



## Frequency of factors leading to acute renal failure in obstetric patients.

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**Article received on:**  
30/09/2019

**Accepted for publication:**  
05/03/2020

**ABSTRACT... Objective:** To determine the frequency of factors leading to acute renal failure in obstetric patients. **Study Design:** Cross Sectional study. **Setting:** Department of Obstetrics and Gynecology, Civil Hospital Karachi, Tertiary Care Hospital. **Period:** July 2015- Jan 2016. **Material & Methods:** Total 250 women during pregnancy and within 42 days after delivery who were diagnosed as ARF were included. Serum creatinine was done on admission and then after 24 hours of delievery. Those with urine output < 30ml / hour and serum creatinine > 1.5 mg / dl were recruited. All data was recorded on proforma. **Results:** The average age of the women was 29.36±5.87 years. Post-partum hemorrhage was the important and common factor i.e. 40.4%, followed by placental abruption 25.6%, Severe pre-eclampsia 18.4%, puerperal sepsis 8.4% and eclampsia 7.2%. **Conclusion:** Ante partum hemorrhage like placental abruption, eclampsia and preeclampsia, and postpartum hemorrhages' are the major causes of obstetrical ARF. Good antenatal care and provision of universal health facility can prevent this dangerous condition. Though it is a treatable and curable complication, but if not diagnosed and treated timely, it can lead to significant maternal morbidity and mortality.

**Key words:** Obstetric Acute Renal Failure, Post-partum Hemorrhage, Placental Abruption, Severe Pre-eclampsia.

**Article Citation:** Zafar S, Jaleel R, Lodhani KK. Frequency of factors leading to acute renal failure in obstetric patients. Professional Med J 2021; 28(5):640-646.  
<https://doi.org/10.29309/TPMJ/2021.28.05.4204>

### INTRODUCTION

Acute renal failure of pregnancy is defined as a rapid deterioraion in renal function either during the course of pregnancy or after delivery.<sup>1</sup> It is generally characterized by deterioration in renal function after number of insults like hypertensive disorders (pre eclampsia and eclampsia), sepsis, hemorrhage etc. Obstetrical ARF can cause maternal complications, maternal deaths and is also associated with perinatal mortality. Although most of the patients recover back, some may suffer with permanent renal dysfunction requiring renal replacement treatment like hemodialysis.

Prakash et al.<sup>2</sup> Arora et al.<sup>3</sup> and Khalil et al.<sup>4</sup> observed maternal mortality as high as 20%, 28% and 15% of patients with obstetric related ARF, in their papers respectively.

Acute kidney injury during pregnancy usually follows a bimodal pattern with 2 peaks: one in

first trimester, usually associated with septic miscarriages, and the second one in the last trimester, caused by pregnancy related complications.<sup>5</sup>

Renal cortical necrosis remains one of the worst complications of obstetric ARF. Its incidence in a study in Peshawar in 2008 was 2.9% and postpartum hemorrhage was found to be the main underlying etiology in this study.<sup>6</sup>

In another study in India, the incidence of pregnancy related ARF was 9.06% and postpartum hemorrhage occurred in around 24.28% of patients.<sup>7</sup> All those factors that are associated with ARF outside pregnancy can cause renal failure in pregnancy as well including volume depletion like hyper emesis, bleeding and sepsis. According to a study in 2011 in Morocco, hypertensive disorders and obstetrical hemorrhages together can cause huge burden

of obstetric ARF that is approximately 75% of all cases.<sup>1</sup> According to this study, the frequency of placental abruption pre-eclampsia, and puerperal sepsis was 42.3% 32.6%, and 18.6% respectively.

According to Khalil et al., DIC, preeclampsia and obstetric hemorrhages are the main underlying etiological factors for acute renal failure.<sup>4</sup> Underlying causes for acute renal failure in pregnancy differs. Large number of studies have quoted preeclampsia as a major cause in developed countries while in under developing countries obstetrical hemorrhages are the main cause of ARF.

