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Original Article

Evaluation Of Pregnancy Related Acute Kidney Injury in An Obstetric High Dependancy Unit in A Tertiary Care Hospital in West Bengal

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ABSTRACT

Introduction: Pregnancy related acute kidney injury (PRAKI) causes substantial maternal and subsequently foetal complications in our country. The important causes of PRAKI are haemorrhage, sepsis, preeclampsia etc.
Methods: A retrospective study was conducted in the Department of Obstetrics and Gynaecology, NRS Medical College and Hospital, Kolkata from March,2025 to March,2026. All patients admitted in Obstetric High Dependency Unit (Obs-HDU) who were either pregnant or within 42 days post-partum period were
Results: PRAKI is responsible for 22 admission in Obs-HDU . Majority were unbooked and referred from other hospitals . 20 patients developed PRAKI postnatally. Main causes were Post partum complications that incudes Sepsis ,Obstetric haemorrhage , preeclamsia; more than one cause is responsible for many cases. Patients neede average 7 cycles of Haemodialysis. Average hospital stays found to be 16.36 days. Maternal mortality noted in about three (3) cases
Conclusion: Main causes of PRAKI were post-partum complications, obstetric haemorrhage , sepsis and preeclampsia. Timely management and referral can save lifes and reduce Maternal mortality.

Keywords: *Pregnancy-Related Acute Kidney Injury(PRAKI), Obs-HDU*

INTRODUCTION

Pregnancy realetd physiological changes make management of complications during Antepartum and Postpartum period challenging. In Countries like us Obstetric patients comprise 10% of ICU admissions. Acute Kidney Injury(AKI) is responsible for 5% hospital admissions but 30% Intensive Care Unit(ICU) admissions. Pregnancy-Related AKI(PRAKI) is the cause of 20% AKI cases and leads to maternal death in 30% cases. The incidence of PRAKI was 22% in 1961 but that is 3-7% after 2000 thanks to reduction in cases of septic abortion[1] and improvement in quality of Antenatal care and postnatal care.

Risk factors and causes of PRAKI are varied. Most important causes include Sepsis, Obstetric Haemorrhage,

Preeclampsia, Post-delivery Fluid management, Chronic Renal Disease, Chronic Hypertension[2]. Less common causes include Acute Fatty Liver(AFL) in pregnancy, HELLP(Haemolysis,Elevated Liver enzymes,Low Platelets) syndrome, Thrombotic Microangiopathy(TMA), mainly responsible for peri-partum PRAKI [3,4].

In First trimester it is Septic abortion that mostly causes PRAKI, whereas in second and third trimester Obstetric Haemorhhage, Preeclampsia, dehydration from gastroenteritis remain to be main causes of PRAKI[5]. Post-partum Haemorrhage, sepsis, faulty Fluid management causes PRAKI in immediate amd late puerperal period.

Early diagnosis and management remain the key to treatment of PRAKI cases. This study gives us the opportunity to evaluate the different causes of PRAKI and there risk factors and management.

METHODOLOGY

All patients admitted in Obs-HDU, Department of Obstetrics and Gynaecology, NRS Medical College, Kolkata, with diagnosis of PRAKI from 1st March,2025 to 31st March,2026 are included in this study.

Inclusion Criteria: All patients admitted in Obs-HDU with pregnancy or less than 42 days postpartum with AKI
Exclusion criteria: Patients with Chronic Renal Disease

In this study AKI was defined as serum creatinine level > 1.5 mg/dl with oliguria(urine output< 0.5 ml/Kg/Hr) for a duration of 6hr or more[6]. PRAKI was defined as AKI during pregnancy or within 6 weeks Postpartum [7].
Maternal history, investigations were analysed and risk factors were determined for AKI.

RESULTS

There were total 630 admissions in Obs-HDU during study period. Amongst them PRAKI cases were 22 (3.49 %).
Most patients were in the 20-30 years age group (average age 25.4 years). Most women (15) were from Rural areas. Most were(20) from lower socio-economic strata and having low literacy(20). Most of the patients are referred from outside hospital and were unbooked in NRS Medical College. In our study, most patients (91 %) developed PRAKI in post-partum period. The proportion of referred cases were high 90.9% and almost all of them were delivered outside NRSMC.

