



BURDEN OF PREGNANCY RELATED ACUTE KIDNEY INJURY IN A TERTIARY CARE HOSPITAL-A ONE YEAR PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT Acute kidney injury (AKI) is the abrupt loss of kidney function, resulting in the retention of urea and other nitrogenous waste products and in the dysregulation of extracellular volume and electrolytes. AKI during pregnancy can be caused by any of the disorders leading to AKI in the general population. Pregnancy complications characteristic of each trimester that can be associated with kidney injury like septic abortion, abruptio placentae, uterine hemorrhage, intrauterine fetal death (IUD), and puerperal sepsis. The current incidence of PRAKI (Pregnancy associated kidney injury) in developing countries has a declining trend. PRAKI not only threatens immediate maternal outcomes but also serves as a hidden driver of CKD (Chronic kidney disease). In this study, we attempt to estimate the incidence of PRAKI in our tertiary care hospital. The incidence was found to be 0.71% during a period of study. The most common cause was sepsis and overall mortality related to PRAKI was 28.12%. Increasing awareness among healthcare workers in adaptation of measures to prevent PRAKI and early diagnosis with prompt referral to specialist can prevent mortality and long-term morbidity associated with this condition.

KEYWORDS :

INTRODUCTION:-

Acute kidney injury (AKI) is the abrupt loss of kidney function, resulting in the retention of urea and other nitrogenous waste products and in the dysregulation of extracellular volume and electrolytes. AKI is defined by the sudden loss of kidney function suggested by increase in serum creatinine from baseline but RIFLE, AKIN, and KDIGO criteria have not been validated in pregnancy related acute kidney injury (PRAKI) because in pregnancy, baseline serum creatinine is lower as compared with similarly healthy, nonpregnant individuals. (1) Pregnancy is associated with a physiological increase in GFR by 50%–80% accompanied by an increase in plasma volume. (2) Together, these result in a normal gestational fall in serum creatinine, which can easily mask mild AKI. A creatinine level of ≥ 1 mg/dl or a rapid rise of 0.5 mg/dl above baseline within 48 hours should be investigated for evidence of AKI. The knowledge of these physiological adaptations in pregnancy is of clinical importance because serum creatinine and blood urea nitrogen of 1.0 mg/dl and 13 mg/dl, respectively, would be considered normal in a nonpregnant individual but reflect renal impairment in a pregnant woman. (3)

AKI during pregnancy can be caused by any of the disorders leading to AKI in the general population. Pregnancy complications are characteristic of each trimester that can be associated with kidney injury. PRAKI usually occurs due to obstetrical complications such as septic abortion, abruptio placentae, uterine hemorrhage, intrauterine fetal death (IUD), and puerperal sepsis in women with previous healthy kidneys. However, there are still huge differences in the epidemiological characteristic of P-AKI with respect to incidence, causes, and outcome between developing and developed countries. (4-6) These differences are due to environmental, socioeconomic, and different health delivery systems. (6,7)

AKI during pregnancy is uncommon in resource-abundant settings. The true incidence is difficult to estimate because of varying diagnostic criteria. Most reviews estimate that, in countries with adequate antenatal care, approximately 1 in 20,000 pregnancies are affected by AKI severe enough to require kidney replacement therapy. (8) The incidence may be considerably higher in countries where antenatal care is less available and in settings where illegal abortions are performed. (9,10) The current incidence of P-AKI in developing countries has a declining trend.

Despite decreasing incidence of P-AKI in developing countries, it still accounts for 5%–20% of total AKI population. (5,11,12) The present study aims to assess burden of pregnancy associated acute kidney injury in a tertiary care hospital.

AIM & OBJECTIVES:-

1. To estimate the prevalence of pregnancy associated kidney injury among antenatal and postnatal women attending our hospital over a period of one year.

2. To determine the common etiological factors in causation of PRAKI in our population.

3. To create awareness among healthcare professionals about preventable causes of PRAKI.

MATERIAL AND METHODS:

Pregnant and postpartum women attending department of OBG, GGH, Kurnool, diagnosed with AKI.

