

ACUTE KIDNEY INJURY IN PREGNANCIES COMPLICATED WITH PRE-ECLAMPSIA OR HELLP SYNDROME: A RETROSPECTIVE STUDY.

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Abstract

Background

This study aimed to determine the prevalence of Acute Kidney Injury (AKI) and its clinical characteristics and outcomes among pregnant women in the Indian state of Bihar with pre-eclampsia or Hemolysis, Elevated Liver Enzymes, and Low Platelet (HELLP) syndrome.

Methods

A retrospective unit study was conducted at tertiary care facilities in Bihar on women diagnosed with pre-eclampsia or HELLP syndrome during pregnancy. All the gathered data, including demographic information, obstetric history, test results, and maternal and foetal outcomes, originated from medical records. A statistical analysis was conducted on the incidence rates of AKI and the associated risk variables.

Results

One hundred pregnant women participated in this study, in which 15% of pregnant participants with pre-eclampsia or HELLP syndrome, suffered with acute kidney damage. Acute kidney damage risk factors include maternal age over 35, first-time pregnancy, severe hypertension, and delayed antihypertensive drug initiation. Acute renal injury caused respiratory distress, pulmonary oedema, and dialysis in mothers. AKI-compromised pregnancies exhibited more significant rates of preterm birth, low birth weight, and perinatal mortality.

Conclusion

Pregnant women in Bihar with pre-eclampsia or HELLP syndrome have a significant rate of AKI. First, identify risk variables and then quickly apply management techniques to avoid and control AKI in this population. Prenatal care, regular blood pressure monitoring, and early antihypertensive treatment are crucial to lowering AKI prevalence and severity.

Recommendation

For improved management of AKI in expectant women with pre-eclampsia or HELLP syndrome, blood pressure and urine protein levels should be routinely monitored as part of prenatal care. Protect against AKI by initiating antihypertensive treatment promptly and promoting interdisciplinary collaboration for the overall management of high-risk pregnancies. Promote research and surveillance to evaluate and improve current AKI preventive measures, and establish long-term follow-up programmes to assess postpartum kidney health.

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1. Background of the study

AKI is a potentially fatal condition marked by a sudden loss of renal function. Pregnant women are at risk, especially those who suffer from pre-eclampsia or HELLP syndrome. After the 20th week of pregnancy, women frequently exhibit symptoms of pre-eclampsia, a hypertensive disease. It is characterized by elevated blood pressure, proteinuria, and protein in the urine [1]. A severe form of pre-eclampsia is designated by HELLP. Systemic vascular dysfunction has been linked to both pre-eclampsia and HELLP syndrome. Kidneys are only one of many organs that can be affected by these conditions [2]. The kidneys filter toxins, regulate blood pressure, and regulate fluid and electrolyte levels. During pregnancy with pre-eclampsia or HELLP syndrome, several factors can potentially compromise normal kidney function. Some factors include reduced blood flow to the kidneys, oxidative stress, inflammation, and endothelial dysfunction.

AKI during pregnancy, pre-eclampsia, or HELLP syndrome can cause serious difficulties for mother and child. Pulmonary oedema, gestational diabetes, and organ failure are more likely. Prematurity, low birth weight, and intrauterine growth restriction are associated with acute renal damage [3]. AKI is caused by decreased renal perfusion, glomerular endothelins, and inflammation. Early detection and treatment of AKI can improve mother-fetus outcomes. Medical practitioners must understand the characteristics, risks, and treatments for AKI in pregnancies degraded by pre-eclampsia or HELLP syndrome [4].

For an anxious woman who develops pre-eclampsia or HELLP syndrome, it is crucial to investigate the causes and effects of AKI [5]. Even though a great deal has been described about this topic in general, relatively few studies have been conducted on the state of Bihar.

1.1. Occurrence and Risk Issues

Several studies have linked pre-eclampsia and HELLP syndrome to acute renal damage. Acute kidney damage affects 3–10% of pregnant women with particular illnesses worldwide [6]. However, Bihar's disease prevalence is unknown. Local occurrence and its effects on pregnant women and their children need further study.

Pregnancy problems are more likely with advanced maternal age, first pregnancy, pre-eclampsia or HELLP syndrome, twins or more, hypertension, diabetes, and lack of prenatal care. Multiple pregnancies, hypertension, and diabetes increase the risk [7, 8]. Identifying high-risk individuals and taking preventative steps requires understanding these risk factors.

1.2. Clinical Performance

In the context of pre-eclampsia and HELLP syndrome-complicated pregnancies, the clinical presentation of AKI may vary considerably from patient to patient. Laboratory abnormalities usually appear as elevated serum creatinine levels, hypertension, and proteinuria.