In our setup, antenatal booking status is poor and majority of the deliveries are home deliveries by Traditional Birth Attendants(Dai), that mostly suffered with complications which if not dealt properly, can cause maternal and perinatal morbidity and mortality.

The purpose of study is to evaluate the frequency of risk factors linked with ARF in our patients. This knowledge can be helpful for the management and counseling of patients regarding pre-pregnancy follow-ups and regular antenatal care. This will help in the prevention of maternal and perinatal morbidity and mortality. Therefore the aim is to determine the frequency of different risk factors linked with ARF in our population.

To determine the frequency of factors leading to acute renal failure in obstetric patients attending CHK, Gynae unit 1

### Acute Renal Failure

Serum creatinine > 1.5mg/dl (4) along with Urine Output < 30ml /hr

### Severe Preeclampsia

Blood pressure: systolic > 160mmHg or diastolic > 110mmHg on two separate occasion at least 6 hours apart along with proteinuria >5gm in a 24 hour urine collection.<sup>5</sup>

### Eclampsia

Preeclampsia associated with convulsions.

### Placental abruption

Placental abruption is vaginal bleeding after 20 weeks of pregnancy from separation of placenta.<sup>8</sup>

### Postpartum hemorrhage

Postpartum hemorrhage is the total blood loss of 500 ml or more from the genital tract following delivery. Postpartum hemorrhage is excessive blood loss > 500ml after normal vaginal delivery or > 1000ml after caesarian section.<sup>9,10</sup>

### Puerperal Sepsis

Infection following delivery upto 12 weeks was assessed clinically by presence of temperature more than 100 degree Fahrenheit, uterine tenderness and purulent vaginal discharge.

### MATERIAL & METHODS

This cross sectional study was conducted at Department of Obstetrics and Gynecology Unit-1, Civil Hospital Karachi, Tertiary Care Hospital for Six months from July 2015- Jan 2016 determined.

The sample was 233 patients using Open epi software for sample size calculation, and taking frequency of puerperal sepsis as 18.6%, d = 5% and CI = 95% calculated sample size is 250.

Sampling Technique was Non-probability (consecutive).

### Inclusion Criteria

1. Women admitted in Gynae Unit 1 through ER during pregnancy or within 42 days of delivery.
2. Maternal age between 15-40 years
3. Gravida 1-10
4. Diagnosed as ARF

### Exclusion Criteria

1. Renal disease prior to pregnancy (glomerulonephritis, Chronic renal failure)
2. History of chronic hypertension or diabetes
3. History of renal stone
4. Elevated serum creatinine prior to pregnancy
5. Dehydration

Patients were enrolled from Obstetric emergency. Patients with severe pre-eclampsia, eclampsia,

placental abruption, postpartum hemorrhage and puerperal sepsis were included. After obtaining informed consent, detailed history and examination was done and previous records were reviewed. Those fulfilling inclusion / exclusion criteria were monitored regarding urine output / hour for 24 hours. Serum creatinine was determined on admission and then after 24 hours. Those with urine output less than 30c.c / hour and serum creatinine > 1.5 mg / dl on any occasion was enrolled in this study. Demographic features like age, gravida, parity and Gestational age were noted. All data was recorded on predesigned proforma.

Data was analyzed using SPSS version 16. For variables like age, gravida, gestational age, mean and standard deviation was determined. For categorical variables like eclampsia, severe preeclampsia, Placental abruption, postpartum hemorrhage, Puerperal sepsis frequency and percentages was calculated. Age >35 was considered as effect modifier and was controlled through stratification.

## RESULTS

Total 250 women during pregnancy and within 42 days of delivery were diagnosed as acute renal failure (ARF) and were included in this study. Most of them were between 21 to 40 years of age (Figure-1). The average age of the women was  $29.36 \pm 5.87$  years. Similarly average gravida, parity and gestational age of the women is shown in Table-I. There were 70(28%) women had primipara, 131(52.4%) had multi parity and 49(19.6%) had grand multi parity as shown in Figure-2.

