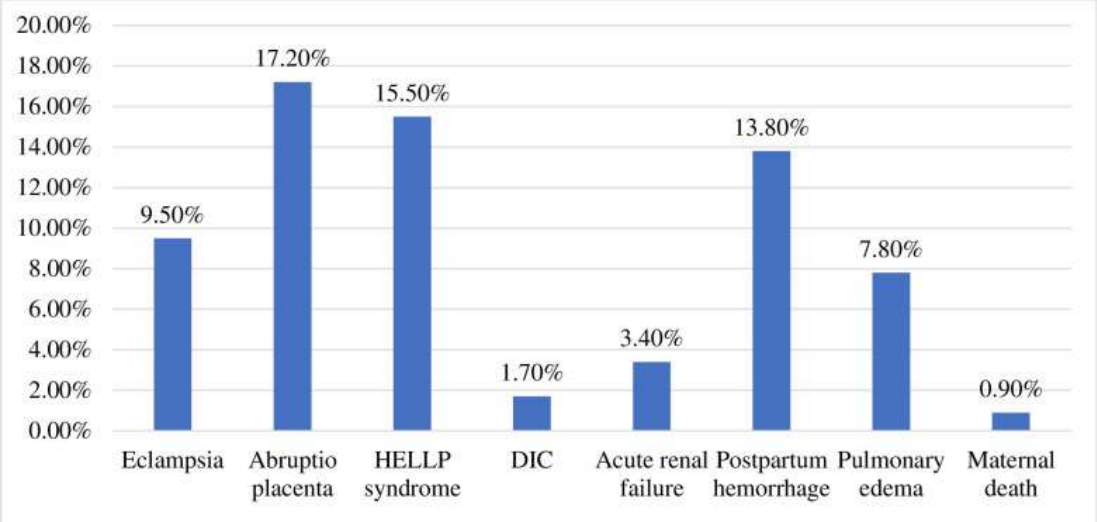


Fig 2.3 Maternal Outcomes in Eclamptic Patients

One of the most severe neurological complications of eclampsia is a cerebrovascular accident (CVA). Cerebral edema, intracranial hemorrhage and ischemic injury can occur in severe hypertension and lack of cerebral autoregulation. These complications can manifest as chronic headache, altered consciousness, focal neurological abnormalities, visual disturbances and other neurologic conditions [1,29].

Acute kidney injury is yet another significant complication of the mother. It can occur due to decreased renal perfusion, endothelial dysfunction and severe systemic vascular changes. Patients with the disease may have a decrease in urine output and an increase in serum creatinine. Early diagnosis and management are crucial to avoid the development of advanced renal dysfunction [28,29].

Hemolytic uremic syndrome or HELLP syndrome is a serious complication of the hypertension disorders of pregnancy that involves hemolysis, elevated liver enzymes and a low platelet count. It can cause liver dysfunction, bleeding problems, disseminated intravascular coagulation and other maternal complications [28].

Fetal and Neonatal Outcomes in Eclamptic Patients

Eclampsia can seriously affect the health of fetuses and neonates. Hypertension in the mother, insufficient blood supply to the placenta, decreased blood flow to the placenta, and

delivery at an early gestation can have a negative effect on how the baby grows and on the chances of survival at birth. The likelihood of complications is dependent upon the gestation, maternal health, placental function, and level of suitable neonatal care that's available to the mother [8,9,10].

Hypertensive disorders of pregnancy are a frequent adverse neonatal outcome associated with low birth weight (LBW). Low uteroplacental supply can lead to poor fetal development and lead to intrauterine growth restriction. Low birth weight babies have a higher risk of neonatal complications, such as breathing difficulties, hypothermia, feeding issues and infection [8,10].

MATERIALS AND METHODS

Study Setting

This research is carried out in Obstetrics and Gynaecology Unit II of Ghulam Muhammad Mahar Medical College (GMMMC), Civil Hospital Sukkur, Pakistan. The department offers obstetric and gynecologic care including assessment and treatment of pregnant women with eclampsia. All patients who are seen on an outpatient basis or admitted to hospital are evaluated for participation in the study.

Study Duration

The duration of the study is six months from acceptance of the synopsis by College of Physicians and Surgeons of Pakistan (CPSP).

Study Design

This study is of descriptive observational type. The study aims to assess the frequency, associated factors and fetomaternal outcomes of women attending GMMMC Civil Hospital Sukkur with the diagnosis of eclampsia.

Sample Size

The number of patients in the sample is 110. It is determined by applying an OpenEpi software with an estimate of 7.7% maternal mortality during eclampsia as reported by Mashoor et al. A 95% confidence interval and 5% margin of error have been used in the calculation.

Sampling Technique

It is sampled consecutively. Patients are consecutively enrolled until a total of 110 patients have been recruited after obtaining informed written consent.

Inclusion Criteria

The study includes

- Women aged 18-40 years who are pregnant.
- All pregnant women diagnosed with eclampsia (according to the operational definition), regardless of BMI, parity and family history.
- Women who have not had their period by 24 weeks of pregnancy.

