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A Study on Acute Kidney Injury in Obstetrics, Admitted in a Tertiary Care Hospital

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ABSTRACT

Acute kidney injury is a common medical condition that affects 30% of seriously ill patients and 5% of all hospitalised patients. In obstetric patients, the frequency varies between 1 in 2000 and 1 in 25000 pregnancies. The effects of AKI on fetomaternal outcomes and associated therapeutic therapies have only received a limited amount of research in India to now. Our research focuses on the examination of acute renal damage in pregnancy. The present hospital based prospective observational study was conducted in the Department of Obstetrics and Gynaecology of Burdwan Medical College and Hospital, Purba Bardhaman, India between May 2019 and August 2020. Obstetric mothers admitted for Obstetric management at BMC and H developing AKI were included in the study after fulfiilling the requisite criteria. Statistical data were analysed by using Microsoft Excel and SPSS V.20 software. In our study among the study population most patients is from 23-27 years age group and it is 40%, followed by 18-22 years age group which is 38%. Pregnancy induced hypertension patients are most commonly affected in pregnancy related acute kidney injury, among them primigravida patients which is 18%. Pregnancy related acute kidney injury most increased systolic and diastolic blood pressure found in eclampsia patient group which is 166.3 mm hg 116.8 mm hg accordingly. Among obstetrics patients most affected patients are from first stage of acute kidney injury which is 80% followed by second common second stage of kidney disease which is 17%. Most patients are treated in conservative manner which is 87% and very few patients are treated by dialysis which is 13%. Kidney injury is one of the most common cause of acute kidney injury in young pregnant women and is the leading cause of acute kidney injury in women in the developing world.

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Key Words
Foetal outcome, maternal outcome, pregnancy related acute kidney injury

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INTRODUCTION

Acute renal failure is still a major unresolved health-care issue worldwide, particularly in India. In India, the prevalence of acute renal failure during pregnancy is 10%, which is unacceptable and provides significant space for improvement in obstetric practises. One of the most common causes of acute kidney injury in young females is pregnancy-related acute renal failure. This syndrome has been linked to an increased risk of chronic renal disease, hypertension and cardiovascular disease in the future and it continues to be a major cause of maternal and foetal morbidity and mortality. Pregnancy-related acute renal failure causes such as preeclampsia, acute fatty liver of pregnancy, HELLP syndrome, thrombotic microangiopathies such as thrombotic thrombocytopenic perpura and atypical haemolytic uremic syndrome have overlapping symptoms and frequently provide a diagnostic dilemma. The good news is that it has decreased dramatically in emerging countries during the last three decades. Pregnancy-related acute renal failure needing dialysis in India has declined from 15% in 1982-1991 to 10% in 1992-2002, which is also correlated with a reduction in maternal mortality from 20-6.4%. These significant reductions are mostly due to lower rates of infection, abortion and childbirth, as well as improved management of postpartum haemorrhage and placental abruption[1].

Acute kidney injury (AKI) is a clinical illness characterised by a sudden decrease in glomerular filtration rate (GFR), which reduces the removal of nitrogenous waste products (urea and creatinine) and other uremic toxins[2]. In affluent countries, the incidence has declined over the last 60 years, from one in 3000 in the mid-20th century to one in 20,000 today[3]. However, AKI still accounts for 25% of dialysis referrals in underdeveloped nations[4]. In India, the prevalence ranges from 4.3-14.5%[5].

Maternal mortality associated with AKI has been observed to range between 9 and 55%[6]. The poverty, lack of awareness and appropriate diagnosis, low sensitivity towards the issue, technical and infrastructural challenges like lack of transport or timely availability of obstetric care and blood products are all accountable for this added burden[7].

The lack of consistent diagnostic and classification standards has been a key impediment to improving AKI outcomes.

The RIFLE criteria are an international classification for stratifying acute renal disorders that was established in May 2004 by the Acute Dialysis Quality Initiative (ADQI). It is based on the following criteria: Risk, injury, failure, loss of renal function and end stage kidney disease. Its significance impacts the length of stay in the intensive care unit, renal recovery and overall morbidity and mortality in AKI patients. The significance and implementation of RIFLE criteria in clinical practise has been reviewed and they appear to have a correlation to outcomes in patients with AKI[8]

As a result, the proportion of obstetric and peripartum patients admitted to ICU in developed countries can reach 10% or more in poor countries[9].

In intensive care units (ICUs), scoring is frequently used for individual patient or group prediction, as well as evaluating and comparing the performance of different ICUs[10].

Individuals with AKI develop multi-organ failure sooner than individuals without AKI. AKI patients had three times the ICU death rate as other patients. Oliguric AKI was found to be a separate risk factor for overall mortality. The presence of infection or cardiovascular failure elevated morbidity and mortality even higher[11].

