

ORIGINAL ARTICLE

Pregnancy Related Acute Renal Failure: An Experience at a Tertiary Care Hospital

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ABSTRACT

The aim of this study to evaluate the magnitude of PRAF (Pregnancy related acute renal failure) in Pakistan, contributing factors responsible for pregnancy related acute kidney failure, the results of treatment options for ARF in pregnancy, including cure rates, maternal mortality, and other factors.

Study design: It was a cross sectional study, conducted at the department of Obstetrics and Gynaecology, Fouji Foundation Hospital, Rawalpindi and Jinnah Teaching Hospital, Peshawar from January, 2023 to June, 2023.

Methodology: A total number of participant was (N=250). The age of participants was 20-37 years included pregnant women. Serum electrolytes complete blood count, renal function test and urine routine were performed on all participants.

Results: The median age was 27.05±4.8 years. Most of the participant's residency were belong to the rural areas 72% and most cases was occurred during third trimester 42%. The participants was included 60% conservative treatment and 40% hemodialysis. When compared both groups' pre-treatment and post-treatment in dialysis, urine production and all biochemical indicators were exhibited significant (P <0.001) improvement. The urea, creatinine, Na, K and urine output were significantly higher in dialysis group than conservative group, p<0.0001. Maternal outcomes was improved 98.6% in conservative group, and 70% improved in dialysis group.

Conclusion: In conclusion, renal failure and maternal difficulties interact intricately to cause PRARF. To get the greatest results, the management strategy whether conservative or incorporating dialysis—should be customized to the unique clinical circumstances of each patient. Improving maternal and newborn health outcomes and reducing the hazards connected with PRARF.

Keywords: Chronic, Acute, Kidney and Dialysis.

INTRODUCTION

The severe disease known as pregnancy-related acute renal failure (PRARF) is defined by a sharp and sudden reduction in kidney function during or soon after pregnancy. It's an uncommon but possibly fatal condition that needs to be treated right now. Pregnancy-related hypertension is the hallmark of a number of illnesses collectively referred to as hypertensive disorders of pregnancy (HDP). These conditions are among the most typical pregnancy-related issues, and they may have serious effects on the health of both the mother and the fetus ¹.

Pregnancy-related acute renal failure (PRARF) can have different etiologies and presentations based on the clinical setting and underlying reasons ². PRARF is frequently caused by hypertensive disorders during pregnancy, which include illnesses including HELLP syndrome, eclampsia, and preeclampsia. Acute renal failure may arise from these conditions due to renal vasoconstriction, glomerular endothelial damage, and reduced renal perfusion ³.

Hypovolemic shock and acute renal failure can result from obstetric bleeding after childbirth, which includes circumstances including placental abruption, uterine rupture, and postpartum hemorrhage. Sepsis can result from infections that start during pregnancy or the postpartum period. This condition weakens renal function, hypotension, and systemic inflammation. Pregnant women with preexisting renal diseases may experience pregnancy complications, leading to acute renal failure, with factors including drug-induced injury, thrombotic microangiopathies, and rare conditions ⁴.

Excessive bleeding during pregnancy or childbirth can lead to hypovolemia and decreased kidney perfusion, causing acute renal failure. This can compromise renal function, cause ischemic injury, and damage renal tubules and glomeruli ⁵. The renin-angiotensin system (RAS) is activated to maintain blood pressure and organ perfusion, but it can exacerbate renal ischemia

and injury. Obstetric hemorrhage can lead to renal dysfunction, tubular injury, and impaired function due to excessive bleeding and tissue injury ⁶. Coagulopathy, a dysfunction in blood clotting or bleeding control, can exacerbate these issues. When all factors considered, obstetric hemorrhage presents a major risk to the health of the mother, including the emergence of acute renal failure. Encouraging maternal outcomes during pregnancy and childbirth can be achieved by preventing or lessening the effects of acute renal failure through early detection, vigorous care, and intervention ⁷.

Dialysis and conservative management are the two main therapeutic modalities frequently considered by healthcare providers in the management of pregnancy-related acute renal failure (PRARF). Conservative Management is careful fluid management that essential to optimize renal perfusion while preventing fluid overload. Intravenous fluids may be administered cautiously to maintain adequate hydration without exacerbating renal congestion ⁸. Controlling hypertension is crucial, especially in cases of hypertensive disorders of pregnancy (HDP), such as preeclampsia and eclampsia. Antihypertensive medications may be used to prevent further renal injury due to elevated blood pressure ⁹. Close monitoring of renal function, electrolyte levels, and urine output is necessary. Supportive measures such as nutritional support, correction of electrolyte imbalances, and treatment of underlying infections or complications are provided as needed. Certain medications that are nephrotoxic or contraindicated in renal failure may need to be adjusted or discontinued to prevent further renal injury ¹⁰.

