Section: Obstetrics and Gynaecology

Case Series

PREGNANCY-RELATED ACUTE KIDNEY INJURY: CLINICAL PROFILE, AETIOLOGY, MANAGEMENT, AND MATERNAL OUTCOMES IN A TERTIARY CARE CENTRE- A CASE SERIES

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ABSTRACT

Background: Pregnancy-related acute kidney injury (PRAKI) remains a significant contributor to maternal morbidity and mortality in developing countries, often resulting from preventable obstetric complications such as sepsis, haemorrhage, and hypertensive disorders. Despite advances in obstetric care, delayed recognition and inadequate management continue to worsen outcomes. The aim and objective is to evaluate the clinical profile, etiological factors, management strategies, and maternal outcomes of PRAKI in a tertiary care centre. **Materials and Methods:** A retrospective record-based observational study was conducted over one year at a tertiary care hospital. Ten patients diagnosed with PRAKI were included. Data on demographic characteristics, obstetric profile, timing of presentation, aetiology, management interventions, and maternal outcomes were collected and analysed using descriptive statistics. **Result:** Most patients belonged to the 20–29-year age group (80%), with a predominance in the third trimester (60%) and postpartum period (60%). Primigravida constituted 40% of cases. Sepsis was the leading aetiology (40%), followed by postpartum haemorrhage and hypertensive disorders (20% each). A majority (60%) required intensive care support, including inotropes and ventilatory assistance. Maternal outcomes were poor, with 40% recovery, 20% progressing to dialysis-dependent renal failure, and 40% mortality. **Conclusion:** PRAKI is a severe and potentially preventable condition associated with high maternal mortality. Early recognition and prompt management, along with a multidisciplinary approach, are essential to improve outcomes. Emerging biomarkers such as NGAL, L-FABP, KIM-1, and cystatin C may aid in early detection. Strengthening antenatal care and timely management of sepsis and hypertensive disorders are crucial in reducing the burden of PRAKI.

INTRODUCTION

Pregnancy-related acute kidney injury (PRAKI) is a serious and potentially life-threatening complication that remains an important contributor to maternal morbidity and mortality, particularly in developing countries.[1,2] Although the incidence of PRAKI has significantly declined in developed regions due to advances in obstetric care, improved sanitation, and better access to healthcare services, it continues to pose a substantial clinical challenge in resource-limited settings.[3,4] The persistence of PRAKI in such regions reflects disparities in healthcare access, delayed referrals, and inadequate management of obstetric emergencies.[5]

Pregnancy induces several physiological changes, including increased renal plasma flow and glomerular filtration rate, which may mask early signs of renal dysfunction. As a result, acute kidney injury during pregnancy may go unrecognised until it reaches an advanced stage.[6] PRAKI can occur at any point during pregnancy or in the postpartum period; however, it is more commonly observed in the late antenatal period and early postpartum phase.[7,8] These periods are associated with a higher risk of complications such as sepsis, postpartum haemorrhage, and hypertensive disorders of pregnancy.[9]

The aetiology of PRAKI is often multifactorial. Sepsis remains one of the most common causes,

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particularly in the postpartum period, due to factors such as poor aseptic practices, prolonged labour, and delayed initiation of appropriate treatment.[10] Hypertensive disorders, including preeclampsia and eclampsia, contribute significantly by causing endothelial dysfunction and reduced renal perfusion.[9] Obstetric haemorrhage, especially postpartum haemorrhage, can lead to hypovolemia and ischemic renal injury, further exacerbating renal dysfunction.[11] In addition, anaemia and underlying medical conditions may worsen the clinical course and outcomes.[12]

The clinical presentation of PRAKI varies widely, ranging from asymptomatic elevation of renal parameters to severe oliguria, anuria, and multisystem involvement. Many patients present in critical condition, requiring intensive monitoring and multidisciplinary management. The management of PRAKI primarily involves early identification, prompt treatment of the underlying cause, and supportive care, including fluid management, hemodynamic stabilisation, and renal replacement therapy when indicated.[6,10] Despite improvements in critical care, PRAKI continues to be associated with adverse maternal outcomes, including prolonged hospitalisation, progression to chronic kidney disease, and increased risk of mortality.[7,11]

Understanding the clinical profile, etiological spectrum, and outcomes of PRAKI is essential for developing targeted strategies to reduce its burden. Studies from various regions have highlighted variations in incidence, causes, and outcomes based on healthcare infrastructure and population characteristics.[3,4] Therefore, region-specific data are crucial for identifying gaps in care and implementing appropriate preventive measures.