Therefore, the present study was conducted to analysis acute kidney injury in obstetrics.

MATERIALS AND METHODS

This hospital based prospective observational study was conducted in Department of Obstetrics and Gynaecology of Burdwan Medical College and Hospital, Purba Bardhaman, West Bengal, India. Total 100 Obstetric mothers admitted for Obstetric management at BMC and H developing AKI were included in the study after fulfilling the requisite criteria. The duration of the study was May 2019 to August 2020.

Inclusion criteria: The cases admitted to Dept. of Obstetrics and Gynaecology developing AKI due to Pregnancy induced hypertension, Pre-eclampsia, eclampsia, HELLP syndrome, Ante partum hemorrhage, Post partum hemorrhage, Iatrogenic injury to urinary bladder and ureters during C-section and Inadequate hydration.

Exclusion criteria: Congenital renal disorder, Pre-existing renal disorders not due to pregnancy, Thrombotic and Drug induced renal disease and Patients who deny to give valid consent for the study

Sample size: 100 Obstetric mothers admitted for Obstetric management at BMC and H developing AKI were included in the study after fulfilling the requisite criteria.

Study techniques: After getting Institutional Research Ethics Committee clearance, all newly diagnosed patient with pregnancy related acute kidney injury attending Gynae and Obstetrics OPD of Burdwan Medical College and Hospital, Burdwan were selected for this study. The enrolled patients were assessed thoroughly before starting, during and at completion of

treatment on the following pattern: detailed history, examination, investigations. One hundred diagnosed patients of pregnancy related acute kidney injury were selected for study. Patients were divided in pregnancy induced hypertension, preeclampsia, eclampsia, HELLP syndrome, Antepartum haemorrhage, Postpartum haemorrhage, Iatrogenic injury to bladder and uterus for C-section.

Age, parity, co-morbidity, mode of delivery, vital signs, urine output, type of interventions noted. Investigations like total count, differential count, ESR, Hb%, serum sodium, serum potassium, serum urea, serum creatinine, urine output is done for all selected patients. Blood pressure measured. After collecting all data from obstetric word records data analysed by appropriate statistical method

Method of data analysis plan: The statistical software SPSS version 20 was used for the analysis. $p<0.05$ was considered as significant.

Ethical considerations: Study was initiated after obtaining the informed consents from the participants and ethical clearance from the institutional ethical committee.

RESULTS AND DISCUSSIONS

Hopefully, the overall incidence of pregnancy related acute kidney injury is declining in most parts of world.

Acute kidney injury (AKI) is traditionally characterised as a sudden and significant loss in renal function. Twelve AKI cases may be traced back to the 1960s. Today's incidence has dropped from 1/3000 to 1/20,000. Medical problems of pregnancy have been a common and alarming reason for acute renal referrals during the last 20-30 years. It's terrifying since the patients were young and healthy just a few days ago, with an unfamiliar and rapidly changing physiology. AKI was reported to be 17.8% and haemodialysis was found to be 1.84% at SKH[12].

There is no agreement on the precise cut offs for diagnosing AKI. This difficulty not only results in contradictory reports in the literature but it is also thought to be a major impediment to research in this sector[6].

In our study among the study population most patients is from 23-27 years age group and it is 40%, followed by 18-22 years age group which is 38% (Table 1).

In the present study, it is seen than most patient contributes from pregnancy induced hypertension category which is 28%, followed by post partum haemorrhage group which is 20%. Least number of patients is from iatrogenic injury which is only 1% (Table 2).

Table 1: Age, gestational age distribution of patients according developing acute kidney injury (AKI) (n = 100)

Age	Total no. of patients developing AKI	Percentage
18-22	38	38.0
23-27	40	40.0
28-32	20	20.0
33-37	2	2.0
Gestational age (weeks)	5	5.0
21-24	7	7.0
25-30	36	36.0
31-36	52	52.0
>36	5	5.0

Table 2: No. of patients distribution according to developing AKI

Type of disease	No. of patients developing AKI	Percentage
PIH	28	28.0
PE	18	18.0
Eclampsia	10	10.0
HEELP	1	1.0
APH	17	17.0
PPH	20	20.0
Iatrogenic injury	1	1.0
Inadequate hydration	5	5.0

Table 3: Gravida distribution of patients according to developing AKI

Type of disease	Multigravida	Percentage	Primigravida	Percentage
PIH	10	10.0	18	18.0
PE	8	8.0	10	10.0
Eclampsia	3	3.0	7	7.0
HEELP	1	1.0	0	0.0
APH	6	6.0	11	11.0
PPH	12	12.0	8	8.0
Iatrogenic injury	0	0.0	1	1.0
Inadequate Hydration	2	2.0	3	3.0

In a study performed by Koroshi, obstetric hemorrhage alone was responsible for 7-39% of AKI cases, whereas Patel *et al*.[13]. (41.7%), Kumar *et al*.[14] (39.02%) and Goplani *et al*.[15] (61.42%) reported septicemia as the commonest cause (Table 3).