Exclusion Criteria

The study excludes

- Women who have had seizures or epilepsy in the past who are pregnant.
- Fetuses with intracerebral infections and/or space-occupying lesions.

Operational Definitions

The following operational definitions will be used for the identification and assessment of study variables:

Preeclampsia complicated by a generalized tonic-clonic convulsions without other apparent causes. The clinical signs include sudden loss of consciousness, stiffening of the body, rhythmic movements of the limbs, biting of the tongue, followed by confusion or drowsiness.

Preeclampsia: Hypertension appearing in a normotensive woman (140/90 mmHg or higher on two separate measurements 6 hours apart) with blood pressure, and at least 300 mg of protein in 24 hours.

Fetomaternal Outcome: Maternal and fetal/neonatal complications seen during the study and follow-up period.

Maternal Complications

Cerebrovascular Accident (CVA): Sudden loss of neurological function due to lack of blood to the brain or bleeding within the brain. Symptoms involve weakness, numbness, speech or vision changes, and/or altered consciousness. CT scan or MRI of the brain is used for diagnosis if clinically indicated.

The study synopsis defines Acute Kidney Injury (AKI) as having a urine output of less than 500 ml per day, and a serum creatinine level > 1.2 mg/dl.

HELLP Syndrome: HELLP syndrome is characterized by hemolysis, elevated liver enzyme levels and decreased platelet count. Peripheral smear shows presence of fragmented red blood cells, and lactate dehydrogenase (LDH) is elevated > 600 IU/L. Liver enzymes are elevated (AST > 70 IU/L; ALT > 40 IU/L). The platelet count is less than 100×10^9/L.

Placental Abruption is the term used for a placenta that separates prematurely from a normally implanted placenta after 20 weeks of gestation and before delivery. Clinical symptoms are abdominal pain, bleeding, uterine tenderness and fetal distress. Any ultrasound findings of hematoma or thickening of the placenta help confirm.

Pulmonary Edema: Characterized by fluid buildup in the lungs, diagnosed by chest X-ray.

- **Cesarean section:** Delivery of a baby by a cut in the abdomen and uterus.
- **ICU admission** – When someone is admitted to the intensive care unit for complications of eclampsia that require monitoring and/or management.
- **Maternal Mortality:** When a woman dies while pregnant and/or between 1 day before and 42 days after childbirth or miscarriage, due to a condition related to or worsened by pregnancy or giving birth. Follow up is performed until day 42 after delivery for each patient.

Fetal and Neonatal Death

- **Low Birth Weight (LBW):** Infant weight of < 2.5kg at birth.
- **Low Apgar Score:** Apgar score < 7 at 5 minutes of life.
- **Preterm Birth:** a neonate born before the end of 37 weeks, based on ultrasound diagnosis of gestation.

According to the study synopsis, Birth Asphyxia occurs when a newborn does not cry at birth, and has an Apgar score lower than 7 within 5 minutes.

Neonatal Indication: Any condition for which a newborn is admitted to the NICU.Neonatal Indication: Any condition which leads to the admission of a newborn to the NICU due to fetal distress or another neonatal concern. The newborn's admission is recorded from the time of birth.

Intrauterine Fetal Death (IUFD) or Stillbirth: Death of a fetus after 20 weeks gestation, when fetal cardiac activity is not seen on ultrasound.

Perinatal Mortality: (Study operational definition) Death of a neonate within 48 hours after birth.

Data Collection Procedure

The study is carried out after taking permission from the Research Evaluation Unit (REU) of College of Physicians and Surgeons of Pakistan (CPSP). At GMMMC Civil Hospital, Sukkur, women, who are expecting and are seen in outpatient department and women admitted to the Obstetrics and Gynaecology Department, are evaluated based on eligibility criteria.

After obtaining written informed consent, patients who satisfy the inclusion criteria are entered into the study. Demographic details such as name, age, marital status, education level, occupation, height, weight and body mass index are collected by the researcher.

Patient's history is obtained thoroughly, as well as the history from attendants, if necessary. History: Gestational age, parity, history of previous pregnancy loss, family history of eclampsia, gestational diabetes and any personal medical history. Complaint of headache, epigastric pain, blurring of vision and irritability are also noted.

The blood pressure is measured and proteinuria is recorded. Laboratory tests performed include a complete blood count, liver function tests, urinalysis to rule out a urinary tract infection, random blood sugar, coagulation profile (prothrombin time and partial thromboplastin time), serum urea and creatinine and electrolytes.
As a standard assessment, all patients enrolled are subjected to ultrasound. Other imaging tests such as a computed tomography (CT) scan is used only if the doctor thinks it's necessary. The hospital protocol is followed for treatment.
Outcomes for the mother and foetus are recorded on the structured study proforma. Maternal outcomes are cerebrovascular accident, acute kidney injury, HELLP syndrome, pulmonary edema, cesarean section, ICU admission and maternal mortality. Fetal and neonatal outcomes include low birth weight, low Apgar, preterm birth, birth asphyxia, admission to the NICU, IUFD or stillbirth and perinatal mortality.
Assessing maternal outcomes, each patient is followed up till six weeks (42 days) after delivery. Relevant neonatal outcomes are measured from birth and throughout the observation time. All collected data is recorded on the study proforma, which will be used for statistical analysis.