When electrolyte imbalances, fluid overload, uremia, or metabolic acidosis cannot be adequately managed with conservative methods alone, dialysis becomes necessary in cases of severe renal impairment or acute kidney injury (AKI). In situations of pulmonary edema or resistant hypertension, dialysis may also be taken into consideration. The two primary therapy options for PRARF are hemodialysis and peritoneal dialysis ¹¹. Whereas peritoneal dialysis uses the peritoneal membrane as a semipermeable membrane for solute exchange, hemodialysis

Received on 17-07-2023

Accepted on 23-11-2023

involves the extracorporeal removal of waste materials and extra fluid from the circulation.

Dialysis schedule and length are determined by the degree of renal failure, clinical state, and patient response. Dialysis may be necessary in certain situations as a stopgap while renal function recovers, it can be required indefinitely or until delivery¹².

The aim of this study to evaluate the magnitude of PRAF in Pakistan, contributing factors responsible for pregnancy related acute kidney failure, the results of treatment options for ARF in pregnancy, including cure rates, maternal mortality, and other factors.

METHODOLOGY

This cross-sectional study was conducted at the department of Obstetrics and Gynaecology, Fouji Foundation Hospital, Rawalpindi and Jinnah Teaching Hospital, Peshawar for the duration of six months i.e from January, 2023 to June, 2023. A total number of participant was (N=250). The age of participants was 20-37 years included pregnant women. Inclusion criteria: Pregnant women suffering acute renal disorder. Exclusion criteria: End stage kidney diseases, renal stone, diabetes mellitus, and history of urological intervention. The physical observation included temperature, pulse rate, blood pressure and urine output was recorded. Serum electrolytes complete blood count, renal function test (blood urea, serum creatinine), and urine routine and microscopy were performed on all patients. Every patient received either conservative care or dialysis. Those who made a full recovery from PR-ARF were released from the hospital, while those who did not were monitored in the ward until their death or partial recovery. The study obtained informed consent from all participants, indicating that the patients were provided with detailed information about the study objectives, procedures, potential risks, and benefits before agreeing to participate. Data was analyzed statically by SPSS. 26. Chi-square, odd ratio and percentage were used to display the category data. The variables had considerably significant, as indicated by the p value of <0.05.

RESULTS

A total number of participants was N=250 of acute renal failure with different etiologies were screened. The age of participants were between 20-37 years. The median age was 27.05±4.8 years. Most of the participant's residency were belong to the rural areas 72% and some were urban areas 68%. The pregnancy stage of the participants most cases was occurred during third trimester 42%, and first, second trimester was 20% and 38%. The number of multipara women 76% exceeds the number of primigravida women 64% with antenatal care 68%. There were 24% participants who had undergone caesarean section, while 76% participants had normal delivery. The lack of access to antenatal care for pregnant

women 72%, resulting 50% home delivery and 60% in hospital delivery. The participants was included 60% conservative treatment management and 40% hemodialysis, see in Table 1.

According to our results to found that, the participants of abortion was 12.8%, hypertension 28%, postpartum sepsis 32% and antepartum heamorrhage 8%. The participants of HELLP and DIC was included 4.8% and 3.2% in Table 2.

According to our results to indicate that, when compared both groups' pretreatment and post-treatment urine production and all biochemical indicators were exhibited significant (P <0.001) improvement or changes in Table 3.

According to our results to indicate that, urea, creatinine, Na, K and urine output were significantly higher in dialysis group than conservative group. The improvement of all these biochemical parameters and urine output was similar and clinically stated to be significant, p<0.0001 in Table 4.

Table 1: Demographic characteristics of patients

Characteristics	Frequency (N=250)	Mean±SD or %
Age		27.05±4.8 years
20-25 years	15	6%
26-31 years	35	14%
32-37 years	200	80%
Residency		
Urban	170	68%
Rural	180	72%
Pregnancy stage		
First trimester	50	20%
Second trimester	95	38%
Third trimester	105	42%
Parity		
Primigravida	160	64%
Multigravida	190	76%
Antenatal care		
Yes	170	68%
No	180	72%
Delivery		
Hospital delivery	150	60%
Home delivery	100	50%
Mode of delivery		
Normal delivery	190	76%
Caesarean section	60	24%
Hemodialysis	100	40%
Conservative management	150	60%

Table 2. Causes of pregnancy related acute renal failure

Causes	Frequency
Abortion	32 (12.8%)
Hypertensive disorder	70 (28%)
Postpartum sepsis	80 (32%)
Postpartum heamorrhage	28 (11.2%)
Antepartum heamorrhage	20 (8%)
HELLP syndrome	12 (4.8%)
DIC	8 (3.2%)