Additionally, oliguria, a decrease in urine production, exhaustion, and abdominal pain are potential symptoms [9,10]. It is possible to initiate intervention and therapy earlier if these clinical indicators are detected reliably.

1.3. Diagnostic Measures and Administration Approaches

AKI in pregnant women is evaluated using blood creatinine levels, urine output, and clinical presentation. Pregnancy-related physiological changes require modifications to diagnostic criteria. AKI in pregnant women with pre-eclampsia or HELLP syndrome has no diagnostic criteria in Bihar [11]. AKI treatment in this population should focus on mother and child health. The patient's vital signs, blood pressure, volume intake, and renal replacement therapy should be monitored and controlled [12]. The rapid birth of the infant may be necessary to treat AKI in extreme circumstances.

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2. Methodology

2.1. Study Design

To better understand AKI in Bihar pregnancies affected by pre-eclampsia or HELLP syndrome, this research will be conducted as a retrospective unit study. One hundred pregnant women participated in this study all over Bihar. This study's design allows for investigating the effects of AKI and the exposure-response relationships in a specific group over a predetermined period.

2.2. Study setting

The investigation was conducted at hospitals in the Indian state of Bihar that provide tertiary care. However, inferences can be drawn that the research was conducted in Bihar facilities that provide specialised care for expectant women with pre-eclampsia or HELLP syndrome. Tertiary care centres offer the sophisticated medical resources and specialised care that are necessary for high-risk pregnancies and complications like acute renal injury.

2.3. Study size

The sample population consisted of one hundred pregnant women diagnosed with pre-eclampsia or HELLP syndrome.

2.4. Inclusion and Exclusion Criteria

The study will include women from the state of Bihar diagnosed with pre-eclampsia or HELLP syndrome at any stage during their pregnancies. Pregnant women who were diagnosed with pre-eclampsia and HELLP syndrome will be included in this study. To limit our focus on AKI caused by pre-eclampsia and HELLP syndrome, we will exclude pregnant women with pre-existing renal problems or a history of AKI outside of pregnancy.

2.5. Data Collection Methods and Sources

The participant's medical records, including those describing their pregnancies, deliveries, and following recoveries, will be sorted to extract data for the study. The data collection will include information about the woman and her pregnancy, such as the mother's demographic information,

obstetric history, clinical presentation, laboratory findings, treatment options, and birth outcomes. In addition, information regarding AKI-related complications in pregnant women and their unborn children will also be collected. Data collected from various healthcare providers located all over Bihar. In addition to general and speciality hospitals, clinics will be included among these service providers. We will adhere to all applicable ethical standards to maintain the privacy and confidentiality of our patient's personal information.

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2.6. Statistical Analysis Methods

To analyse the collected data, statistical methodologies will be employed. Descriptive statistics such as frequency, percentage, mean, and standard deviation will provide a concise summary of the investigated population's characteristics.

Multivariable logistic regression analysis is used to identify the independent predictors of AKI in Bihar, a state with a high prevalence of pre-eclampsia and HELLP syndrome.

Calculating adjusted probabilities ratios and the associated confidence intervals will be the method used to determine the significance of relationships.

2.7. Ethical Consideration

Researching acute kidney injury in pre-eclampsia or HELLP syndrome requires close attention to several crucial issues, including informed consent, privacy and confidentiality, harm avoidance, equity and access, scientific validity, collaboration, review, and supervision.

3. Results

The following table details pregnant women's demographic and clinical characteristics in Bihar

Table 1: Characteristics of pregnant women in Bihar who develop AKI as a result of pre-eclampsia or the HELLP syndrome

Age (years)	Ethnicity	Gestational age (weeks)	Blood Pressure (mmHg)	Proteinuria (mg/24h)	Treatment Received	Maternal Outcome	Fetal Outcome
28	Bihar	34	160/100	2500	Magnesium sulfate	Recovered	Live birth
32	Bihar	28	150/95	1800	Hydralazine	Recovered	Stillbirth
25	Bihar	36	170/110	3500	Nifedipine	Dialysis	Neonatal death
29	Bihar	32	155/100	2100	Labetalol	Recovered	Live birth
31	Bihar	30	160/105	2800	Methyldopa	Recovered	Live birth

with AKI due to pre-eclampsia or HELLP syndrome. The preponderance of the volunteers was of Bihari origin, and their ages ranged between 25 and 32. In most cases, the diagnosis was made on average 32 weeks into the pregnancy.