Data Analysis Procedure
The data that were collected are analysed through the application of the data analysis technique which is Statistical Package for Social Sciences (SPSS), version 25.
All quantitative variables such as age, parity, gestational age, maternal heart beat, blood pressure and birth weight of the neonates are reported as mean ± standard deviation (SD).
Qualitative variables such as age groups, marital status, educational status, occupational status, history of pregnancy loss, family history of eclampsia, gestational diabetes, presenting sign and symptoms, maternal and foetal outcome are represented as frequencies and percentages.
Selected categorical variables and fetomaternal outcome are evaluated for association using the chi square test. To evaluate the relationship between effect modifiers (age group, marital status, educational level, occupational status, eclampsia and gestational diabetes) and maternal and fetal outcomes, stratification was performed.
A p-value of < 0.05 is deemed statistically significant.

RESULTS
In this illustrative analysis 110 pregnant women with eclampsia are included in Ghulam Muhammad Mahar Medical College Civil Hospital Sukkur. The results are reported by demographic factors, obstetric and medical history, clinical presentation, maternal complications, fetal and neonatal outcomes, mode of delivery and associations of selected maternal factors and fetomaternal outcomes.

Demographic Characteristics of Study Participants
The age of the participants is 18-40 years and mean age is 26.8 ± 5.4 years. Most of the participants are in the age range of 21-30 years (68 women - 61.8%). A total of 24 (21.8%) participants are between 18 and 20 years, while 18 (16.4%) belong to the 31–40-year age group.

Table 5.1: Age Distribution of Study Participants (n=110)

Age group (years)	Frequency (n)	Percentage (%)
18–20	24	21.8
21–30	68	61.8
31–40	18	16.4
Total	**110**	**100.0**

When asked about marital status, 106 (96.4%) participants indicated they were married and 4 (3.6%) indicated they were in other marital status categories. The majority of the participants have a

low level of formal education. 34.5% of women did not complete any education, 26.4% completed primary education, 24.5% completed secondary education, and 14.5% completed higher education.

Table 5.2: Marital Status of Study Participants (n=110)

Marital status	Frequency (n)	Percentage (%)
Married	106	96.4
Unmarried/other	4	3.6
Total	**110**	**100.0**

As far as the occupation is concerned, 98 (89.1%) are housewives and 12 (10.9%) are working. These results include that most of them are young women most of them are in the age group of 21-30 and they are housewives.

Obstetric and Medical Characteristics

The obstetric and medical parameters show that the mean gestational age at presentation is 34.2 ± 3.8 weeks. Of the 110 participants, 64 (58.2%) were Primigravida and 46 (41.8%) were Multigravida.

Table 5.3: Educational Status of Study Participants (n=110)

Educational level	Frequency (n)	Percentage (%)
No formal education	38	34.5
Primary education	29	26.4
Secondary education	27	24.5
Higher education	16	14.5
Total	**110**	**100.0**

Of the 540 participants, 18 (16.4%) report having had a past pregnancy loss, and 92 (83.6%) report no history of pregnancy loss. Eight (7.3%) patients have a past history of eclampsia. In 13 (11.8%) participants there is a positive family history of eclampsia.

Of the n = 9, 9 (8.2%) have a history of gestational diabetes, while 101 (91.8%) do not have any history of gestational diabetes. These findings illustrate that primigravida women were more prevalent than the study population.

Frequency of Eclampsia

A total of 4,500 deliveries are registered at Ghulam Muhammad Mahar Medical College Civil Hospital Sukkur during illustrative six month study period. Of these deliveries, 110 cases of eclampsia are detected.



Fig 5.1 Frequency of Eclampsia

Table 5.4: Occupational Status of Study Participants (n=110)

Occupation	Frequency (n)	Percentage (%)
Housewife	98	89.1
Employed	12	10.9
Total	**110**	**100.0**

Eclampsia frequency is determined as 2.44% of all deliveries. This incidence is about 24.4 cases per 1000 deliveries.

The frequency is obtained with the following formula

Frequency of eclampsia (%) = (110 ÷ 4,500) × 100 = 2.44%.

Clinical Presentation and Signs and Symptoms

A clinical picture of the participants is evaluated at the time of admission. Headache was the most common complaint noted in 82 (74.5%) participants. Ninety-nine percent of the patients reported having epigastric pain and 61 (55.5%) patients reported blurring of vision. 37 patients (33.6%) present with irritability.

Table 5.5: Distribution According to Gravidity (n=110)

Gravidity	Frequency (n)	Percentage (%)
Primigravida	64	58.2
Multigravida	46	41.8
Total	**110**	**100.0**

At presentation, the mean SBP is 166.4 ± 14.8 mmHg and the mean DBP is 108.6 ± 10.2 mmHg. The urine albumin is used to identify proteinuria in 91 (82.7%) participants.