Frequency of factors causing acute renal failure in obstetric patients are shown in Table-II. Post-partum hemorrhage was the commonest factor that was observed in 40.4% (101/250) cases, followed by placental abruption 25.6%.

(64/125), Severe pre-eclampsia 18.4% (46/250), puerperal sepsis 8.4% (21/250) and eclampsia 7.2% (18/250).

Rate of severe pre-eclampsia and post-partum

hemorrhage was significantly high in below 35 years of age while rate of placental abruption puerperal sepsis was significantly high in women whose age is above 35 years as shown in Table-III. Rate of severe pre-eclampsia, eclampsia, post-partum hemorrhage was significantly high in primiparous and multiparous women as compare grand multiparous, where rate of placental abruption and puerperal sepsis was high as depicted in Table-IV. Frequency of various factors causing acute renal failure according to gestational age is presented in Table-V.

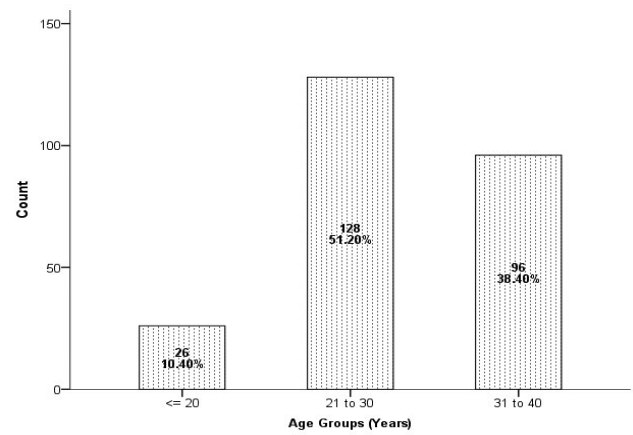


Figure-1. Age distribution of the patients n = 250

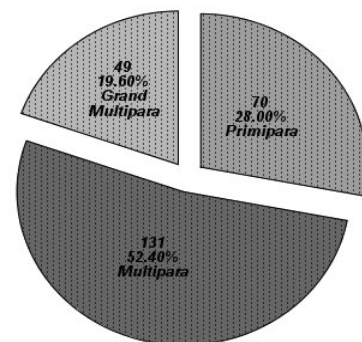


Figure-2. Parity status of women n=250

## DISCUSSION

Acute renal failure in pregnancy is a serious complication causing maternal and perinatal mortality and morbidity. In well developed countries, infectious causes have been eradicated now like malaria and gastro-enteritis. The incidence of obstetric ARF has declined now as a result of improved antenatal care, increase awareness and reduced incidence of post miscarriage sepsis.<sup>11</sup>

Variables	Mean	Std. Deviation	95% Confidence Interval for Mean		Median	IQR
			Lower Bound	Upper Bound		
Age (Years)	29.36	5.87	28.63	30.09	30	10
Gravida	5	2.5	4.18	5.82	4	3
parity	3	2.4	2.97	4.59	3	4
Gestational Age (weeks)	34.58	2.91	34.22	34.94	36	2

Table-I. Descriptive statistics of characteristics of women n=250

Factors Leading To Acute Renal Failure	Frequency	Percentage
Severe Pre-Eclampsia	46	18.4%
Eclampsia	18	7.2%
Placental Abruption	64	25.6%
Post-Partum Hemorrhage	101	40.4%
Puerperal sepsis	21	8.4%

Table-II. Frequency of factors leading to acute renal failure in obstetric patients

Factors Leading To Acute Renal Failure	Age Groups (Years)		P-Values
	< 35 Years	≥ 35 Years	
Severe Pre-Eclampsia	40(23.4%)	6(7.6%)	0.003
Eclampsia	14(8.2%)	4(5.1%)	0.37
Placental Abruption	27(15.8%)	37(46.8%)	0.0005
Post-Partum Hemorrhage	80(46.8%)	21(26.6%)	0.002
Puerperal sepsis	10(5.8%)	11(13.9%)	0.032