Table 1: Sociodemographic and maternal characteristics of study population

Baseline and Maternal characteristics	Number(%,Total cases=22)
Age (years)	
<30 years	15(68.18%)
>30 years	7(31.82%)
Area of Residence	
Rural	15(68.18%)
Urban	7(31.82%)
Referred	
Unbooked	15(68.18%)
Booked	7(31.82%)
Literacy	
Illiterate	10(45.45%)
Undergraduate	10(45.45%)
Graduate	2(9.1%)
***Socioeconomic Status(Modified Kuppuswamy*)**	
Upper middle	2(9.1%)
Lower middle	6(27.27%)
Upper lower	6(27.27%)
Lower	8(36.36%)
Referred	
No	2(9.1%)
Yes	20(90.9%)
Delivery outside NRS Medical College	
Yes	18(81.81%)
No	4(18.19%)
Antepartum/Postpartum	
Antepartum 1st Trimester	1(4.5%)
Antepartum 2nd and 3rd trimester	1(4.5%)
Postpartum	20(91%)

Table 2 : Study population clinical conditions

Clinical Characteristics	Number(n) (%,N=22)
Clinical presentations*	
Anuria/Oliguria	18(81.8 %)
Severe Anaemia	12(54.5%)
Signs of Sepsis	15(68.1%)
Hypertensive disorder of pregnancy	14(63.6%)
AGE	1(4.5%)
Shock	14(63.6%)
Respiratory distress	6(27.2%)
Pregnancy outcome	
Abortion	1(4.5%)
Delivery	21(95.5%)
Mode of Delivery	
Vaginal delivery	8(36.3%)
Assisted vaginal delivery	2(9.09%)
Caesarean delivery	12(54.07%)
Duration of Hospital Stay(days)	16.3 days
Maternal outcome	
Alive	19(86.36%)
Mortality	3(13.64%)

N.B-* Number(N) can be more than 22 as one patient can present with more than one presentation

As shown in table 2 most patients presented with decreased urinary output(oliguria/anuria), and many had severe anaemia during admission. Decreased urinary output (anuria/oliguria) remain the most common presentation, followed by signs of sepsis,shock and respiratory distress. Only one case of PRAKI in our study was presented in Antenatal condition.The average duration of hospital stay was 16.36 days and 3 patients expired.

Table 3: Causes of PRAKI

Causes of PRAKI	Number
PRERENAL CAUSES	***17***
Hypovolemia following delivery	12
PPH(uterine atony,Bleeding during Caesarean,Uterine laceration)	2
Hypotension due to sepsis	2
Puerperal sepsis	1
RENAL CAUSES	**4**
Preeclampsia	2
Eclampsia	1
DIC	1
POST RENAL CAUSES	***1***
Trauma to the Uterus and Bladder during caesarean section	1

The main causes of PRAKI in our study were Prerenal causes causing Hypovolemia followed by Hypotension ; total 17 cases were found to be due to prerenal causes arising from hypovolemia(12) , PPH(2), Hypotension due to sepsis(2) , puerperal sepsis(1) . Most important of these causes are Hypovolemia due to fluid deficit and haemorrhage. Sepsis also contributed to the PRAKI cases. Renal causes include Preeclampsia and Eclampsia and DIC(many are due to Hypertensive disorders of Pregnancy). Acinetobacter sp and Enterococcus are causative organisms for most of the Sepsis cases that ultimately caused PRAKI.
Average duration of stays in hospital was 16.3 days.

DISCUSSION

This study evaluates etiological causes of PRAKI among critically ill pregnant and post-partum patients. In our study PRAKI cases were 3.49% amongst all admitted patients in OBS-HDU. In another study of same kind , PRAKI reported to be 11.6% of all admissions to Critical Care Obstetric Unit [8]. In Lesser developed countries this incidence is around 4.2-15% [9]. The incidence is declining but still in developing countries PRAKI is responsible for 5-20% AKI cases [10].

