OBSTETRIC RENAL FAILURE

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ABSTRACT: Renal failure in obstetrics is rare but important complication, associated with significant mortality and long term morbidity.[1,2] It includes acute renal failure due to obstetrical complications or due to deterioration of existing renal disease.
AIMS AND OBJECTIVES: To evaluate the etiology and outcome of renal failure in obstetric patients.
METHODS: We prospectively analyzed 30 pregnant and puerperal women with acute renal failure or pre-existing renal disease developing renal failure during pregnancy between November 2007 to sep-2009. Patients who presented/developed ARF during the hospital stay were included in this study.
RESULTS: Among 30 patients, mean age was 23 years and 33 years age group. 12 cases (40%) patients were primigravidae and 9(30%) patients were multigravidae and 9 cases (30%) presented in post-partum period. Eighteen cases (60%) with ARF were seen in third trimester, followed by in postpartum period 9 cases (30%). Most common contributing factors to ARF were Pre-eclampsia, eclampsia and HELLP syndrome 60%, sepsis 56.6%, post abortal ARF 10%. DIC 40%. Haemorrhage as the aetiology for ARF was present 46%, APH in 20% and PPH in 26.6%. The type of ARF was renal in (63%) and prerenal (36%); Oliguric seen in 10 patients (33%) and high mortality (30%). Among the 20 pregnant patients with ARF, The average period of gestation was 33±2 weeks (30 -36 weeks), 5 cases (25%) presented with intrauterine fetal demise and 18 cases (66%) had preterm vaginal delivery and 2 cases (10%) had induced abortion. And the average birth weight was 2±0.5 kg (1.5 kg). Eight cases (26%) required dialysis. 80% of patients recovered completely of renal functions. 63% patients recovered without renal replacement therapy whereas 17% required dialysis. the maternal mortality was 20%, the main reason for mortality was septic shock and multi organ dysfunction (66%).
CONCLUSION: ARF related pregnancy was seen commonly in the primigravidae and in the third trimester, the most common reasons were pregnancy induced hypertension, HELLP syndrome and obstetric haemorrhage and resulted in high risk condition for fetal and maternal mortality. The most effective measures still remain the careful prevention and the aggressive management of the obstetric complications. Ideal care for women with acute renal failure in pregnancy or post-partum requires a multidisciplinary approach that includes maternal-fetal medicine, critical care medicine, nephrology and neonatology specialties.

KEYWORDS: Acute Renal Failure, DIC, MTP, Pregnancy, PPH.

HOW TO CITE THIS ARTICLE: Rajeshwari S. N, Asha Swarup, Mahesh E. "Obstetric Renal Failure". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 46, November 09, 2015; Page: 8241-8251,
DOI: 10.18410/jebmh/2015/1112

INTRODUCTION: Acute renal failure (ARF) is a clinical syndrome characterized by abrupt and sustained decrease in renal function resulting in retention of nitrogenous (urea and creatinine) and non-nitrogenous waste products. Depending on the severity and duration of the renal dysfunction, it can be accompanied by metabolic disturbances, such as metabolic acidosis and hyperkalaemia, changes in body fluid balance, and effects on many other organ systems.[3]

The care of pregnant women with renal failure is challenging because of consideration of wellbeing of mother and fetus.[2]

While Pregnancy Related-ARF (PR-ARF) has become rare occurrence in developed world, it continues to be associated with significant mortality and long term morbidity in developing world.[2]

The concern of pregnancy with existing renal disease is twofold. Firstly, the effect of the pregnancy on renal functions like accelerated deterioration of renal functions to end stage renal disease. Secondly, existing renal disease can influence the continuation of pregnancy culminating in pre-eclampsia, preterm delivery, IUGR, anemia, caesarian delivery, still birth.[4]

Improvements in obstetric care have led to a decline in PR-ARF from several parts of the world. At our Indian centres, the proportion of obstetric ARF cases fell from 22% in 1960s to 8% in 1990s. This followed adoption of the MTP Act and increased availability of medical facilities, cutting down the number of septic abortions and therapeutic termination of complicated pregnancies.[5] In other developing countries, however obstetric complications continue to be a major cause of ARF.

In our country, very few studies have been conducted on renal failure in obstetric patients. Hence, this descriptive observational study will enlighten on prevention, early diagnosis and management of this dangerous complication in pregnancy.

Submission 17-10-2015, Peer Review 19-10-2015,
Acceptance 20-10-2015, Published 07-11-2015.
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DOI: 10.18410/jebmh/2015/1112

MATERIALS AND METHODS: This Prospective Study Was Conducted In The Department Of OBG at MS Ramaiah Medical College. 30 pregnant and Puerpural women admitted with acute renal failure or pre-existing renal disease developing renal failure were included in the study. Meticulous history, general physical, systemic examination including obstetric examination when needed, and relevant laboratory investigations would be carried out for the pregnant and puerperal women developing acute renal failure or with existing renal disease developing renal failure.

Criteria for Renal Failure:

1. Serum creatinine ≥1.5 mg%. OR
2. Urine output <400 ml/ 24 hours, even after correcting with i.v fluids.
3. Need for dialysis.