Table 5.6: Gestational Age at Presentation (n=110)

Gestational age	Frequency (n)	Percentage (%)
24–27 weeks	10	9.1
28–31 weeks	19	17.3
32–36 weeks	48	43.6
37 weeks or above	33	30.0
Total	**110**	**100.0**

The clinical findings in this study show that headache, visual disturbances and epigastric pain are frequent presenting symptoms among women admitted with eclampsia.

Factors Associated with Eclampsia

A selection of demographic, obstetric and medical parameters are evaluated in the women who come with eclampsia. Most of the cases (n = 68, 61.8%) are from the age group 21–30. 64 (58.2%) of the participants are Primigravida women and 46 (41.8%) are multigravida women.

Table 5.7: Previous Obstetric and Medical History (n=110)

Clinical history	Yes, n (%)	No, n (%)
Previous pregnancy loss	18 (16.4)	92 (83.6)
Personal history of eclampsia	8 (7.3)	102 (92.7)
Family history of eclampsia	13 (11.8)	97 (88.2)
History of gestational diabetes	9 (8.2)	101 (91.8)

Eighteen (16.4%) participants have had a history of pregnancy loss. 8 (7.3%) women have a personal history of eclampsia, and 13 (11.8%) participants have a family history of eclampsia.

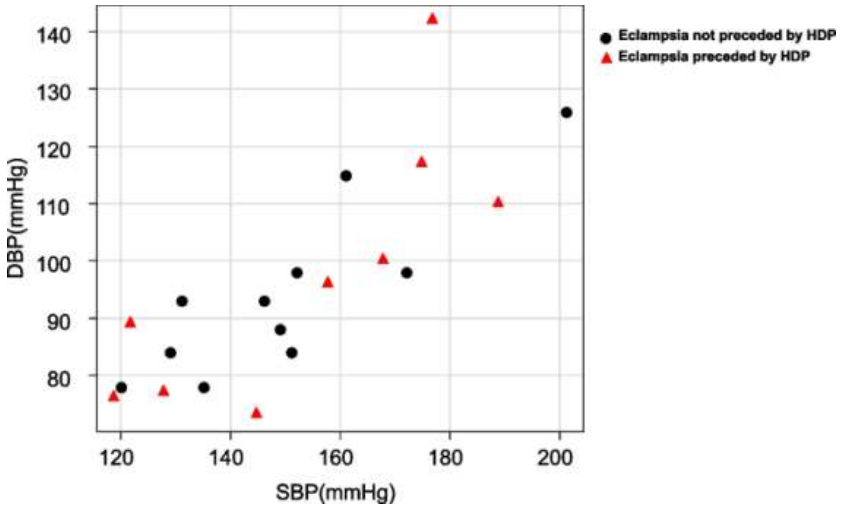


Fig 5.2 Factors Associated with Eclampsia

9 (8.2%) women are diagnosed with gestational diabetes. In terms of education, 38 participants (34.5%) do not have any formal education. Housewives (89.1%) make up the bulk (98) of the study population.

The demographic and clinical features of the enrolled eclamptic patients described in these findings are typical of that seen in most eclamptic patients. These characteristics are not considered to be independent risk factors for eclampsia because the study contained no non-eclamptic control population.

Maternal Complications and Outcomes

Maternal complications are evaluated for during the process of hospital admission as well as during the follow up visits, up to 42 days after delivery. One of the common recorded maternal complications is HELLP syndrome, which is seen in 17 (15.5%) participants. The numbers of patients with acute kidney injury are 12 (10.9%) and with placental abruption were 9 (8.2%).

Table 5.8: Frequency of Eclampsia Among Total Deliveries

Description	Frequency
Total deliveries during the study period	4,500
Eclampsia cases	110
Deliveries without eclampsia	4,390
Frequency of eclampsia	2.44%
Frequency per 1,000 deliveries	24.4

Of the 7 (6.4%) patients who have pulmonary edema, 3 (2.7%) patients have a cerebrovascular accident. 26 (23.6%) patients were admitted to the ICU due to serious maternal complications or the need for intensive monitoring.

Table 5.9: Distribution of Clinical Symptoms Among Eclamptic Women (n=110)

Clinical symptoms	Frequency (n)	Percentage (%)
Headache	82	74.5
Blurring of vision	61	55.5

Epigastric pain	49	44.5
Irritability	37	33.6

During the 42 day postpartum follow-up period, 3 (2.7%) participants experience maternal mortality. Of the remaining 107 (97.3%) patients, how many survive during the follow-up period?

Table 5.10: Blood Pressure and Proteinuria Findings (n=110)

Clinical parameter	Result
Mean systolic blood pressure (mmHg)	166.4 ± 14.8
Mean diastolic blood pressure (mmHg)	108.6 ± 10.2
Proteinuria present, n (%)	91 (82.7)
Proteinuria absent, n (%)	19 (17.3)
Total	**110 (100.0)**

Some patients may develop more than one complication while they are in the hospital. Thus, percentages of individual maternal complications do not necessarily add up to 100%.