The majority of study population in this study come from lower socioeconomic strata, are from rural areas and have lower literacy. Most of the patients are referred from outside (90.9%) and most of the patients are unbooked

(68.18%). As our Hospital is one of the Tertiary care Hospitals the number of referred cases are higher in our study. Prerenal causes of PRAKI in our study are hypovolemia, due to deficit in fluid replacements or haemorrage, causing renal hypoperfusion. Hypoperfusion causes diminished Glomerular Filtration and subsequently AKI. But in cases of Renal causes of PRAKI, direct kidney injury is responsible.

In the current study hypovolemia due to PPH and post-delivery fluid deficit are the leading causes of PRAKI. During PPH huge volume of blood been lost within a short span of time, that activates the Renin-Angiotensin-Aldosterone system which in turn causes Renal shut down to retain fluid. Haemorrhage followed by hypovolemia causes diminished renal perfusion and renal hypoxia and finally acute kidney injury. Almost all cases of PPH that finally caused PRAKI were delivered outside our hospital and were referred to our hospital after renal shutdown started. This observation highlights the need of more vigilant care from Medical Officers and Nursing staffs regarding timely interventions like fluid replacements and medicinal measures to stop PPH.

Sepsis is another important cause of PRAKI, though in our study its incidence was not much only 3 cases. Worldwide it is an important cause of PRAKI and Maternal Mortality; in similar studies conducted in India average mortality in AKI due to sepsis was 56.4% [11]. Timely vigorous management with proper antibiotics and intravenous fluids can reduce the incidence of PRAKI due to sepsis. In our study all cases of PRAKI due to sepsis were delivered outside our hospital and were referred to our hospital. More vigilance from Medical officers and health workers regarding development of sepsis are solicited to reduce the incidence of PRAKI from Sepsis.

Hypertensive Disorders of Pregnancy (HDP) are most common cause of PRAKI in western countries and they are included in Renal causes of PRAKI. In our study three (3) cases were attributed to different hypertensive disorders (Preeclampsia, Eclampsia). As these disorders are multifactorial and causes direct kidney injury, PRAKI from these causes are hard to treat and many of them later develop permanent kidney disease.

Kidney Disease Improving Global Outcomes(KDIGO) Initiative group proposes a new classification system combining RIFLE and AKIN classification criterias ; this new system has three (3) stages depending on urine output and serum creatinine level. According to this system criterias for AKI including PRAKI are (1) Increase in SCr by ≥0.3 mg/dl (≥26.5 μmol/l) within 48 hours (2) Increase in SCr by ≥1.5 times baseline that is known or presumed to have occurred within the prior 7 days , (3) Increase in serum cystatin C by ≥1.5 times baseline that is known or presumed to have occurred within the prior 7 days (4) Mean urine volume of less than 0.5 ml/kg/h (based on ideal body weight) for ≥6 hours . So, by noticing serum Creatinine level and hourly urine output PRAKI can be detected in a reversible stage.

In our study most common causes of PRAKI were found to fall in Prerenal category, but worldwide leading cause of PRAKI is preeclampsia. After initiation of Government programmes like E-moc and C-moc proportion of Prerenal causes are reducing ; can be reduced further by more vigilant fluid replacements and timely transfusion of Blood and blood products to counter losses due to obstetric haemorrhages. To improve management of APH and PPH mock drills in Institutions should be initiated. More emphasis should be given to maintain proper intake-output charting which can identify PRAKI at reversible stage [9]. Early Institutional booking and regular Antenatal check up can diagnose HDP in early stage and prevent PRAKI from preeclampsia. Encouraging Institutional delivey alone can reduce the incidence of sepsis both antenatally and during puerperium, and hence can reduce PRAKI from sepsis.

Our study is conducted in a tertiary level hospital where patients are referred from different districts of West Bengal, so this study reflects occurrence of PRAKI in West Bengal. But as patients are from different districts long term follow up was not possible.

CONCLUSION

From our study it can be concluded that Prerenal PRAKI mostly follows hypovolemia due to fluid deficit postnatally , more specifically following PPH. Prerenal causes are preventable so medical officers and other health care staffs should be sensitized in the early detection of Obstetric haemorrhage ; they should have proper training to manage hypovolemia from obstetric haemorrhage like fluid resuccitation, strict intake-output monitoring.

CONFLICT OF INTEREST: None declared

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