Lab Investigations:

1. Complete urine analysis – 24 hour urine protein, urine culture and sensitivity.
2. Biochemical tests – blood urea nitrogen, creatinine, random blood sugar, serum electrolytes, liver function tests, uric acid, creatinine clearance when indicated.
3. Complete haematological tests – complete blood count, bleeding time, clotting time, PT, APTT, INR when indicated.
4. Abdomino-Pelvic and obstetric ultrasound.
5. Other relevant investigations and immunological tests would be done based on clinical problems.

RESULTS: Following Results Were Observed in Our Study:

The age group of patients with pregnancy ARF ranged between 19 to 35 years. The mean age of cases studied was 26 years. Below 20 yrs. 4 case (13.3%), 21-25 yrs., 9 cases (30%), 26–30 yrs. 8 cases (26.6%) and above 3o yrs. 9 cases (30%). The peak incidence of ARF is seen between 21 to 25 years and 31 to 35 years age group.

Distribution of Patients According To Parity:

- 17 cases presented in the first pregnancy (56.6%).
- 6 cases in second pregnancy (20%).
- 7 cases in third or pregnancies (23.3%).
- Majority of the cases are seen in the primigravidae.

Distribution of Cases According To Trimesters: The majority of cases with ARF were seen in third trimester i.e, 18 cases (60%) followed by postpartum period 9 cases (30%). 3 cases (10%) related to abortion were seen in second trimester.

Demographic Characteristics of Study Population: Among 30 patients with ARF, 12 (40%) patients were primigravida and 9(30%) patients were multigravidae. 9 cases (30%) presented in the post-partum period.

MAIN CHARACTERISTICS OF ARF: Among 30 cases, 20 cases presented with non oliguric renal failure and 10 cases presented with oliguria with only 2 cases had anuria. Other presenting features were.

THE ETIOLOGICAL FACTORS FOR ARF: Out of 30 patients, Pre eclampsia, eclampsia and HELLP syndrome accounted for 18 patients (60%) with pregnancy related ARF and were the most common etiologic factors leading to ARF followed by sepsis which is seen among 17 patients (56.6%). Post abortal sepsis was the most common precipitating event for ARF was present in 3 patients (10%). 12 patients (40%) had DIC on presentation. Haemorrhage as the etiology for ARF was present 13 patients (43.3%), APH in5 cases (16.6%) and PPH in 8 cases (26.6%). Only 1 case was found to be due to acute fatty liver of pregnancy. 1 patient presented with acute gastro enteritis which contributed to ARF in postpartum period.

Among 30 patients presented with ARF at the time of admission, 21 patients were antenatal cases and 9 were postnatal cases.

Among ante natal 16 patients had high BP with biochemical abnormality, 4 patients presented with excess bleeding per vagina with pain abdomen, 4 patients in preterm labour. Urinary symptoms - reduced urine output in 3 cases, anuria in 2 cases and edema in 11 cases were seen.

Among 9 postpartum patients, 2 patients had high blood pressure, 6 cases had predominant urinary symptoms like had reduced urine output, 5 cases had edema.

Non-urinary symptoms - vomiting, fever, and Haemorrahge breathlessness jaundice were other the major complaints.

Patients Course of ARF:

- Total number of cases 30.
- Patients admitted with acute renal failure to ICU – 17 (%).
- Developed ARF in hospital 6 patients (25%), 4 antenatal and 2 postpartum.
- Average days of ICU stay 9 days. (Range-1 to 18days).
- RRT was instituted in 40% cases.
- No of patient's died-6 (20%).

General Physical Examination: Physical findings varied depending on the cause of ARF. Uterine hemorrhage being the most common cause of ARF, most commonly due to hypertension, pallor, tachycardia, dehydration, edema were the most common findings followed by fever, icterus, hypotension as sepsis was associated in most of the cases. Flapping tremors seen in the present study was due to hepatic cause not due to uremia, as all these cases had raised liver enzymes, Ammonia level and these patients had minimal alteration of renal function.

Types of Acute Renal Failure: Acute renal failure has been classically divided arbitrarily based on good clinical history, physical findings, urinary analysis and other investigations even in spite of extensive scrutiny it is very difficult to differentiate between pre renal and intrinsic renal failure. Majority of the patients had Intrinsic renal

failure (63.3%) followed by pre renal cause. Intrinsic renal failure patients had high mortality (16.6%) compared to pre renal (3.3%).

Out of 30 cases 10 patients had oliguria (33%) and 20 patients (66%) had non oliguric renal failure. Mortality among oliguric renal failure patients was high (30%). Only three out of twenty non-oliguric patients (15%) died.

RENAL REPLACEMENT THERAPY: Out of 30 patients, 8 patients (26%) required renal replacement therapy. And remaining patients (64%) were managed conservatively on medical treatment. Of these, 7 patients underwent hemodialysis and only one patient underwent peritoneal dialysis. Patient who had hemodynamic instability were subjected to peritoneal dialysis. So therefore mortality was high among whom undergone PD. Mortality among RRT group was high (37.5%) compared to conservative management group (13.6%). Among conservative group morality is due to underlying illness than ARF per say.

The common indications for dialysis were azotemia (5 cases), oligoanuria (cases 2), metabolic acidosis (2 cases).

MATERNAL OUTCOME IN PREGNANCY INDUCED ACUTE RENAL FAILURE: Complete renal recovery was observed in 24(80%) patients, out of whom 19(63%) recovered without dialysis support with medical management like fluid and blood replacement, diuretics (furasemide), proper broad spectrum antibiotics. Dialysis was required in 5 (16%) patients. Two among dialysis group and one among conservative group took one year for complete recovery of renal functions. Two cases one from each group, underwent renal biopsy 3 months and 1 month after delivery respectively.