Inclusion Criteria:

AKI was defined either as an increase in serum creatinine by 1.5 times baseline over 48 hours or reduced urine volume of 0.5 mL/kg/h for six hours or need for dialysis. All consecutive patients with AKI irrespective of etiology, i.e., pre-renal, renal, or post-renal, are included in this study.

Exclusion Criteria:

Patients with preexisting renal diseases, Chronic hypertension, hypertensive nephropathy, diabetes, bilateral contracted kidney, renal transplant recipients, were excluded from the study.

MATERIAL AND METHODS:-

All antenatal mothers attending outpatient department of GGH are subjected to serum creatinine estimation in the first visit itself, irrespective of risk status. There was no booked case which landed in AKI as per our study data. There was a total of 35 cases of AKI during the period of 1 year. They were all referral cases from private or government sectors. Three were excluded from the study as they were cases of acute on chronic kidney disease due to chronic hypertension, Diabetes, Mixed connective disease. Out of the 32 cases analyzed, 13 (40.6%) cases did not require dialysis. They were defined by serum creatinine raised by 1.5 times from the base line and (or) reduced urine volume of 0.5 mL/kg/h for six hours. They recovered spontaneously over a period of 2 to 3 days. Two of these were cases of non-oliguric AKI caused by Leptospirosis. Four were due to grade 3 abruptio placentae and six were due to pre-eclampsia. One case was following massive postpartum hemorrhage.

The highest serum creatinine recorded in these cases was 3.2 mg/dl. Most common cause of AKI with higher levels of creatinine was sepsis, contributing to 10 cases (31.25%), of which two could not be taken up for hemodialysis due to multiorgan dysfunction and septic shock. Another case which could not be taken up for HD was a case of scrub typhus and leptospirosis with MODS. There were 16 cases which required hemodialysis, of which six cases could not survive. Out of the 16, two were antenatal mothers with acute gastroenteritis who responded to hemodialysis, but the fetuses died in utero. Fourteen were postpartum mothers, of which 6 occurred following vaginal delivery and 8 were following cesarean section. Sepsis was the cause in 5 out of 7 cases following cesarean section and in 3 out of six cases of vaginal delivery. Incompatible blood transfusion reaction was the cause for the

remaining 2 cases following cesarean section, which could not survive in spite of hemodialysis. Remaining 3 cases of mortality were due to sepsis. There was a total of 9 deaths out of 32 cases of AKI, accounting to 28.12% mortality. Out of this, 6 occurred in spite of HD and 3 were cases which could not be taken up for HD.

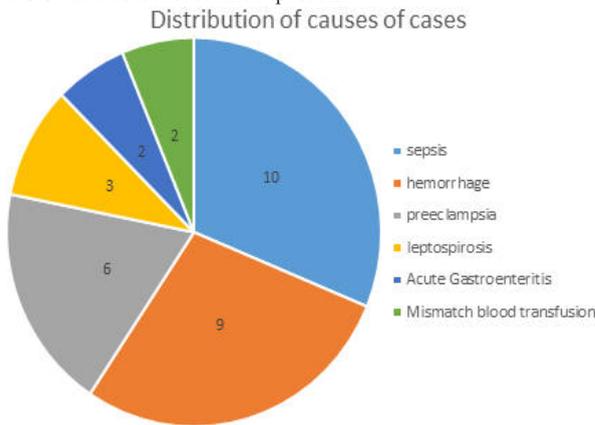


Figure 1. Distribution of cases of PRAKI according to etiology.



Flow chart 1. Analysis Of Cases Included In The Study.

