

# Acute renal failure in pregnancy at a tertiary level hospital in Mumbai: An epidemiological profile.

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## ABSTRACT

**Background:** To study the clinical profile of pregnancy related acute renal failure, management and outcome in terms of cure, maternal morbidity and maternal – fetal mortality. **Methods:** This is a prospective observational study carried out on hospitalized patients in our hospital over a period of fourteen months (August 2007 – September 2008) after approval from the ethical clearance committee. **Results:** A total of 41 patients, with age ranging between 15 – 45 years. The majority of the patients 25 (60.98%) were multigravida and 16 (39.02%) were primigravida. The bimodal frequency pattern were also observed in our study, first between 19 to 24 weeks of gestation and second around 31 to 36 weeks of gestation. The incidence of PR-ARF was about 1 in 270 pregnancies. Sepsis was the commonest cause of PR-ARF (46.34 %) followed by Toxaemia of Pregnancy (31.69%) and Haemorrhage (14.62%). The incidence of septic abortion as a cause of PR-ARF has declined to 7.31%. Oliguria was the commonest symptom (58.53%). Fluid overload was the most common complication encountered (33.33%). **Conclusion:** Incidence of PR-ARF is still high in our country as compared to western countries. Multigravidas were more commonly affected than primigravidas. Sepsis was the commonest cause of PR-ARF followed by toxemia of pregnancy and haemorrhage. Maternal and fetal mortality were high , 17.07 % and 2.43 % respectively.

**Keywords:** Acute Renal Failure, Maternal Morbidity/Mortality, Pregnancy.

## INTRODUCTION

Acute renal failure 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. Though a rare disease in developed countries, acute renal failure (ARF) in pregnancy is still a common and serious complication in developing countries like India. In 1958, the estimated incidence of ARF in pregnancy was as high as 1 in 1400. Now in industrialized countries it is 1 in 20000 because of liberation of abortion laws, improved antenatal care, obstetric practices and better management of maternal complications potentially leading to ARF.<sup>[1-3]</sup>

bimodal distribution with respect to gestational age. A peak in early pregnancy is associated with infection particularly septic abortion and unskilled abortion while a third trimester peak is associated with late obstetric complications such as pre eclampsia, abruptio placentae, post partum haemorrhage, amniotic fluid embolism and retained dead fetus.<sup>[5,6]</sup>

Apart from non – obstetrical causes, the pregnant females are predisposed to various obstetrical causes of ARF like hyperemesis gravidarum, septic abortion in the first trimester, pre- eclampsia, eclampsia, antepartum haemorrhage in the 2nd half, postpartum haemorrhage, puerperal sepsis, Acute fatty liver of pregnancy and idiopathic post partum renal failure in the later part of the pregnancy.<sup>[7]</sup>

In this study we aim to study the epidemiological profile of acute renal failure in pregnancy: socio-demographic variables and etiological factors and its impact on maternal morbidity.

## MATERIALS AND METHODS

### Study design

This was a prospective observational study carried out on hospitalized patients in our hospital over a period of fourteen months (August 2007 – September 2008) after approval from the ethical

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ARF in pregnancy may comprise up to 25 % of the referrals to the dialysis centre 1 and is associated with high risk of maternal mortality (9 to 55%)<sup>[4]</sup> in developing countries. ARF in pregnancy follows a

clearance committee. Out of 11,079 pregnant patients admitted during this period 51 patients were referred to nephrology division in view of deranged renal function. Out of these 51 patients 10 patients were excluded (3 were having shrunken kidneys, 4 patients were diabetic, 2 hypertensives and 1 patient had renal calculus disease) and 41 patients met the inclusion criteria and were included in the study. These forty one pregnant patients were previously healthy and had developed acute renal failure (ARF), were having oliguria (urine output < 400 ml/day) and increasing azotaemia (serum creatinine > 1.5 mg/dl). All pregnant females who were not willing to participate in the study, hypertensive, diabetic, having renal calculi and shrunken / scarred kidney on ultrasound were excluded.

**Data collection and analysis**

All patients who required prolonged dialysis were admitted in this nephrology ward and those patients who developed multiple organs dysfunctions were managed in intensive care unit. All details including name, age, gravida, periods of gestation, ANC registration status, presenting complaints and other relevant details were taken from each patient. All

patients were thoroughly examined with great attention on record of blood pressure, puffiness of face, bipedal edema, pallor, icterus and papilloedema. Chi square test was used in statistical analysis. P < 0.05 was accepted as the level of statistical significance.

**RESULTS**

During the study period 11,079 pregnancies were recorded, of which 41 were diagnosed with acute renal failure. Most common age group involved was 21 to 30 years [Table 1]. In our study we also have observed bimodal distribution with first peak between 19 – 24 weeks of gestation and second peak between 31 – 36 weeks of gestation. Of these 41 pregnancies, 25 were multiparous and remaining were primiparous. 4 females were in first trimester, 8 were in second trimester, 24 in third and 5 had a gestational age more than 36 weeks. Numerous causes of acute renal failure in the subjects included are enumerated in Table 2. Most common cause was sepsis, followed by pre-eclampsia.