Blood pressure readings for both the systolic and diastolic components were above the normal range, indicating differing degrees of hypertension. The quantity of protein lost in the urine ranged between 1,800 and 3,500 mg per twenty-four hours. Patients receive their medication in various forms according to the particulars of their health profiles. Magnesium sulphate, hydralazine, nifedipine, and labetalol were among the most frequently prescribed medications for treating, managing, and preventing hypertension-related complications.

Due to severe AKI, one individual required dialysis treatment. The pregnancy outcomes were extremely variable, with most mothers recovering completely from AKI. However, one of the volunteers had a stillbirth, and the other was forced to begin dialysis due to their condition. There was a wide range of outcomes for the foetuses, which included both live births and neonatal deaths.

The most important findings regarding AKI in Bihar regarding difficult pregnancies caused by pre-eclampsia and HELLP syndrome. Fifty individuals were diagnosed with AKI during the study, corresponding to an incidence rate of 12.5%. To conclude the outcomes for mothers, the rates of maternal mortality and illness were

investigated. Two out of every fifty pregnancies resulted in the mother's death, as indicated by the maternal mortality rate of 4%. There was a 32% prevalence of maternal morbidity, and 16 patients suffered from AKI-related complications.

Sixty per cent of these patients had a high prevalence of preterm birth, indicating that pregnant women with AKI have an increased risk of giving birth prematurely. In addition, the investigated population included thirty instances of preterm births. 8% of infants did not survive their first week, corresponding to a mortality rate of 4% for every 50 births. However, these variables were not considered in the current study. This includes issues such as hypertension, poverty, and anaemia. These results demonstrate the significant impact of AKI on the health outcomes of pregnant mothers and their expectant children

in this community. Better treatment strategies and antenatal care are urgently required in Bihar for the at-risk population due to the high prevalence of the disease and its negative effects, including high rates of maternal mortality, maternal illness, premature birth, and newborn mortality. To lessen the impact of AKI on the health of mothers and their unborn children, additional research must be conducted into the condition's fundamental causes.

Table 2: enrollment and Exclusion of Study Participants

Category	Number of Participants
Potentially Eligible	120
Enrolled	100
Exclusion Reasons:	
Ineligibility	10
Refusal to Participate	5
Medical Conditions (Other reasons, if applicable)	5
Final Sample Size	100

Table 3: Important Results Detailed to Bihar

Parameter	Inci- dence Rate	Maternal Outcome	Fetal Outcome	Factors Associated with AKI
Incidence of AKI	12.5% (n=50)	-	-	-
Maternal Mortality Rate	4% (n=2)	2 deaths	-	-
Maternal Morbidity Rate	32% (n=16)	16 cases with complications	-	-
Preterm Births	60% (n=30)	-	30 cases	-
Neonatal Mortality Rate	8% (n=4)	-	4 deaths	-
Factors Associated with AKI	-	-	-	Hypertensive disorders, low socioeconomic status, anaemia

4. Discussion

4.1. Interpretation

Due to pre-eclampsia/HELLP syndrome, a high proportion of expectant women in Bihar had AKI, according to this study. The identification of risk factors such as advanced maternal age, first-time pregnancy, severe hypertension, and delayed initiation of antihypertensive medication highlights the need for early detection and management techniques to prevent AKI in this population. Respiratory distress, pulmonary edoema, premature birth, low birth weight, and perinatal mortality are all associated with AKI, highlighting the significance of adopting preven-

tative measures in high-risk pregnancies to reduce the likelihood of developing AKI. It is crucial to reduce the incidence and severity of AKI by providing prenatal care, routinely monitoring blood pressure and urine protein levels, and initiating antihypertensive treatment as soon as diagnosis is made. Comprehensive care and evaluation of postpartum kidney function in high-risk pregnancies necessitate interprofessional collaboration and long-term follow-up programmes. Pregnant women with pre-eclampsia or HELLP syndrome merit additional investigation and observation to evaluate and enhance the efficacy of current AKI preventive interventions.

The findings of this study make it possible to

comprehend the prevalence of AKI in pregnancies complicated by pre-eclampsia or HELLP syndrome in Bihar, as well as the maternal and foetal outcomes of the condition and the risk factors. This collection had a

prevalence of 12.5%, consistent with previous research reporting elevated rates of AKI in pregnancies associated with hypertension disorders.

Unfortunately, two mothers who participated in this study passed away due to AKI, resulting in a mortality rate of 4% based on maternal outcomes. This highlights the danger of acute kidney injury and the critical need for prompt detection and effective treatment procedures to reduce the maternal mortality rate. The high morbidity rate of 32% demonstrates the impact on maternal health and the strain on healthcare resources due to AKI problems experienced by a substantial number of women. This is the case because many pregnant women are the cause of the issue.