Table-III. Comparison of frequency of factors leading to acute renal failure between below and equal to 35 Years of age women

Factors Leading to Acute Renal Failure	Parity			P-Values
	Primi Para (n=70)	Multi Parity (n=131)	Grand Multiparty (n=49)	
Severe Pre-Eclampsia	25(35.7%)	17(13%)	4(8.2%)	0.0005
Eclampsia	12(17.1%)	6(4.6%)	0(0%)	0.0005
Placental Abruption	4(5.7%)	34(26%)	26(53.1%)	0.0005
Post-Partum Hemorrhage	27(38.5%)	61(46.6%)	13(26.5%)	0.048
Puerperal sepsis	2(2.9%)	13(9.9%)	6(12.2%)	0.127

Table-IV. Comparison of frequency of factors leading to acute renal failure among different parity

Factors Leading To Acute Renal Failure	Gestational Age (Weeks)		P-Values
	≤ 36 weeks (n=213)	> 36 Weeks (n=37)	
Severe Pre-Eclampsia	42(19.7%)	4(10.8%)	0.19
Eclampsia	18(8.5%)	0(0%)	0.06
Placental Abruption	54(25.4%)	10(27%)	0.82
Post-Partum Hemorrhage	82(38.5%)	19(51.4%)	0.14
Puerperal sepsis	17(8%)	4(10.8%)	0.56

Table-V. Comparison of frequency of factors leading to acute renal failure different Gestational Age

Now a days, road traffic accidents, contrast exposure, hospital acquired ARF and chemotherapeutic agents are the main causes of ARF there. Although obstetrical ARF is declining in under developing countries, it is still one of the main causes of acute renal failure there.<sup>12</sup> The etiological factors behind obstetrical ARF have now changed. miscarriage was the main cause

of obstetrical ARF previously.<sup>13</sup> The proportion of ARF secondary to septic miscarriages has decreased from 33.3% to 1.8% in the last 20 years.<sup>14</sup>

The incidence of obstetric ARF has decreased markedly in developed countries to less than 1 in 20 000 births; now it represents <1% of

adult ARF<sup>15</sup> In under developing countries, the incidence is very high, 7%–36% of ARF.<sup>16,17</sup> The incidence may be lower ranging from 4% to 14% in some low-income countries (e.g. in India),<sup>5,7</sup>

In present study the average age of the women was  $29.36 \pm 5.87$  years. There were 70(28%) women with primiparity, 131(52.4%) with multi parity and 49(19.6%) with grand multi parity. In a study by Khalil et al [4], their age values range from 18 to 40 years with mean age of 29-5.4 years. Duration of gestation was 33-4.9 weeks. The status of gravida and parity were found to be around  $4 \pm 2.2$  and  $3.8 \pm 2.1$  respectively. In a study by Bentata et al<sup>1</sup>, the mean age of the women was  $29 \pm 5$  years (range, 20–45 years) and the mean gestational age was  $30 \pm 4$  weeks (range, 22–39 weeks). In total, 37.2% women were primiparous, 48.8% were multiparous, and 14.0% were grand multiparous.

Acute renal failure is mostly associated with septic miscarriage and hyperemesis gravidarum in first trimester, pre eclampsia in last trimester and with thrombotic microangiopathies and sepsis in post partum period. Although it is rare in well developed countries, it has a high incidence of pregnancy-related ARF in under developing countries thereby increasing maternal morbidity and mortality.<sup>18,19</sup>

In this study post-partum hemorrhage was the main factor that was observed in 40.4% (101/250) cases, followed by placental abruption 25.6% (64/125), Severe pre-eclampsia 18.4% (46/250), puerperal sepsis 8.4% (21/250) and eclampsia 7.2% (18/250). According to a study conducted in Morocco in 2011, hypertensive disorders and obstetric hemorrhage together accounts for approximately 75% of cases of obstetric ARF in total.<sup>1</sup> The frequency of placental abruption severe pre-eclampsia, eclampsia, and puerperal sepsis was found to be 42.3%, 32.6%, 20.9%, and 18.6% respectively according to this study.