Among 30 patients, 17(56%) patients needed ICU care. Duration of stay in ICU ranged from 1 to 18 days. Average being 9 days. Majority cases were admitted to ICU for 5 to 10 days. 2 cases were in ICU for more than 15 days.

Blood and blood products were required in 22 patients out of 30. Fourteen cases managed conservatively required blood and 8 patients undergoing dialysis required blood and blood products.

3 patients of hemodialysis group and 3 in conservative group died irrespective of blood transfusion due to other factors.

Among the 20 pregnant patients with ARF, 5 cases (25%) presented with intrauterine fetal demise and 18 cases (66%) had preterm vaginal delivery and 2 cases (10%) had induced abortion. 10 cases (55%) were induced in view of deteriorating renal function and fetal distress and other reasons and 4 cases (22%) went into spontaneous preterm delivery. 4 cases (22%) needed emergency LSCS in view of fetal distress and maternal condition. 4 babies (19%) among vaginal deliveries were born still born.

Among the delivered babies, 4 babies (22%) had birth weight between 500–1500 grams, 12 babies (66%) between 1500-2500 grams, 2 babies (11%) more than 2500 grams. Majority of babies weight was between 1500–2500 grams.

DISCUSSION: There have been many studies of the epidemiology of acute renal failure. However, in most cases, the definition of acute renal failure rests on arbitrary biochemical cut-off points. These biochemical dividing lines vary from study to study making comparisons difficult.

Obstetric ARF is now a very rare entity in the developed countries. Its incidence is less than 1:20000 of all gestations. Stratta et al quoted the incidence of obstetric ARF to decrease from 43% in (1956-1967) to 0.5% with respect to total ARF cases (1988-1994) and no case of maternal death or irreversible renal damage was observed in last seven years 31.[6]

In our study, the peak incidence of ARF was seen between 21 to 25 years and 31 to 35 years age group. Majority of the cases were seen during the first pregnancy (56.6%). Among them 60% with ARF were seen in third trimester, followed by in postpartum period (30%). Among 30 patients with ARF, 40% patients were primigravida and 30% patients were multigravidae. 30% presented in post-partum period.

Acute renal failure in pregnancy follows a bimodal distribution. There are peaks in the first trimester (related to unregulated and/ or septic abortion) and in the late third trimester (related to obstetric complications). In a study by Rani PU et al the incidence of pregnancy related ARF has decreased from 20.3% to 12.2%, due to decline in the incidence of APH, puerperal sepsis and post abortal causes. On the contrary, there is a significant increase in the incidence of hypertensive disorders of pregnancy contributing to high maternal and perinatal mortality.[7]

In Syed Munib et al study, ARF due to sepsis has fallen significantly in the last 30 yrs relative to the incidence secondary to obstetric complications (eg, abruption placentae, amniotic fluid embolism and post-partum Haemorrhage) in developed countries. In developing countries, the incidence of pregnancy related ARF is still high, mainly due to lack of education and antenatal care.[8]

In the present study, 10% of cases were due to post abortal complications in the early pregnancy, while 60% in late pregnancy due to obstetric complications and 30% were in post-partum period due to obstetric Haemorrhage and sepsis. This is in contrast with a previous study conducted in India in which 59.7% of patients were reported to have developed ARF in early pregnancy. This declining trend appears to be due to the legalization of abortion. Study done by Prakash J et al showed a declining trend in post abortal ARF, 9% in the 1980s to 7% in the 2000s.[9]

Utas et al reported that etiology of the ARF related to the pregnancy (n=70) were as follows; Eclampsia (50%), HELLP Syndrome (15.7%), post-partum Haemorrhage (14.3%), septic abortion (11.4%) and postpartum ARF (8.6%). Seluck et al, on the other hand, reported etiology of the ARF related to the pregnancy as follows (n=74): abortion (30%), HELLP syndrome and pre eclampsia

(14%), pre eclampsia or eclampsia (12%), post-partum Haemorrhage(15%), IUD (12%), abruption placenta (6%), placenta previa (1%).[10]

In our study, Pre eclampsia, eclampsia and HELLP syndrome accounted for 60% patients with pregnancy related ARF and were the most common etiologic factors leading to ARF, followed by sepsis which was seen among 56.6%. Post abortal sepsis as the most common precipitating event for ARF was present in 10% and was declining trend compared to other studies. 40% had DIC associated with ARF. Haemorrhage as the aetiology for ARF was present 46%, APH in 20% and PPH in 26.6%. Only 1 case was found to be due to acute fatty liver of pregnancy.

Non oliguric ARF was seen in 66% of cases compared to 33% of oliguric cases. Majority of patients presented with intrinsic- renal failure or developed during hospital stay mostly due a complication of preeclampsia, eclampsia and HELLP syndrome followed by jaundice.