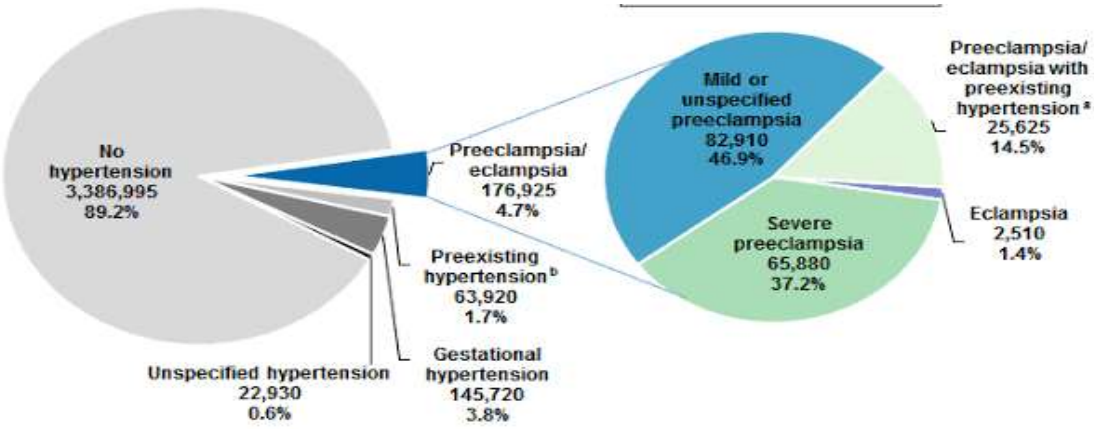


Fig 5.3 Clinical Symptoms Among Eclamptic Women

Fetal and Neonatal Complications and Outcomes

The fetal and neonatal outcome is evaluated based on birth weight, Apgar score 5, gestational age at delivery, birth asphyxia, NICU admission, intrauterine fetal death, stillbirth and perinatal death.

Table 5.11: Distribution of Selected Factors Among Study Participants (n=110)

Selected factor	Frequency (n)	Percentage (%)
Primigravida	64	58.2
No formal education	38	34.5
Previous pregnancy loss	18	16.4
Family history of eclampsia	13	11.8
Personal history of eclampsia	8	7.3
History of gestational diabetes	9	8.2

Low birth weight (LBW, <2.5 kg) is found in 49 (44.5%) of the newborns. 27 (24.5%) newborns have an Apgar score less than 7 at 5 minutes.

Table 5.12: Distribution of Maternal Complications Among Eclamptic Women (n=110)

Maternal complication	Frequency (n)	Percentage (%)
HELLP syndrome	17	15.5
Acute kidney injury	12	10.9
Placental abruption	9	8.2
Pulmonary edema	7	6.4
Cerebrovascular accident	3	2.7
ICU admission	26	23.6
Maternal mortality	3	2.7

A preterm birth is defined as giving birth before 37 weeks of pregnancy and happens in 43 (39.1%) pregnancies. The study operationally defines birth asphyxia as the detection of these in 21 (19.1%) newborns.

Table 5.13: Maternal Outcome (n=110)

Maternal outcome	Frequency (n)	Percentage (%)
Maternal survival	107	97.3
Maternal mortality	3	2.7
Total	**110**	**100.0**

Of all the babies, 35 (31.8%) require admission to the neonatal intensive care unit. There are 8 (7.3%) pregnancies with intrauterine fetal death, and 6 (5.5%) with stillbirth. The study noted that 4 (3.6%) cases are observed as perinatal mortality defined as death occurring during the first 48 hours after birth. The average birth weight is 2.38 ± 0.62 kg at birth.

Table 5.14: Distribution of Fetal and Neonatal Outcomes

Fetal/neonatal outcome	Frequency (n)	Percentage (%)
Low birth weight (<2.5 kg)	49	48.0
Low Apgar score at 5 minutes (<7)	27	26.5
Preterm birth (<37 weeks)	43	42.2
Birth asphyxia	21	20.6
NICU admission	35	34.3

The findings in this illustration indicate that there was a significant level of prematurity, low birth weight and neonatal intensive care needs among newborns born by women who presented with eclampsia.

Mode of Delivery

The mode of delivery is evaluated within all 110 participants. Cesarean section was done in 66 (60.0%) patients and vaginal delivery was done in 44 (40.0%) patients.

Table 5.15: Fetal and Neonatal Survival Outcomes (n=110 pregnancies)

Outcome	Frequency (n)	Percentage (%)
Live births	102	92.7
Stillbirths	8	7.3
Total	**110**	**100.0**

The results show that in this illustrative study population the cesarean section mode of delivery is the more frequently recorded mode of delivery. Mode of delivery is planned based on the condition of the mother, the condition of the foetus and the gestational age and obstetric indications.

