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Original Research Paper

Nephrology

AKI IN PREGNANCY: A CRITICAL CRISIS IMPACTING TWO LIVES

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ABSTRACT

Background: AKI during pregnancy is a major cause of complications for both mothers and fetuses, leading to increased morbidity and mortality rates. A decline in kidney function can lead to chronic kidney disease or end-stage kidney disease. Additionally, it is associated with a higher risk of adverse cardiovascular events and may result in longer hospital stays and extended time in the intensive care unit. Therefore, our study aimed to reveal the clinical characteristics and maternal-fetal outcome with pregnancy-related AKI among primigravida in Prayagraj and its surrounding districts. **Material and Methods:** A retrospective observational study was conducted at S.R.N. Hospital in Prayagraj, Uttar Pradesh, from January 1, 2014, to December 31, 2024, to assess the clinical characteristics and outcomes of pregnancy-related AKI. The study included 460 primigravida patients admitted to the Nephrology ICU. Key outcomes examined were the need for renal replacement therapy and the rates of maternal and fetal mortality, highlighting the critical need for targeted interventions in this high-risk group. **Result:** The mean age of patients was 24 years. AKI was observed in 11% during the first trimester, 21% in the third trimester, and 68% in the postpartum period. RRT was initiated in 240 primigravida patients, of whom 202 (84.16%) received continuous and intermittent haemodialysis, while 38 (15.84%) patients underwent plasmapheresis. Mother and fetal mortality were noted as 30% & 29.11% respectively. **Conclusion:** Our study clearly shows that promptly referring obstetric patients with acute kidney injury (AKI) to a nephrologist can significantly improve both maternal and fetal health outcomes. Early intervention not only helps prevent complications but also enhances the long-term health prospects for both mothers and their infants. In these situations, it is essential to provide counselling for ongoing follow-up before taking any further steps.

KEYWORDS :

INTRODUCTION

AKI in pregnancy presents a significant clinical challenge as it poses a risk to both the mother and the fetus. Usually, the development of AKI during pregnancy follows a bimodal distribution with two incidence peaks: one in the first trimester caused by septic abortion and other in the third trimester and/or around delivery due to late obstetrical complications [1].

During the first trimester of pregnancy, AKI is commonly reported, secondary to pre-renal AKI due to dehydration from hyper emesis gravidarum and septic shock associated with sepsis [2]. In the third trimester and immediate puerperium, it is associated with preeclampsia/eclampsia, ante partum hemorrhage (APH), postpartum hemorrhage (PPH), puerperal sepsis, hemolytic uremic syndrome (HUS) and HELLP syndrome [3].

The incidence of AKI in pregnancy has significantly decreased in developed countries due to improved general healthcare; however, it remains a serious public health problem in developing countries. Our study aimed to reveal the clinical characteristics and maternal-fetal outcome with pregnancy-related AKI among primigravida in Prayagraj and its surrounding districts.

MATERIAL AND METHODS

A retrospective observational study was conducted to evaluate the clinical characteristics and maternal-fetal outcome of pregnancy-related acute kidney injury at S.R.N. Hospital in Prayagraj, UP, from January 1, 2014, to December 31, 2024. A total no of 460 primigravida with a diagnosis of AKI was admitted in Nephro ICU. Records were analyzed for demographic characteristics, obstetric history, and clinical profiles at the time of admission. We excluded patients with preexisting conditions such as diabetes mellitus, hypertension, contracted kidney conditions, renal transplant recipients, and CKD. Relevant microbiological, pathological, and radiological investigations were sent to laboratories upon admission and during the hospital stay as needed. Data were analyzed, including maternal and fetal outcomes, using descriptive statistics with SPSS (version 22).

Definitions

- AKI was defined on the basis of Risk, Injury, Failure, Loss of function, and End stage renal disease (RIFLE) criteria [4].
- CKD abnormalities of kidney structure or functional abnormalities with GFR $\leq$ 60 mL/min/1.73m^2 that is present for more than three months [5].
- PRAKI was defined as AKI diagnosed any time during pregnancy or during postpartum phase (first6 weeks post delivery) [6].
- Hemolysis, elevated liver enzymes, and low platelet count (HELLP) syndrome was defined by the combination of thrombocytopenia (<100 G/L), elevated liver enzymes (aminotransferase >70 UI/L), and hemolysis [7].
- Sepsis was defined as per the criteria laid down by the American College of Chest Physicians [8]

The American College of Obstetricians and Gynecologists (ACOG) defines preeclampsia as the new onset of hypertension (blood pressure ≥140/90 mm Hg) and either new-onset proteinuria or significant end-organ dysfunction (e.g., kidney dysfunction, liver issues, neurological symptoms) after 20 weeks of gestation and eclampsia as the occurrence of new-onset tonic-clonic seizures or coma in a pregnant or postpartum woman. These seizures are not due to other neurologic conditions and are considered a severe complication of preeclampsia, which involves high blood pressure and potential end-organ dysfunction. Eclampsia can happen before, during, or after labor, most often developing in the first 48 hours postpartum respectively [9].

Outcomes

The outcomes that were evaluated included maternal and

fetal mortality, recovery of renal function, the need for renal replacement therapy (RRT), and levels of proteinuria. Renal recovery was defined as a serum creatinine level of 1.0 mg/dL or lower, along with a 24-hour urine protein output of less than 150 mg/day within six weeks of being diagnosed with AKI [7].

RESULTS

In terms of renal manifestations all the primigravida were diagnosed with AKI at the time of admission and required ICU level of care. The mean age of patients was 24 years. AKI was observed in 11% during the first trimester, 21% in the third trimester, and 68% in the postpartum period. RRT was initiated in 240 primigravida patients, of whom 202 (84.16%) received continuous and intermittent haemodialysis, while 38 (15.84%) patients underwent plasmapheresis. Mother and fetal mortality were noted as 30% & 50% respectively.