The study done by Holley JL et al, showed pregnancy outcome in women with renal disease was significantly worse, and showed no improvement over retrospective reports from the 1970's and 1980's. Specifically fetal deaths were more common in women with renal disease and were predicted by proteinuria and the degree of renal dysfunction.[11]

In this study, among the 20 pregnant patients with ARF, 5 cases (25%) presented with intrauterine fetal demise and 18 cases (66%) had preterm vaginal delivery and 2 cases (10%) had induced abortion. 10 cases (55%) were induced in view of deteriorating renal function and fetal distress and other reasons and 4 cases (22%) went into spontaneous preterm delivery. 4 cases (22%) needed emergency LSCS in view of fetal distress and maternal deteriorating condition and with poor Bishop's score. 4 babies (19%) among vaginal deliveries were born stillborn. The average period of gestation was 33±2 weeks (30–36 weeks). Mean duration of labour was 10 ± 5 hours (6–48hr). 5 cases had stillborn baby. And the average birth weight was 2±0.5 kg. (1.5–2.5kg). 9 babies needed NICU admission.

We had 2 patients with preexisting renal disease, one with post kidney transplant and one with polycystic kidney disease. Both cases had preterm vaginal delivery, spontaneous and induced respectively.

In our study, 66% patients presented with non oliguric renal failure and 33% presented with oliguric renal failure. Twenty six percent of our patients required dialysis and most of these had serum creatinine more than 3 mg% with other indications of dialysis like oligoanuria, fluid overload, metabolic acidosis, hyperkaleimia as observed by others. Eighty percentage of our patients recovered completely of renal functions.

Sixty three percent patients recovered without renal replacement therapy whereas seventeen patients required dialysis.

Two patients took 1 year for complete renal recovery. Renal biopsy was done in puerperal period in these two cases. One had a Focal segment glomerulosclerosis and another had Mesangial proliferative glomerulosclerosis.

In the present study, the maternal mortality was 20%, while a previous study conducted in India, it was approximately 30%. In this study the main reason for mortality was septic shock and multi organ dysfunction (66%). Kumar et al recently reported a maternal mortality rate of 24%. Seluk et al detected the maternal mortality as 18%.[12]

Utas et al detected that maternal mortality reduced to 20.8% in 1991-97 when compared to 31.8% in 1983-90. This appears to be the result of aseptic delivery practices and early management of ante partum and postpartum haemorrhages.[10]

The mortality related to PR-ARF has declined to < 10% in Europe and North America, while the reported mortality rate of PR-ARF has decreased from 56% in 1987 to 24.39% in 2005 in India.[13]

CONCLUSION:

- The incidence of acute renal failure in pregnancy has declined over recent decades as a result of improved antenatal care and virtual elimination of post-abortal sepsis.
- The alarming increase in HTN disorders of pregnancy as a cause of PR – ARF calls for identification of high risk groups, prevention and to intervene quickly and aggressively in situation that could potentially lead to ARF like in placental abruption, acute pyelonephritis, preeclampsia, post-partum hemorrhage, and any disease that may lead to systemic infection, dehydration and or hypotension.
- Early recognition of ARF with prompt therapy of reversible causes and rapid Delivery in untreatable cases has led to more favourable outcome for both gravid and fetus.

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AGE (YEARS)	No. of Patients (n =30)	Percentage of Patients (%)
15 – 20	4	13.3%
21– 25	9	30%
26 – 30	8	26.6%
31– 35	9	30%

Table 1: Distribution of Patients According To Age

	No. of patients	Percentage
1st pregnancy	17	56.6%
2nd pregnancy	6	20%
3rd pregnancy and more	7	23.3%

Table 2: Distribution of Patients according To Parity

Trimester	No. of cases	Percentage
First trimester	0	0 %
Second trimester	3	10%
Third trimester	18	60%
Puerperal	9	30%

Table 3: Distribution Of Cases According To Trimesters

Total Number of patients	30
Multigravada	9(30%)
Primigravida	12(40%)
Puerperal	9(30%)
Mean age of patients (in years)	19-35(26)
Patients who received ANC	28(93%)
Patients who did not receive ANC	2(6.6%)
Home delivery/ abortion	2
Hospital delivery /abortion	28

Table 4: Demographic Characteristics Of Study Population

Parameters	No. of patients	Percentage
Hypotension and shock	4	13.3%
Hypertension	18	60%
Oliguria/anuric failure	10	30%
Non- oliguric failure	20	66.6%
Uterine bleeding	11	36.6%
Fluid overload	2	6.6%
Jaundice	9	30%
Hyperemesis gravidarum	0	0%

Fever	7	23.3%
Diarrhea	1	3.3%
Encephalopathy/altered Sensorium	2	6.6%

Table 5: Main Characteristics of ARF (N=30)

Etiological causes	No. of patients	Percentage of patients
Pregnancy induced hypertension	18	60%
Ante partum hemorrhage	5	16.6%
Post-partum hemorrhag	8	26.6%
Septic abortion	3	10%
Disseminated Intravascular Coagulation	12	40%
Acute fatty liver of pregnancy	1	3.3%
Hypotension and shock	3	10%
Uremic encephalopathy	0	0%
HELLP syndrome	2	6.6%
Acute gastroenteritis	1	3.3%
Blood transfusion	1	3.3%
Sepsis	17	56.6%

Table 6: The Etiological Factors For ARF (N=30)

Symptoms	No. of patients	Percentage
Reduced urine out put	8	26.6%
Anuria	2	6.6%
Edema of the feet	16	53.3%
Uterine bleeding	8	26.6%
Fever	7	23.3%
Abdominal pain	9	30%
Breathlessness	3	10%
Vomiting	11	36.6%
Altered sensorium	0	0%
Jaundice	9	30%
Loose stools	1	3.3%
Hypertension	18	60%