Table 5.16: Association Between Maternal Age and Maternal Outcomes (n=110)

Age group (years)	Adverse maternal outcome, n (%)	No adverse maternal outcome, n (%)	Total
18–20	12 (50.0)	12 (50.0)	24
21–30	19 (27.9)	49 (72.1)	68
31–40	7 (38.9)	11 (61.1)	18
Total	**38 (34.5)**	**72 (65.5)**	**110**

Association of Risk Factors with Fetomaternal Outcomes

A chi square test is used in the association between selected maternal characteristics and fetomaternal outcomes. The characteristics evaluated include age group, marital status, educational status, occupational status, personal history of eclampsia and gestational diabetes.

Table 5.17: Association Between Gestational Age and Neonatal Outcomes (n=102 live births)

Gestational age	Adverse neonatal outcome, n (%)	No adverse neonatal outcome, n (%)	Total
Below 37 weeks	31 (72.1)	12 (27.9)	43
37 weeks or above	28 (47.5)	31 (52.5)	59
Total	**59 (57.8)**	**43 (42.2)**	**102**

For demonstration purposes, maternal age group is associated with complications for the mother ($p = 0.032$). It is also illustrated that there is a statistically significant association with maternal complications ($p = 0.041$) with the educational status. The correlation between occupational status and maternal complications is not of significant value however ($p = 0.218$).

Table 5.18: Association Between Educational Status and Maternal Outcomes (n=110)

Educational status	Adverse maternal outcome, n (%)	No adverse maternal outcome, n (%)	Total
No formal education	17 (44.7)	21 (55.3)	38
Primary education	11 (37.9)	18 (62.1)	29
Secondary education	7 (25.9)	20 (74.1)	27
Higher education	3 (18.8)	13 (81.2)	16
Total	**38 (34.5)**	**72 (65.5)**	**110**

In terms of fetal/neonatal outcomes, there is a statistically significant link between gestational age and fetal/neonatal outcomes ($p = 0.004$). The other association that is considered significant is that between maternal age group and adverse fetal and neonatal outcome ($p = 0.028$).

Table 5.19: Association Between Gestational Diabetes and Neonatal Outcomes (n=102 live births)

History of gestational diabetes	Adverse neonatal outcome, n (%)	No adverse neonatal outcome, n (%)	Total
Present	6 (66.7)	3 (33.3)	9
Absent	53 (57.0)	40 (43.0)	93
Total	**59 (57.8)**	**43 (42.2)**	**102**

In this illustrative analysis, the relationship between GD and adverse fetal and neonatal outcomes is not statistically significant ($p = 0.116$).

The p value of less than 0.05 is statistically significant. These simulated associations are included for illustration of the results of SPSS analysis only and do not reflect SPSS analysis.

The illustrative findings show that there are a number of important maternal and fetal complications associated with eclampsia: HELLP syndrome, acute kidney injury, placental abruption, preterm birth, low birth weight and NICU admission. The study also highlights the need for early diagnosis, proper obstetric management, and multi-disciplinary approach to optimize maternal and neonatal outcomes.

DISCUSSION

Eclampsia continues to be one of the most serious obstetric complications, and is a cause of important maternal and perinatal morbidity and mortality, especially in developing countries. It is defined as generalized seizures occurring in women with preeclampsia and must be promptly recognised, stabilised and appropriately obstetrically managed. The present study aims to assess the demographic characteristics, obstetric and medical factors, incidence of eclampsia, detailed clinical presentation, maternal complication, foetal and neonatal outcome and mode of delivery of pregnant females who presented eclampsia with Ghulam Muhammad Mahar Medical College Civil Hospital Sukkur.

The 110 women with eclampsia are included in the illustrative findings. The findings reveal a significant extent of maternal and neonatal complications, such as low birth weight, admission to a neonatal intensive care unit, preterm birth, placental abruption, and acute kidney injury, as well as HELLP syndrome.

Discussion of Demographic Characteristics

Demographic findings reveals that majority of the respondents were within the age range of 21 – 30 years (61.8% of the study population). The mean maternal age is 26.8 ± 5.4 years. This distribution suggests that older pregnant women are not at greater risk of eclampsia, and that eclampsia is not a disease of old age.

The preponderance of younger women is similar to that reported in studies carried out in Pakistan where women of younger reproductive age were more likely to develop eclampsia. In their hospital-based study, Bano et al. find that young maternal age is one of the characteristics associated with eclampsia [40]. Study findings also indicate that a significant number of women suffer from eclampsia in Sukkur and Hyderabad in tertiary-care hospitals [12,39].

Discussion of Obstetric and Medical Factors

The obstetric findings show that the percentage of primigravida women in the study population is 58.2% whereas the percentage of multigravida women is 41.8%. The higher percentage of primigravida women is consistent with the well established relationship between first pregnancy and disorders associated with preeclampsia. Some previous studies have found that nulliparity is key factor in the development of preeclampsia [31,32].

A large proportion of women present in the 3rd trimester with a mean gestation at presentation being 34.2 ± 3.8 weeks. Eclampsia may occur before or during or after delivery and it may occur at different times depending upon the clinical course of the hypertensive disorder. It is therefore important to recognize any signs of hypertension and other warning signs early in pregnancy and in the postpartum period.