DISCUSSION :-

The incidence of PRAKI in pregnancy in India has shown a decline over the years, with older studies reporting rates as high as 12%, while more recent data, such as the 2023 study by Kharkongor et al., report an incidence of only 1.08% (13). None of the cases booked for antenatal care in our institute landed in AKI requiring dialysis. The were only four cases of pre-eclampsia with mild elevation in serum creatinine which normalized spontaneously over a period of two to three days. This reflects improvements in antenatal care and healthcare awareness among pregnant women. Recent data from the Indian Society of Nephrology (ISN) registry indicate that obstetric complications contribute to 5% of all acute kidney injury (AKI) cases, underscoring a persistent and significant public health concern in India (14). Despite these advances, sepsis remains the predominant cause of PRAKI in

many developing regions. The shift from post-abortal sepsis as the leading cause to puerperal sepsis reflects improvements in antenatal care but also highlights the persistent risk of sepsis following childbirth. Puerperal sepsis was commonly reported, constituting the primary cause of sepsis in many studies, while post-abortal sepsis also contributed significantly in some.(15,16,17,18).In our study also, puerperal sepsis contributed to 31.25% .Pre-eclampsia and eclampsia, another significant contributor to PRAKI, appeared frequently in multiple studies, with incidences ranging from 14 to 46.9%. Gopalakrishnan et al. reported a 21% incidence of pre-eclampsia/eclampsia (19), while Prakash et al. found it in 46.9% of cases (11). In our observation 12.5% was the contribution by preeclampsia and eclampsia. In addition, HELLP syndrome was a contributing factor in certain cases, with incidences as high as 44.45% reported by Kharkongor et al. (13) .Obstetric hemorrhages such as antepartum haemorrhage (APH) and postpartum haemorrhage (PPH) were also prevalent in many of the studies. There were a total of 9 cases of AKI in our study due to hemorrhage, which contributed to a total of 28.12% .Krishna et al. found that 23.4% of patients experienced APH and PPH (18), while Sahay et al. reported a combined incidence of 44.5%.(20) Other studies, such as those by Sandilya et al. and Kharkongor et al., reported significant occurrences of hemorrhage-related complications, which were often associated with sepsis or pre-eclampsia.(13,21) The maternal mortality in PRAKI is as high as 25% (5) which is similar to our study(28.12%).Renal outcomes in PRAKI varied considerably across studies, with a significant proportion of patients requiring renal replacement therapy (RRT) up to 85%, including hemodialysis (HD) and peritoneal dialysis (PD), as well as long-term impacts such as chronic kidney disease (CKD) and dialysis dependency. In our study 50% of cases required HD.PRAKI not only threatens immediate maternal outcomes but also serves as a hidden driver of CKD, adding to the existing healthcare burden in a country already witnessing an epidemic of CKD(23). Outcomes also varied significantly regarding CKD development and dialysis dependency. Prakash et al. found that 76.83% of patients fully recovered, though 10.8% progressed to CKD(11). Gopalakrishnan et al. identified 35% of patients developing CKD, with 7.69% becoming dialysis dependent (19). In the cohort by Goplani et al., 97.14% of patients underwent HD, and 85.9% achieved full recovery, though 12.85% progressed to CKD, and 14.28% became dialysis dependent (15). Similarly, Najjar et al. found that 40% of their patients required dialysis, with 72.5% achieving full recovery, while only 5% developed CKD (16). In our cohort, 70% achieved full recovery, 12.5% lost for follow up and 18.5% are dialysis dependent after a period of 12 months of follow up. This highlights the need for long-term follow-up to monitor renal function and manage the progression to ESKD. Maternal outcomes were similarly concerning, with mortality rates ranging from 2.5 to 34%. Larger studies, such as those by Sachan et al. and Patel et al., reported maternal mortality rates of 34% and 15%, respectively (22,23). This is similar to 28.12% mortality in our study. There were 8 cases of intra uterine fetal death, 2 due to Acute gastroenteritis, 4 due to abruption, 2 due to pre-eclampsia.

CONCLUSION:

While the incidence of PRAKI in India has decreased due to better healthcare access and awareness, the condition continues to pose a significant risk to maternal and fetal health. CKD following an AKI episode during pregnancy poses a significant burden to the rising number of CKD patients in the health care system. Increasing awareness among healthcare workers in adaptation of measures to prevent PRAKI and early diagnosis with prompt referral to specialist can prevent mortality and long-term morbidity associated with this condition.

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