Table 7: The presenting symptoms of ARF

G P E	No. of patients	%
Tachycardia	15	50%
Dehydration	13	43.3%
Edema	16	53.3%
Febrile episode	7	23.3%
Pallor	23	76.6%
Icterus	9	30%
Hypotension	3	10%
Flapping tremors	2	6.6%

Table 8: General Physical Examination (G P E) (n=30)

Type	No. of patients	Mortality
PRE-RENAL	11(36.6%)	1(3.3 %)
RENAL	19(63.3%)	5(16.6%)
POST RENAL	0(0%)	0(0%)

Table 9: Types of Acute Renal Failure

	No. Cases	Died
Oliguria	10(33%)	3(30%)
Non-Oliguria	20(66%)	3(15%)

Table 10: Types of ARF and Mortality

Treatment	No. Of Pts.	Recovered	Died	Mortality
Conservative	22(74%)	19	3	13.6%
Renal replacement therapy	8(26%)	5	3	37.5%

Table 11: Management and Outcome

RRT	Number of Patients	Recovered	Died
Hemodialysis	7	5	2
Peritoneal Dialysis	1	0	1

Table 12: Renal Replacement Therapy (RRT) (NO=8)

Complete renal recovery	24	80%
Recovery without dialysis	19	63.3%
Recovery with dialysis	5	16.6%
Irreversible renal failure	0	0%
Death	6	20%

Table 13: Maternal Outcome in Pregnancy Induced Acute Renal Failure (N=30)

ICU admission	No. of cases	Percentage
Yes	17	56.6%
No	13	43.4%

Table 14: Need for Intensive Care Unit Admission

No. of days in ICU	No. of cases	Percentage
0 – 5	5	16.6%
5 – 10	8	26.6%
10 – 15	1	3.3%
>15	2	6.6%

Table 15: Number Of Days In ICU

Blood transfusion	No. of patients	Percentage
Yes	22	73.4%
No	8	26.6%

Table 16: Need for blood and blood products

Transfusions required	Packed cells	FFP	Platelets	Cryoppt	Whole blood
0–5	12	5	4	1	6
5–10	5	3	2	4	0
10–15	0	2	2	1	0
>15	1	6	2	0	0

Table 17: Number of Blood Transfusions

TERM	0	0%
PRE TERM	18	66%
ABORTION	2	10%
IUD (TERM)	0	0%

IUD (PRE TERM)	5	25%
STILL BORN (TERM)	0	0%
STILL BORN (PRE TERM)	4	20%

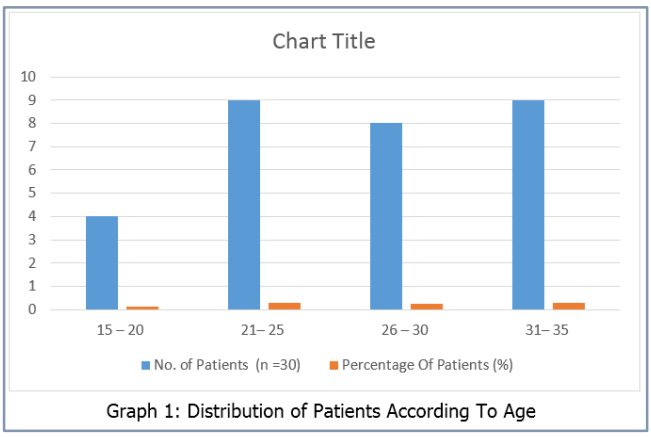
Table 18: Perinatal Outcome

Induced labour (term)	0	0%
Induced labour (pre-term)	10	55%
Spontaneous labour (term)	0	0%
Spontaneous labour (pre-term)	4	22%
Instrumental	1	5.5%
Lscs	4	22%