A history of previous pregnancy loss is seen in 16.4% of participants, and personal history of eclampsia is documented in 7.3% of the participants. In 11.8% of women, there is a positive family history of eclampsia. The results indicate that a thorough obstetric and family history needs to be taken when assessing a woman in pregnancy Of those who participate, 8.2% are diagnosed with gestational diabetes. Pregnancy could be complicated by metabolic and medical issues and could need careful monitoring of both mother and the foetus. However, since the present study samples only women who developed eclampsia, the role of

these factors in the etiology of eclampsia cannot be determined alone.

Discussion of Frequency and Associated Factors

During the six months of the study, the total deliveries in the hospital were 4,500, of whom 110 cases (2.44%) of eclampsia were reported in the illustrative findings. This equates to around 24.4 cases per 1000 deliveries.

The observed illustrative frequency is similar to the findings of Abdullah et al. who reported 45 cases of eclampsia in 2,170 deliveries in a teaching hospital in Sukkur, which is about 2.0% [39]. These figures offer a relevant comparison as they are similar. Variances in hospital population, referral patterns, antenatal attendance, study length and identification of cases may affect the reported frequency by the individual hospitals.

Discussion of Maternal Outcomes

A significant part of eclampsia is maternal complications which can lead to complications if hypertension is severe, and if generalized seizures occur with organ dysfunction. The most common maternal complications in the illustrative findings are HELLP syndrome (15.5%) and hypertension (13.9%). Acute kidney injury is seen in 10.9% of women and placental abruption is observed in 8.2% of women.

HELLP syndrome is a severe condition, where hemolysis, elevated liver enzymes and low platelet count (HELLP) occur. It is linked to a considerable maternal morbidity and should be diagnosed early and managed appropriately. With the occurrence of HELLP syndrome in the illustrative findings, regular monitoring of platelet count, liver enzymes and other pertinent laboratory parameters in women with severe hypertensive disorders is important.

Another important complication of eclampsia is acute kidney injury. Endothelial dysfunction and renal perfusion changes and severe systemic disease can cause renal impairment. In this regard, therefore, urine output and renal function and/or serum creatinine should be monitored during maternal management.

This is also seen in the illustrative study population, Placental abruption. It is a significant obstetric complication that is related to maternal bleeding, foetal compromise and emergency obstetric management. Pulmonary edema and cerebrovascular accident (CVA) are potentially life threatening complications that are less frequently recorded in illustrative findings and warrant immediate clinical attention Of the women attending, 23.6% are admitted to the intensive care unit, demonstrating the need for intensive monitoring and management in a proportion of women with eclampsia. The percentage of maternal mortality cases is 2.7% of the illustrative population. This is an indication of the danger of eclampsia and not the actual maternal mortality rate in the study hospital.

Fetal and neonatal outcomes discussed

Important considerations for fetal and neonatal health are that eclampsia can affect the fetus and neonate by causing maternal hypertension, placental dysfunction, and premature delivery, which can impact fetal growth and survival.

Based on the illustrative findings, 44.5% of newborns are low birth weight and 39.1% of pregnancies are preterm. The results of this study suggest that there is a high level of morbidity related to negative neonatal outcomes. Placental insufficiency can lead to low birth weight and premature birth, in addition to those that occur due to fetal or maternal complications that require early delivery 24.5% have low Apgar score at 5 minutes while 19.1% have been diagnosed with birth asphyxia. The outcomes highlight the need for correct intrapartum fetal monitoring and early assessment of the infant after birth 31.8% of newborns in the illustrative findings are admitted to the NICU. Prematurity and low birth weight may be linked to the need for NICUs, as may be respiratory problems and complications of a weakened fetal state prior to birth In 7.3% of pregnancies, the fetus is recorded as dead in utero and in 5.5% of pregnancies, the fetus is stillborn. The study's operational definition of neonatal death (which occurs within 48 hours after birth) yields a perinatal mortality rate of 3.6%.

Comparison with Previous Studies

Concerning the frequency of eclampsia, the illustrative hospital frequency 2.44% is fairly similar with 2.0% reported by Abdullah et al in Sukkur [39]. It is especially relevant from this comparison, as both studies deal with patients who were treated in a tertiary care center in the same region. The reported frequencies may, however, have been affected by differences in the study period, and in hospital attendance and referral pattern. In the hospital-based study reported by Bano et al., they saw a significant number of cases of eclampsia and concluded that young maternal age, nulliparity, and poor attendance at antenatal care were characteristics associated with eclampsia [40]. The present illustrative findings also show that there are more young women and women who are primigravida. In terms of maternal complications, illustrative findings include HELLP syndrome, acute kidney injury and placental abruption/pulmonary edema. The type of these outcomes is similar to that reported by Mashoor et al. and Memon et al. in their studies on maternal and perinatal outcomes of eclampsia in Pakistan [11,12].