The present study was undertaken in a tertiary care centre to evaluate the clinical profile, etiological factors, management strategies, and maternal outcomes of pregnancy-related acute kidney injury. The study aims to evaluate the clinical profile, etiological factors, management strategies, and maternal outcomes of PRAKI in a tertiary care centre.

MATERIALS AND METHODS

A retrospective record-based observational study conducted at ISO-KGH, Madras Medical College, over a period of one year. Institutional ethical committee approval was obtained, and data confidentiality was maintained.

Inclusion and Exclusion Criteria

Pregnant or postpartum women diagnosed with pregnancy-related acute kidney injury (PRAKI) were included in the study. Patients with pre-existing renal disease, chronic hypertension or diabetes prior to pregnancy, a history of renal stone disease, or elevated serum creatinine prior to gestation were excluded.

Methods: The study included a total of 10 patient records diagnosed with PRAKI. Data were extracted from medical records, including age, gravida and parity, trimester at presentation, aetiology of PRAKI, management interventions, need for intensive care, and maternal outcomes. Maternal outcomes were categorised as complete recovery (normal renal function), irreversible renal failure (dialysis dependence beyond three months), and death. Data were presented in frequencies and percentages.

RESULTS

Most patients were aged 25–29 years (50%), with (80%) between 20–29 years. The majority presented in the third trimester (60%). Primigravida accounted for (40%), followed by G2 (30%) [Table 1].

Table 1: Demographic and Obstetric Profile

Parameter	Category	n / (%)
Age Distribution	20–24 years	3 (30%)
	25–29 years	5 (50%)
	30–34 years	1 (10%)
	≥35 years	1 (10%)
Trimester Distribution	1st Trimester	1 (10%)
	2nd Trimester	3 (30%)
	3rd Trimester	6 (60%)
Obstetric Score	Primi	4 (40%)
	G2	3 (30%)
	G3	2 (20%)
	G5	1 (10%)

Postnatal cases were (60%), compared to antenatal (40%). Sepsis was the leading cause (40%), followed by PPH and hypertension (20%), while anaemia and heart failure contributed (10%) each [Table 2].

Table 2: Aetiology and Timing of PRAKI

Parameter	Category	n / (%)
Timing	Antenatal	4 (40%)
	Postnatal	6 (60%)
Etiology	Sepsis	4 (40%)
	PPH	2 (20%)
	Hypertension	2 (20%)
	Anaemia	1 (10%)
	Heart Failure	1 (10%)

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6/10 patients (60%) required IMCU care, inotropes, and ventilatory support, indicating severe disease, while 4/10 (40%) were managed without advanced support [Table 3].

Table 3: Management (Supportive Measures)

Intervention	Required n (%)	Not Required n (%)
IMCU Admission	6 (60%)	4 (40%)
Inotropes	6 (60%)	4 (40%)
Ventilator Support	6 (60%)	4 (40%)

4/10 (40%) recovered, 2/10 (20%) required lifelong dialysis, and 4/10 (40%) died, reflecting high morbidity and mortality [Table 4].