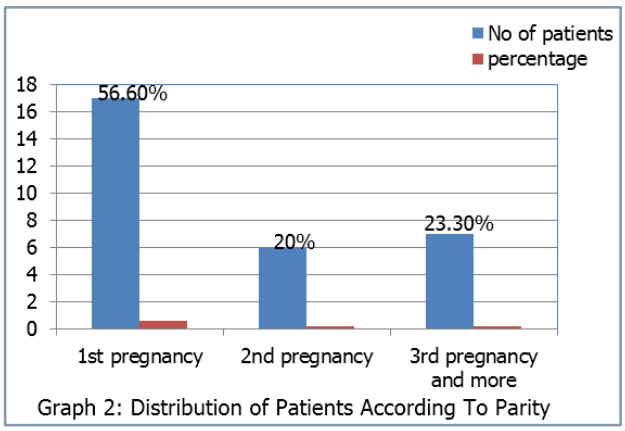
Table 19: Mode of delivery

500 – 1500	4	22%
1500 – 2500	12	66%
2500 – 3500	2	11%

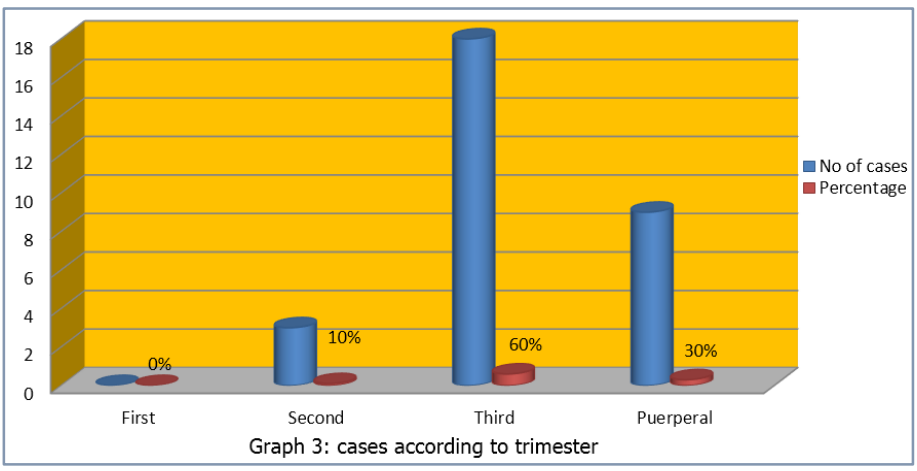
Table 20: Birth Weight (In Grams)



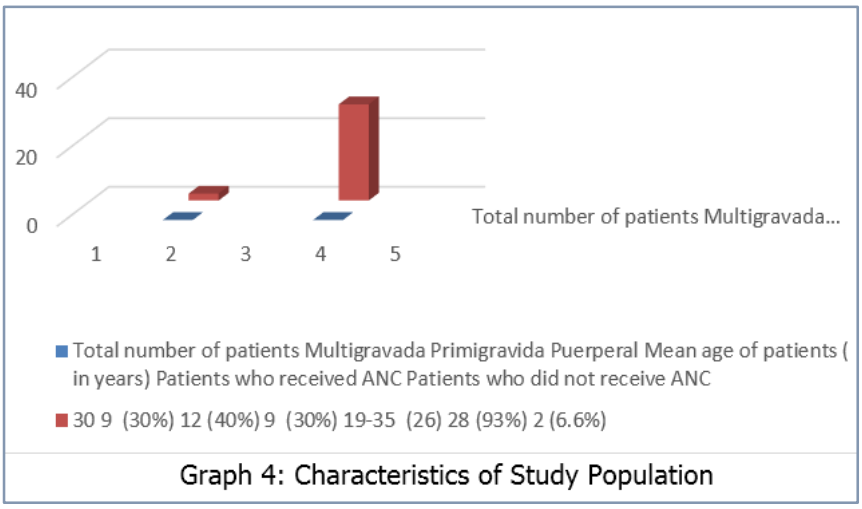
Graph 1: Distribution of Patients According To Age



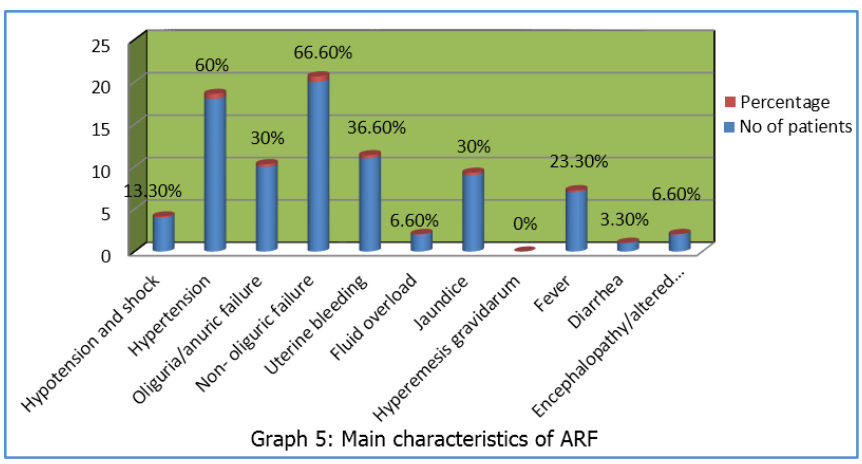
Graph 2: Distribution of Patients According To Parity