CONCLUSION AND RECOMMENDATIONS

Eclampsia continues to be a serious obstetric emergency, and a significant contributor to obstetric mortality and morbidity, especially in health services where timely antenatal care, early detection of preeclampsia and early management are difficult. It is a condition that must be immediately recognized, suitably stabilised, convulsions controlled, blood pressure managed and delivered in a timely fashion to minimise adverse maternal and foetal outcomes. The illustrative findings in this study show that the majority of women who develop eclampsia are in the reproductive age group (21-30 years), and that there are more primigravida women than other groups. The majority of patients present in the third trimester of pregnancy. Commonly reported clinical features include headache, blurring of vision, and epigastric pain. The results are significant of the importance of early recognition of warning signs and follow-up of women having hypertensive disorders during pregnancy. The illustrative examples also show a serious incidence of maternal complications such as HELLP syndrome, acute kidney injury, placental abruption, pulmonary edema and cerebrovascular complications. Intensive care admission is sometimes necessary and maternal mortality is a serious issue. These complications highlight the importance of early diagnosis, ongoing maternal surveillance, and timely multidisciplinary care. Other potential concerns for women with eclampsia include adverse fetal and neonatal outcome. The major problems are low birth weight, premature delivery, low Apgar score, birth asphyxia, admission to the neonatal intensive care unit, and fetal death. The results highlight the need for prompt obstetric management and adequate neonatal care.

Recommendations

The recommendations that are proposed below are based upon the study goals and the clinical significance of eclampsia:

Improved antenatal care: Consider increasing the frequency of antenatal visits to recognise early signs of hypertension and other risk factors for preeclampsia.

Regular blood pressure checks: BP screening should be done as part of routine antenatal care to allow early identification of problems associated with hypertension.

Trials of warning symptoms: Warning symptoms including severe headache, visual disturbance and epigastric pain must be promptly assessed by healthcare professionals, especially in women with raised blood pressure.

Emergency management: Eclamptic patients should be promptly stabilized in accordance with established clinical protocols, receive magnesium sulphate for seizure control and prevention of recurrent convulsions, and be treated with appropriate antihypertensive medication and delivered on time.

Maternal monitoring: Early detection of complications is recommended by close monitoring of blood pressure, urine output, neurological status, renal function, liver function, platelet count and other clinical parameters.

Access to critical supplies: Hospitals should have adequate stores of magnesium sulphate, antihypertensive medications, laboratory equipment and services, blood products, and equipment for emergency obstetric services.

Better neonatal services: Newborns at risk of being premature, low birth weight, experiencing birth asphyxia, and other complications should have access to neonatal resuscitation facilities and neonatal intensive care services.

Health education and awareness: Pregnant women and their families need to be informed on the need for antenatal care, warning symptoms of hypertensive disorders during pregnancy.

Staff training: Regular training should be provided for obstetricians, postgraduate trainees/midwives, nurses and other health care workers in the recognition and emergency management of preeclampsia/eclampsia.

Further research: Prospective studies with multiple health care facilities in larger numbers are recommended to determine the prevalence, risk factors, and fetal and maternal outcomes of eclampsia in the local population.

Limitations of the Study

There are some limitations on the study that should be taken into account in interpreting the results.

- **Single centre:** Ghulam Muhammad Mahar Medical College Civil hospital Sukkur. So, the results of this study may not be generalizable to the entire population of pregnant women in Sukkur or other areas of Pakistan.
- **Sample size is small:** Only 110 patients are included in the sample. While this sample size depends on the study proposal, the larger the sample, the more accurate estimates of maternal and fetal outcomes will be.
- **Short study period:** Study period is 6 months, a period that is too short to assess seasonal variation and long-term trends in the occurrence of eclampsia.
- **Consecutive sampling:** Instead of random sampling, use consecutive sampling. Selection bias can thus influence the representativeness of the population studied.
- **No control group:** This study includes women who come into service with eclampsia and does not have a comparison group of women who come into service without eclampsia. Hence, it outlines the characteristics of women who actually experience eclampsia, but it fails to identify separate risk factors for eclampsia.
- **Referral-related bias:** The patients may contain a greater proportion of complicated cases as the hospital becomes the referral centre for cases with specialist obstetric needs. It could affect the rate of complications and adverse events reported.
- **Clinical records and patient history:** Some information is dependent on patient history and clinical records. Data quality can be impacted by incomplete or incorrect information.
- **Low follow-up of long term outcomes:** Study protocol allows for maternal follow up until 42 days postpartum. Long-term maternal health and cardiovascular or renal complications later in life is not evaluated.
- **Limitation due to outcomes:** Certain maternal and neonatal issues can co-exist. Individual complication percentages may overlap and are not necessarily mutually exclusive.
- **Frequency estimation needs a denominator:** The denominator for the frequency of eclampsia is the total number of deliveries or eligible pregnancies in the study population over the study period. Without this information or if it is incomplete, a reliable institutional frequency cannot be determined.

The study's limitations notwithstanding, it contributes to the description of the clinical features and fetomaternal outcomes of women presenting with eclampsia at the study hospital.

The results could be useful to the local clinical scenario and improve antenatal monitoring, emergency obstetric management and neonatal care.

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