In a study by Khalil et al<sup>4</sup>, obstetrical haemorrhages was found in 64.99% followed by DIC and eclampsia which were present in 34.99% and 16.66 % respectively. Akhter et al<sup>20</sup> and Naqvi

et al<sup>21</sup> concluded obstetrical hemorrhages as a major cause in 58.13% and 63% respectively which is comparable to our results. According to Ansari<sup>18</sup> the major cause related to obstetrical ARF was haemorrhages. (38% of cases).

In a study by Khalil et al<sup>4</sup>, DIC with or without obstetrical haemorrhages was found in 34.99% while Ansari et al<sup>18</sup> reported DIC in combination with puerperal sepsis and septic miscarriage in 31%. Eclampsia is found in 12–23% in variety of studies<sup>22</sup>

In well developed countries the underlying etiology of obstetrical ARF is quite different .a number of studies have reported preeclampsia as a major cause.<sup>22,23</sup> Hachim et al<sup>24</sup> and Venturæ et al<sup>25</sup> found eclampsia-preeclampsia in 74.5% and 47.7% respectively. This discrepancy in underlying etiology in various studies conducted in Pakistan versus developed countries can be due to good antenatal care in developed countries leading to reduce incidence of obstetrical haemorrhages and timely and proper management of preeclampsia.

Etiologies of obstetric AKI differ country wise. In Morocco, hypertensive disorders are more common. Hachim et al and Miguil et al, reported 74.5% and 67.2% incidence preeclampsia respectively.<sup>24,26</sup>

Bentata et al<sup>27</sup> reported 60.9% incidence for preeclampsia and eclampsia.

In India, obstetric AKI was mainly related to septic miscarriages. It usually occurred in the first trimester of pregnancy due to the non legalization of abortion, as well as the unavailability and difficult accessibility of different contraceptive methods. Goplani et al<sup>7</sup>, Najar et al<sup>11,28</sup> and Prakash et al<sup>29</sup> reported an incidence of septic miscarriages of 20%, 50% and 72%, respectively in their papers. Recent studies in India reported a decline in AKI related to septic miscarriages mainly due to legalizing miscarriage laws , and an increase in the incidence of third trimester AKI, mainly of hypertensive disorders and obstetrical hemorrhages.<sup>3,29</sup> In Turkey, hypertensive disorders are the main cause of pregnancy-related AKI,

around 75.2%.<sup>30</sup> while in Brazil, it accounts for 41.8% of cases.<sup>31</sup>

HELLP syndrome, was associated with severe preeclampsia in 20% of cases according to Silva et al, compared with 46.5% in Bentata et al study. HELLP syndrome was responsible for AKI in 40%, 38% and 44.4% of cases by Silva et al, Miguil et al and Drakeley et al respectively in their studies.<sup>32,23,31</sup>

Placental abruption is also considered a serious complication of severe preeclampsia, being associated with AKI in 9.1%, 17.2%, 32% and 28.3% of cases according to studies by Silva et al, Miguil et al, Drakeley et al and Mjahed et al, respectively.<sup>32,23,31</sup> In Bentata et al<sup>27</sup> study, Placental abruption was associated with AKI in 23.9% of cases.

## CONCLUSION

Ante partum hemorrhage like placental abruption, eclampsia and preeclampsia, and postpartum hemorrhages' are the major causes of obstetrical ARF. Good antenatal care and provision of universal health facility can prevent this alarming condition. Though it is a treatable and curable complication, but if not diagnosed and treated timely, it can lead to maternal morbidity and mortality. The best treatment remains prevention.



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### AUTHORSHIP AND CONTRIBUTION DECLARATION

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1	Shaheena Zafar	Main author, Data, Collection analysis, Data writing.	
2	Riffat Jaleeel	Data collection, Analysis.	
3	Kouser Karim Lodhani	Concept, Analytical thinking, Paper writing.	