Causes of AKI in Pregnancy, Maternal outcomes of Pregnancy and Fetal outcomes of pregnancy are listed in Table 1, Table 2 and Table 3respectively while figure 1 and figure 2 illustrates the urgency fetal outcome.

Table 1: Causes of AKI in Pregnancy.

Sr. No.	Causes	(n=460)	%age
1	Sepsis	276	60%
2	Antepartum hemorrage(APH)	10	2.1%
3	Postpartum hemorrage(PPH)	59	12.8%
4	Lupus	28	6.2%
5	Ectopic	09	1.9%
6	Pre - eclampsia	18	3.91%
7	Eclampsia	60	13.00%

Table 2: Maternal Outcomes of Pregnancy.

Sr. No.	Maternal outcomes	(n=460)	%age
1	Complete recovery	313	68.05%
2	Progression to CKD	3	0.65%
3	End stage renal disease	6	1.30%
4	Death	138	30%

Table 3: Fetal Outcomes of Pregnancy.

Sr. No.	Fetal outcome	(n=460)	%age
1	Normal baby	225	48.94%
2	Intrauterine growth retardation	101	21.95%
3	Intrauterine still birth	33	7.17%
4	Early neonatal death	70	15.21%
5	Miscarriages & Ectopic	31	6.73%

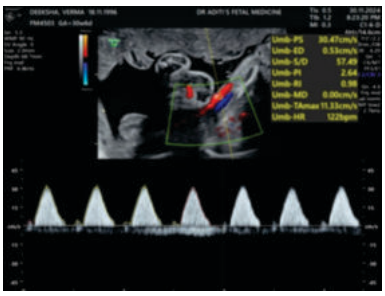

Fig -1: Absent Umblical flow in Severe IUGR in Preeclampsia S/o Compromised fetal circulation.
Outcome: Delivery at 34 weeks.

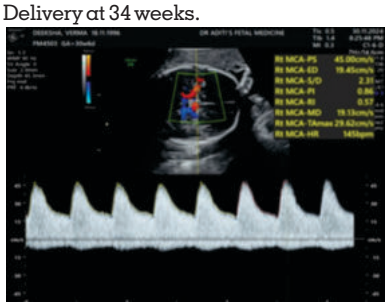

Fig -2: Brain Sparing effect in severe PET.
Outcome: Immediate delivery at 30 weeks, Prologed NICU admission.

DISCUSSION

Pregnancy-Related Acute Kidney Injury (PRAKI) is a rare but serious complication that can occur during pregnancy. In developing countries, it is linked to significant health risks and high rates of morbidity and mortality among young women who are often otherwise healthy. It poses risks not only to the mother but also to the fetus.

Interestingly, our study found that PRAKI in the first trimester is largely linked to the self-medication of over-the-counter (OTC) drugs for induced abortions, affecting both married and unmarried primigravida women. We identified the primary causes of AKI in primigravida. Sepsis stands out as the leading cause at 60%. Other significant contributors include PPH at 12.8%, APH at 2.1%, lupus at 6.2%, preeclampsia at 3.9%, and eclampsia at 13%. Additionally, ectopic pregnancy accounts for 1.9%. These findings underline the critical risks associated with AKI in this population. Similar to our study, sepsis contributed 30–60% cases of PRAKI in other Indian series, in contrast to 11% in Western literature [10].

In other series, the contribution of pre-eclampsia and eclampsia to PRAKI is variable, (14–86% of PRAKI), and it is reported that the incidence of AKI in preeclampsia is 1–8.9%, while in HELLP syndrome, it is around 8–15% with varying severity of renal dysfunction [11,12].

We observed that an impressive 68.05% of mothers experienced complete recovery, highlighting the effectiveness of our interventions. However, it is concerning that 0.65% of females progressed to CKD and 1.3% developed ESRD. Moreover, our findings indicate a significant mortality rate of 30% among patients, underscoring the urgency of addressing these serious outcomes. The overall incidence of AKI-RRT in our study (52.17%) is lower than those reported in other Indian subcontinent series (60–94%) [13-15]. The lower percentage of AKI-RRT in our series could be related to early detection of AKI either related to the criteria used for diagnosis or early referral to our center, leading to the earlier implementation of treatment.

Out of 460 patients, we successfully achieved 48.94% normal babies, 21.95% experienced intrauterine growth retardation, 7.17% suffered intrauterine stillbirth, 15.21% had early neonatal death, and 6.73% reported abortions. We noted a low incidence of septic abortions in contrast to a higher incidence (12–50%) in some parts of India (12–50%) [13,15].

According to the RIFLE criteria, the majority of our patients were classified into the "Injury" and "Failure" categories. Some studies reported a higher prevalence of the "Loss" and "Failure" stages, while others noted that 50% of patients in the "Risk" category achieved complete recovery of renal function [16].

The mortality rate observed in our series (30%) is similar to those found in contemporary series from India and other developing countries;[13,15] however, it is higher than those noted in Western series. It is clear that complications such as sepsis, severe hemorrhage, oliguria, and acute kidney injury requiring renal replacement therapy (AKI-RRT) indicate a poor prognosis. These findings are consistent with established determinants of maternal morbidity and mortality [17].

The strengths of our paper include a large sample size, availability of clinical data and reasonable length of follow-up with minimal patient attrition.

CONCLUSION

Our study clearly indicates that timely referral of obstetric patients with AKI to a nephrologist can significantly improve maternal and fetal morbidity. Early intervention can also help to prevent complications, ultimately enhancing future health outcomes for both mothers and their infants. In such cases, counselling for continued follow-up is essential before further steps are taken.

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