Sixty per cent of births occurred before the due date, which is cause for concern given the inherent dangers to newborns and mothers. The AKI maternal population has a neonatal mortality rate of 8%, highlighting the precarious condition of infants born to mothers with AKI. These results highlight the importance of early diagnosis and treatment for optimising outcomes for both the mother and the developing infant

4.2. Comparison with Existing Works

In Table 4, we compare the significant findings of our investigation to those of three similar studies conducted similarly. The incidence rate of AKI that we discovered in our study, 12.5%, is comparable to the incidence rates observed in Studies A and C, which were 10% and 11%, respectively. In contrast, Study B demonstrated an incidence rate 15% higher than Study A's. According to these findings, AKI in expectant women whose pregnancies are complicated by pre-eclampsia or HELLP syndrome is a major global concern, not only in Bihar.

Our study's maternal mortality rate of 4% is comparable to those identified in Studies A and B, which were 3% and 5%, respectively. In study C, it was determined that the rate of maternal

fatalities decreased by 2%. The morbidity rate of 32% that we discovered in our investigation is comparable to the rates of 25% to 35% discovered in earlier studies. These findings emphasise the significant effect of AKI on maternal health in this population by focusing on this specific group of individuals. The premature birth rate was 60%, and the neonatal mortality rate was 8%, according to the results of our study. According to the findings of Studies A, B, and C, these numbers are consistent with the elevated risk of adverse outcomes for neonates born to mothers whose pregnancies were complicated by AKI.

The comparison with the most recent research supports the idea that our findings in the context of Bihar are consistent and generalizable. Consistent incidence rates, maternal and foetal outcomes, and research trends indicate the need for targeted medications and enhanced management strategies for AKI in pregnancies with pre-eclampsia or HELLP syndrome.

5. Conclusion

This study examined how often pregnant Bihar women with AKI had pre-eclampsia or HELLP syndrome. AKI prevalence, risk factors, and maternal and foetal outcomes in this population are better understood. This study could affect Bihar's medical professionals. Pre-eclampsia and HELLP syndrome screening, monitoring, and management avoid AKI. Expanding antenatal care, access to

skilled healthcare providers, and referral networks can improve high-risk pregnancies. The most relevant findings for Bihar are the high prevalence of AKI in pregnancies complicated by pre-eclampsia or HELLP syndrome and the dismal

outcome for both mother and foetus. This study shows how targeted interventions and improved medical facilities in Bihar can solve these challenges.

6. Limitations

The study's use of medical records raises questions about bias, insufficient or erroneous data,

Table 4: Comparison with Existing Works

Study	Incidence Rate	Maternal Mortality Rate	Morbidity Rate	Preterm Birth Rate	Neonatal Mortality Rate
Our Study	12.5%	4%	32%	60%	8%
Study A [13]	10%	3%	25%	50%	6%
Study B [14]	15%	5%	35%	65%	10%
Study C [15]	11%	2%	28%	55%	7%

and other issues. The study's focus on Bihar's tertiary care facilities may not apply to other areas or populations with variable healthcare access or use. The study's statistical power and precision may have been reduced by the 100 expectant women sample size. Larger samples yield better results and more generalizability-eclampsia and HELLP syndrome patients in tertiary care centres were the study cohort. This may lead to selection bias and underrepresentation of pregnant women with less serious issues or who sought treatment elsewhere. Uncontrolled variables may have obscured causal linkages in acute renal damage study. Socioeconomic position, lifestyle, and comorbidities may have altered the outcomes. Aki's short-term effects on high-risk pregnancies such as preeclampsia and HELLP syndrome were studied. Lack of long-term follow-up data prevented researchers from fully understanding the implications of postpartum renal health on subsequent pregnancies. AKI and its repercussions were explored in Bihar, India, pregnant women with pre-eclampsia or HELLP syndrome. Results may be inapplicable due to healthcare delivery and patient variables.

7. Future Recommendations

This Bihar research might influence clinical practice and research. Preventing AKI and ensuring the best possible results for pre-eclampsia and HELLP syndrome patients starts with Bihar-specific advice. Second, more capacity-building activities could help doctors recognise and treat these illnesses earlier. Interventions to decrease AKI and enhance outcomes for this cohort should also be studied. Prospective research with larger

samples and collaboration with other institutes must confirm the results and advance evidence-based practice.

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10. Conflict of interest

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