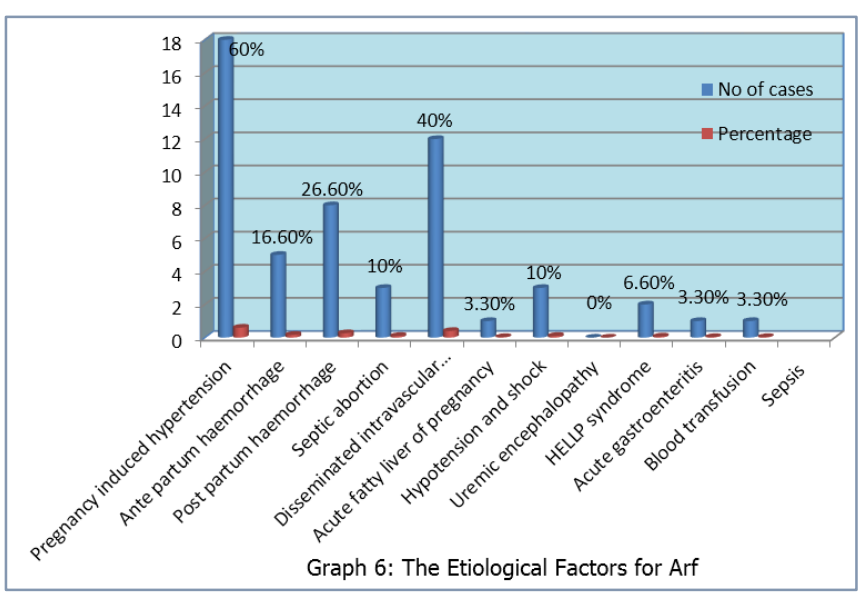
Graph 3: cases according to trimester



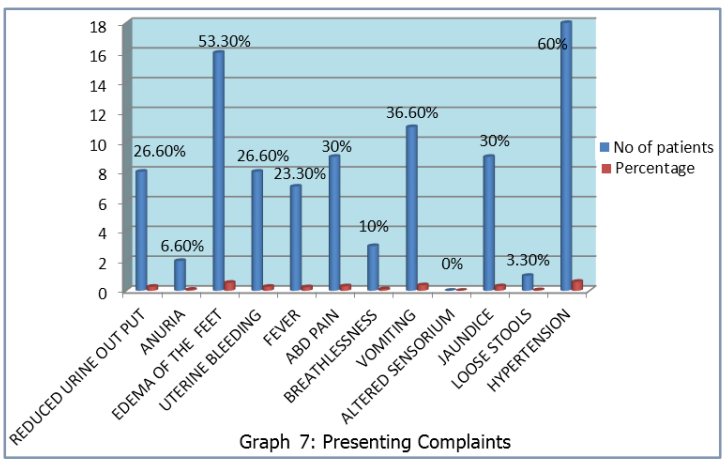
Graph 4: Characteristics of Study Population



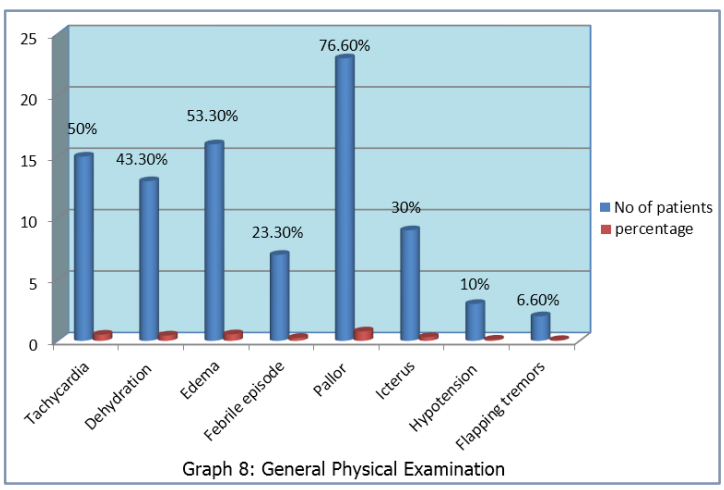
Graph 5: Main characteristics of ARF



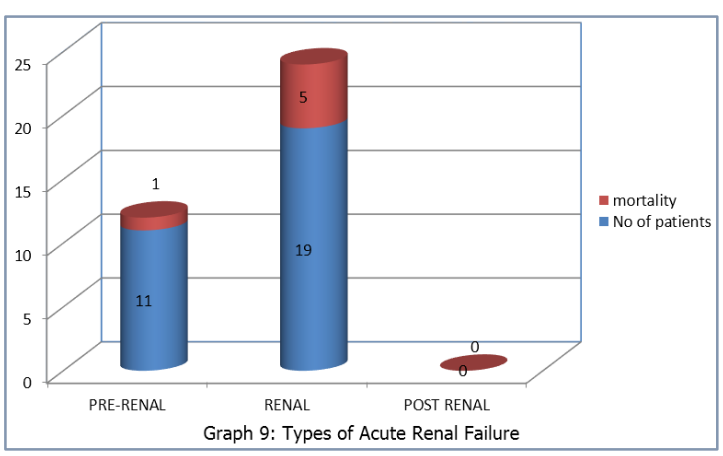
Graph 6: The Etiological Factors for Arf