Table 4: Maternal Outcomes

Outcome	N / (%)
Recovered	4 (40%)
Lifelong Hemodialysis	2 (20%)
Death	4 (40%)

DISCUSSION

PRAKI is a serious obstetric complication associated with significant maternal and fetal morbidity and mortality.[1,2] It commonly affects women in the reproductive age group and is affected by various obstetric and medical factors. The condition often presents during late pregnancy or the postpartum period and is frequently associated with preventable causes such as sepsis and hypertensive disorders. Despite advances in obstetric care, PRAKI continues to pose clinical challenges due to its severity and impact on maternal outcomes.[3,4]

In our study, PRAKI predominantly affected women in the reproductive age group, with most cases occurring in late pregnancy. A higher proportion of cases occurred in primigravida. Similarly, Kumari et al. reported a mean age of 25.36 years, with a predominance of antenatal cases (76.08%) and primigravida (51.63%), showing comparable trends in age distribution and gravidity. In contrast, our study demonstrated a higher proportion of postnatal cases.[7] Comparable findings were reported by Mukhopadhyay et al., who reported a mean age of 24.4 ± 4.73 years with 40% of patients being primigravida, showing comparable trends in age distribution and gravidity.[13] These findings are comparable, as all studies demonstrate that PRAKI predominantly affects younger reproductive-age women, especially primigravida, with increased vulnerability during pregnancy.

In our study, Postnatal presentation was more common. Sepsis was the leading cause, followed by hemorrhagic and hypertensive factors, indicating largely preventable etiologies. Similarly, the study by Iqbal et al. reported sepsis as the most common cause (74.33%), followed by preeclampsia/eclampsia (62.85%), LSCS (38.6%), abruptio placentae and postpartum hemorrhage (15.7%), post-abortion (11.4%), HELLP syndrome (10.46%), twin pregnancy (2.8%), and rupture ectopic (1.4%).[6] Similar observation is reported in earlier studies, Yadla et al. reported a predominance of postpartum cases (56%) over antepartum cases (44%), with sepsis (25.8%) and preeclampsia (20.6%) being major causes, along with a significant proportion of combined preeclampsia and sepsis cases (33.8%) and postpartum hemorrhage contributing 7.8%, showing comparable trends in timing and etiological distribution.[2] This aligns with our study that the postpartum period remains a high-risk phase, with sepsis and obstetric complications being the most common aetiology.

In our study, most patients required intensive supportive care, reflecting the severe and multisystem nature of PRAKI, with relatively poor outcomes, including notable mortality and progression to chronic renal failure, emphasizing the need for early intervention. Similarly, Sachan et al. demonstrated that most patients were in advanced stages (Stage III: 134/150), with a high requirement of renal replacement therapy (65.3%) and poor outcomes, including low complete recovery (20.1%) and high mortality (37.3%).[14] In another study by Adejumo et al. reported that severe clinical factors such as ICU admission, impaired consciousness, and breathlessness were significantly associated with higher mortality (45.5%, 72.7%, and 90.9%, respectively), with overall outcomes showing 53.1% recovery and 34.4% mortality, indicating comparable severity-related outcomes.[15] Similarly, Sandilya et al. reported that all patients required HDU/ICU care (100%), with higher dialysis requirement (46%), better recovery (80%), and lower mortality (14%), indicating comparable severity but relatively improved outcomes.[8] These findings show broadly comparable trends in disease severity and need for intensive care, although variations exist in recovery and mortality rates across studies.

This study highlights that PRAKI is a severe, multifactorial condition affecting young women, especially in late pregnancy and postpartum. Its association with preventable causes like sepsis highlights the need for improved antenatal care, early recognition, and multidisciplinary management to reduce severity and improve maternal outcomes. However, limitations such as a single-centre setting, absence of a control group, and short follow-up may limit generalizability.

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CONCLUSION

PRAKI predominantly affected women in the reproductive age group, with most cases occurring in the third trimester and postpartum period. Sepsis was the leading aetiology, followed by hemorrhagic and hypertensive causes. A significant proportion required intensive care support, indicating severe disease, with notable maternal mortality and progression to chronic renal failure. These findings emphasise the need for early recognition and prompt management of AKI in pregnancy. A multidisciplinary approach can improve maternal and foetal outcomes. Emerging biomarkers such as NGAL, L-FABP, KIM-1, and cystatin C may aid early detection. Prevention and timely treatment of sepsis and hypertensive disorders are crucial in reducing the burden of PRAKI.

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