Pregnancy induced hypertension patients are most commonly affected in pregnancy related acute kidney injury, among them primigravida patients which is 18% most commonly affected in pregnancy related acute kidney injury, followed by multigravida patients of post partum haemorrhage which is 12%.

This finding is consistent with the findings of 76.55% Munib and Khan[16] 68.57% Haddadi *et al*.[17] who also reported multiparity in their patients.

In our study, among obstetrics patients, contribute in pregnancy related acute kidney injury most commonly affected gestational age is more than 36 weeks which is 52%, followed by 31-36 weeks which is 36% and least common in 21-24 weeks of gestational age.

In our study, according to mode of delivery among patients of pregnancy related acute kidney injury most commonly patients contributes from normal delivery category which is 15% both in pregnancy induced hypertension and post partum haemorrhage followed by caesarean section from antepartum haemorrhage which is 12% (Table 4).

Table 4: Distribution of patients of AKI according to mode of delivery

Type of disease	Normal delivery	Percentage	Caesarean Section	Percentage
PIH	15	15.0	13	13.0
PE	7	7.0	11	11.0
Eclampsia	3	3.0	7	7.0
HEELP	1	1.0	0	0.0
APH	5	5.0	12	12.0
PPH	15	15.0	5	5.0
Iatrogenic injury	0	0.0	1	1.0
Inadequate hydration	1	1.0	4	4.0

Table 5: Systolic blood pressure and diastolic blood pressure distribution of patients according to developing AKI

Type of disease	Systolic BP in mm Hg (Mean)	Diastolic BP in mm Hg (Mean)
PIH	149.8	92.8
PE	146.6	94.5
Eclampsia	166.3	116.8
HEELP	140.0	98.0
APH	124.7	86.2
PPH	132.6	89.5
Iatrogenic injury	116.0	84.0
Inadequate hydration	114.2	74.4

Table 6: Distribution of patients developing AKI according to serum creatinine

Type of disease	Serum creatinine (mg dL^{-1})
PIH	1.8
PE	1.6
Eclampsia	2.1
HEELP	2.2
APH	1.5
PPH	1.6
Iatrogenic Injury	1.5
Inadequate Hydration	1.5

Table 7: Patient distribution of AKI according to stage

Stages of AKI	No. of patients	Percentage
First	80	80.0
Second	17	17.0
Third	3	3.0

In present study, among patients of pregnancy related acute kidney injury most increased systolic and diastolic blood pressure found in eclampsia patient group which is 166.3 mm hg 116.8 mm hg accordingly (Table 5).

In our study, according to serum creatinine among patients of pregnancy related acute kidney injury increased serum creatinine mostly found on patients of HEELP syndrome which is 2.2 mg dL^{-1} followed by eclampsia patients who has 2.1 mg dL^{-1} serum creatinine (Table 6). In present study, among obstetrics patients most affected patients are from first stage of acute kidney injury which is 80% followed by second common second stage of kidney disease which is 17% (Table 7).

In our study, according to urine output in obstetric patients developing acute kidney injury most decreased urine output in 24 hrs found in patients of inadequate hydration which is 615 mL in 24 hrs followed by patient of preeclampsia which is 646.4 mL in 24 hrs (Table 8).

In our study, according to treatment in obstetric patients developing acute kidney injury most patients are treated in conservative manner which is 87% and very few patients are treated by dialysis which is 13% (Table 9).

Table 8: Distribution of urine output in patients developing AKI

Type of disease	Urine output (mL in 24 hrs)
PIH	696.8
PE	646.4
Eclampsia	650.3
HEELP	705.0
APH	684.6
PPH	670.8
Iatrogenic injury	675.0
Inadequate hydration	615.0

Table 9: Distribution of patients according to treatment

Types of treatment	No. of patients	Percentage
Conservative	87	87.0
Dialysis	13	13.0

CONCLUSION

Most commonly from age group of 23 years to 27 years affected from acute kidney injury in pregnancy. Pregnancy induced hypertension patients are more at risk for acute kidney injury. Primigravida patients are more at risk for pregnancy induced acute kidney injury who are under pregnancy induced hypertension category. After 36 weeks of pregnancy there is high risk for developing pregnancy induced acute kidney injury. Eclampsia patients are more at risk for developing kidney injury. Serum creatinine are mostly raised in HEELP syndrome. Most patients have first stage of acute kidney injury. Urine output mainly decreased due to inadequate hydration. Most patients treated conservatively, few patients went for dialysis. So, it is concluded that pregnancy related acute kidney injury is one of the most common cause of acute kidney injury in young pregnant women and is the leading cause of acute kidney injury in women in the developing world

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