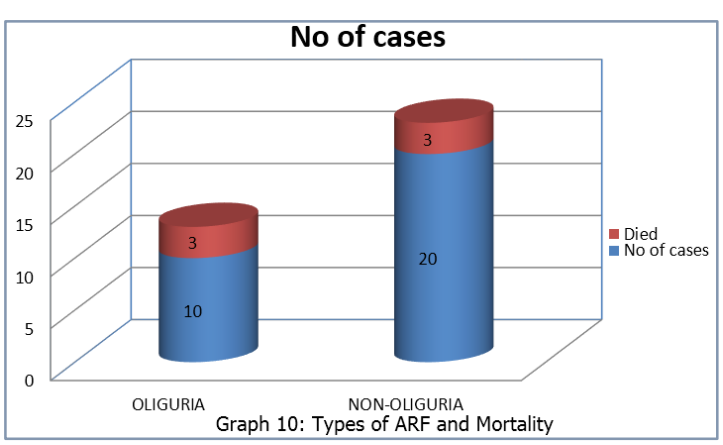
Graph 7: Presenting Complaints



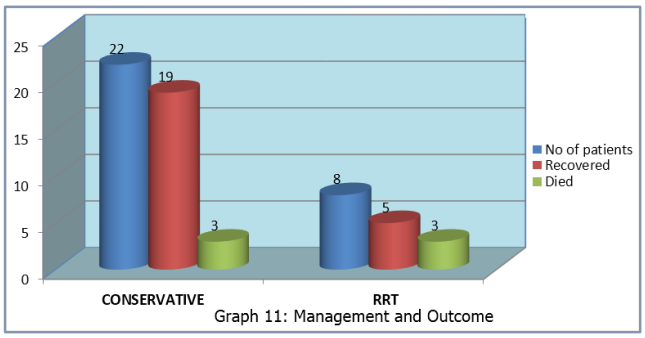
Graph 8: General Physical Examination



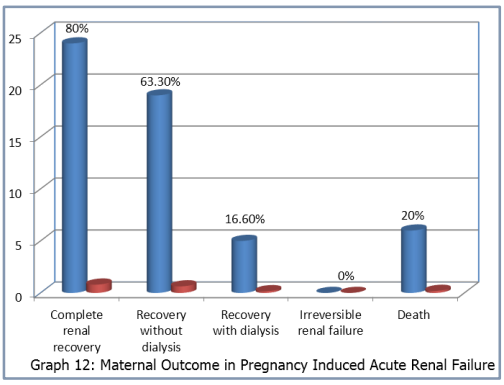
Graph 9: Types of Acute Renal Failure



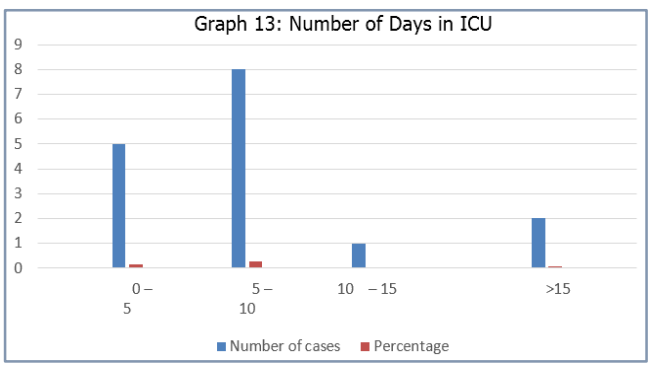
Graph 10: Types of ARF and Mortality

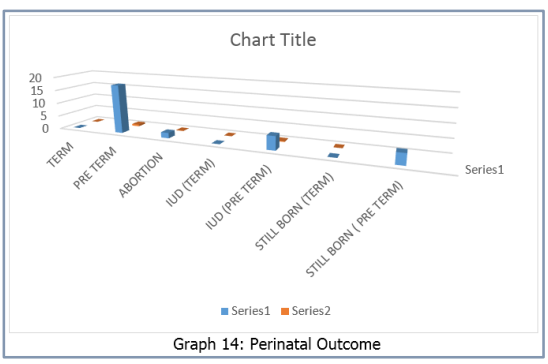


Graph 11: Management and Outcome

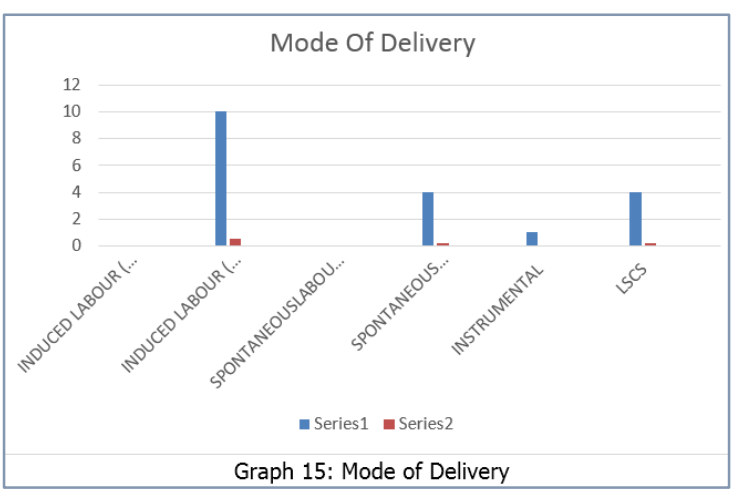


Graph 12: Maternal Outcome in Pregnancy Induced Acute Renal Failure

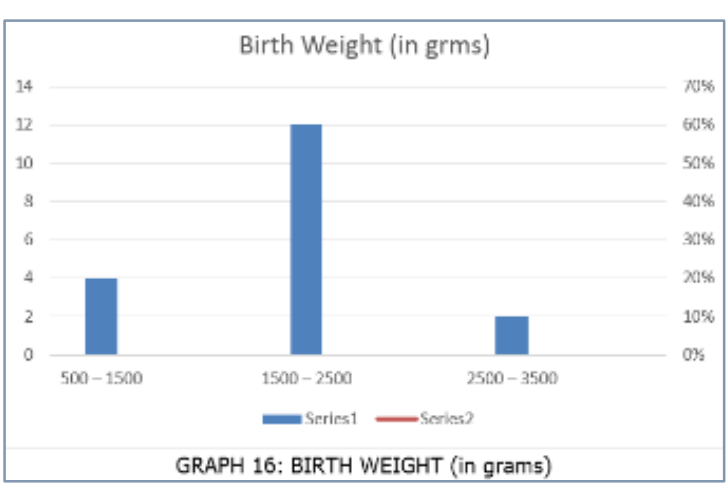




Graph 14: Perinatal Outcome



Graph 15: Mode of Delivery



GRAPH 16: BIRTH WEIGHT (in grams)