**Table 1: Characteristics of subjects included in the study.**

Variable	n
Total pregnancy	11,079
Age distribution	
16-20 years	7
21-30 years	28
31-40 years	5
More than 40 years	1
Acute renal failure	41
Gravid status	
Primigravida	16
Multigravida	25
Gestational age	
Less than 12 weeks	4
13- 24 weeks	8
25 – 36 weeks	24
More than 36 weeks	5

**Table 2: Causes of acute renal failure in our patients.**

Cause	n
Sepsis	19
Abortion	3
Antepartum hemorrhage	3
Preeclampsia	9
Eclampsia	3
HELLP syndrome	1
Postpartum hemorrhage	3
Intra-uterine fetal death	8
Disseminated intravascular coagulation	2
Miscellaneous	20

**DISCUSSION**

In our study of 41 patients with pregnancy related ARF (PR-ARF), which is a hospital based study carried out in a tertiary care teaching hospital over a period of 14 months from August 2007 to September 2008, we found that the incidence of ARF was 1 in

270 pregnancies with 11079 deliveries conducted over that period. This incidence is much higher as compared to that of developed countries where it is 1 in 20,000 pregnancies. This is because of legalization of abortion laws with easy access to abortion facility, improved post –abortion, antenatal and post natal care, prevention and early treatment of complications in the developed countries.<sup>[1,2]</sup> In India

despite legalization of abortion this high incidence suggests poor health infrastructure, lack of antenatal care, failure of ANC registration due to illiteracy, adverse socioeconomic, cultural and religious factors which limit access to abortion, failure of prevention and early treatment of complications of pregnancy, poor obstetric practices and late referral of pregnancy related complications. In developing countries, the incidence still remains at 9-25% mostly due to late referral of pregnancy related complications.<sup>[1]</sup>

Out of 41 patients, 16 (39.03%) were primigravidas and 25 (60.97%) were multigravidas which was similar to the study of Goplani et al<sup>[10]</sup> with 22 (31.4%) primigravidas and 48 (68.57 %) multigravidas. This suggests that multigravidas are most commonly affected because of recurrent pregnancy complications. The maximum number of patients belonged to age – group of 21 – 30 years (68.29%) followed by 16 – 20 years (17.07 %), 31 – 40 years (12.19%) and > 40 years (2.43%) in our study. This was similar to the study conducted by Rafique et al<sup>[12]</sup> from Pakistan in which maximum number of patients were in the age group 22 – 36 years (88.9%) of age group. This is because 21 – 30 years of age – group being the reproductive age – group, more prone to pregnancy related complications and because of early marriage in our country.

Krane et al<sup>[5]</sup> and Harkins et al<sup>[6]</sup> in their study have mentioned about the bimodal frequency distribution of PR-ARF in relation to periods of gestation. The first peak is seen between 7 and 16 weeks being caused by septic abortion while toxaeemias of pregnancy, haemorrhages and puerperal sepsis account for the second peak which is seen between 34 and 36 weeks. In our study we also have observed bimodal distribution with first peak between 19 – 24 weeks of gestation and second peak between 31 – 36 weeks of gestation. However in our study the first peak was mostly due to non – obstetrical causes of ARF than obstetrical causes of ARF alone. These non – obstetrical causes of ARF were mainly infectious such as malarial fever, gastroenteritis, tuberculosis and leptospirosis. In developed countries the first peak related to septic abortion has been eliminated because of legalization of abortions and better post abortal care. Even in other Indian studies there is no first peak which is suggestive of reduced rate of septic abortion. Majority of PR – ARF was seen in late pregnancy and post partum period comprising about 63.41% (26/41) followed by second trimester 26.82% (11/41) and first trimester 9.75% (4/41).

On comparing our study results with the other studies we have found that though there is high incidence of ARF in late pregnancy and post partum group, it has actually decreased. This seems mostly due to early treatment of complications occurring in the later part of pregnancy. Incidence of ARF in the

first trimester has also decreased to 9.75% as compared to other studies by Rafique et al<sup>[12]</sup> and Goplani et al<sup>[10]</sup> which was 14% and 20% respectively.

The high incidence of ARF in first trimester in all the three studies is due to the fact that ANC unregistered and home delivery patients with complications were encountered in all of the three studies.

However the major concern in our study was increased rate of ARF in the second trimester which was due to increased number of cases of toxaeemias of pregnancy and non obstetrical infectious causes. This was consistent with the study by Rani et al in which she has mentioned that though there is a decline in the incidence of other causes of PR-ARF over last decade ,the incidence of toxaeemia of pregnancy has increased from 17.8% - 43.9% in our country contributing to persistently high maternal (23.2%) and perinatal mortality (53.7%). This alarming increase in HTN disorders of pregnancy as a cause of PR-ARF, calls for identification of high risk groups, prevention and effective management of it in order to bring down the incidence of PR ARF in developing countries as well.<sup>[13-17]</sup>

Maternal mortality was 17.07% in our study which is less as compared to other studies where it is reported to be 24.39%, 18.57% and 23.2% by Siva Kumar et al, Goplani et al<sup>[10]</sup> and Rani et al<sup>[2]</sup> respectively. This appears to be due to early management of ante and post partum haemorrhage, complications of toxaeemia of pregnancy and early intervention in form of haemodialysis and medications to treat complications and further progression of renal failure. Neonatal deaths were seen only in 2.43 % of patients while IUFD was seen in 19.51% of patients with PR – ARF, 34.14% were delivered at term and 36.58% were continuing pregnancy. Sepsis with multi organ failure, pulmonary edema and hyperkalemia were the common causes of mortality.

## CONCLUSION

The incidence of acute renal failure (ARF) in pregnancy is still high in our country. As per our study it is about 1 in 270 pregnancies which is significantly high as compared to developed countries where it is 1 in 20000 pregnancies. Multigravidas were more commonly affected as compared to primigravidas. In ANC unregistered patients mortality was high as compared to ANC registered patients. Maternal mortality was 17.07% and it has declined as compared to other studies. Neonatal deaths were seen only in 2.43 % of patients while IUFD was seen in 19.51% of patients with PR – ARF.

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