Table 3: Biochemical parameters between two group Conservative and Dialysis

Biochemical parameters	Conservative		Dialysis		P=value
	Pre-dialysis	Post-dialysis	Pre-dialysis	Post-dialysis	
Urea (mg %)	170.47±78.29	122.40±30.12	195.28±89.41	115.31±22.41	<0.0001***
Creatinine (mg %)	8.31±3.11	3.76±2.8	10.11±4.55	3.54±1.8	<0.0001***
Na ⁺⁺ (mEq/L)	140.09±0.5	141.35±5.4	142.05±6.6	141.30±4.9	0.005*
K ⁺⁺ (mEq/L)	2.08±0.1	4.01±0.55	5.22±0.33	3.11±0.23	0.002*
Urine output (ml)	580.30±630.22	989.54±500.12	180.29±120.33	545.22±265.67	<0.0001***

Table 4: Improvement of biochemical parameters in two groups

Biochemical parameters	Conservative	Dialysis	t value (DF=58)	P=value
Urea (mg %)	-58.79±36.5	-90.33±78.33	1.25	0.228
Creatinine (mg %)	-3.86±3.22	-5.87±2.36	1.65	0.177
Na ⁺⁺ (mEq/L)	-0.44±3.55	3.52±8.51	3.21	0.023
K ⁺⁺ (mEq/L)	-0.42±0.31	-0.13±0.76	0.85	0.432
Urine output (ml)	876.54±650.44	890.16±506.33	0.02	0.876

Table 5: Maternal outcome of two groups

Outcome	Conservative	Dialysis	X ² value (DF=58)	P=value
Improved	98.6%	70%	2.13	<0.001
Partial improved	0	22%	2.13	<0.001
Expired	1.3%	8%	2.13	<0.001

According to our results to found that, 98.6% participants was improved in conservative group, while 70% improved in dialysis group. More mortality rate 8% was higher than conservative group 1.3%, see in Table 5.

DISCUSSION

One dangerous condition that can happen during pregnancy after childbirth is pregnancy-related acute renal failure (PRARF). Research and healthcare data from other developing nations offer insights into the prevalence, risk factors, and outcomes connected with this disorder¹³.

In the current study to indicate that, considering its potential to increase maternal morbidity and mortality, 32% sepsis-induced pregnancy-related acute renal failure (PRARF) is a serious problem in low-resource nations. Acute renal failure is one of the severe organ dysfunctions that can result from sepsis, a systemic inflammatory response to infection, especially in pregnant women. Access to prompt and sufficient healthcare treatments, such as parental care and obstetric services, may be restricted in nations with inadequate resources¹⁴. Pregnant women might not get the proper infection screening, diagnosis, or treatment as a result, which increases the risk of sepsis and PRARF. In pregnant women may be more susceptible to infectious diseases as a result of poor living circumstances, restricted access to clean water, and poor sanitation. These factors raise the possibility of contracting infections can progress to sepsis and PRARF¹⁵.

According to our results to indicate that, 28% hypertensive disorders of pregnancy that was present in patients with pregnancy-related acute renal failure (PRARF) and increased risk of morbidity and mortality for both the mother and the fetus. This correlation has been noted in Pakistan as well as in a number of other countries with different healthcare systems. Eclampsia or pre-eclampsia continues to be a primary cause of PRARF, over the past 20 years, hypertensive pregnancy problems have replaced hemorrhage as the most common cause of PRARF in Pakistan¹⁶.

In our study to found that, hemorrhage as a cause of pregnancy-related acute renal failure (PRARF). The percentage of patients 11-18% whose pregnancy-related acute renal failure (PRARF) was caused by bleeding. Acute renal failure can be brought on by hemorrhage during pregnancy or childbirth for a number of reasons, including insufficient blood volume (hypovolemia), poor renal perfusion, and the release of toxins from damaged red blood cells¹⁷. Obstetric emergencies such placental abruption, uterine rupture, postpartum hemorrhage, or problems from surgical interventions following childbirth are frequently linked to hemorrhage-related PRARF¹⁸.

In the present study to indicate that, following therapy for pregnancy-related acute renal failure (PRARF), biochemical variables and urine output improved in both groups—those they were needed hemodialysis 40% and other received conservative treatment 60%. Conservative treatment, which usually consists of supportive measures including blood pressure control, fluid management, and close observation without the need for dialysis, was included to 60% of the patients. After treatment, biochemical indicators improved in both groups of serum creatinine, urea and electrolyte values (sodium, potassium). The statement implies that although the biochemical variables (blood urea, serum creatinine, sodium, potassium) and urine output improved statistically similarly in both the dialysis group and the conservative treatment group, the improvements in the dialysis group were clinically more significant similar to conservative treatment group¹⁹. According to the statement, there was no statistically significant difference in urine production or improvement in biochemical markers between the two groups. This shows that these metrics improved as a result of the use of both treatment techniques. Clinical decision-making about the treatment modality for patients with pregnancy-related acute renal failure (PRARF) may be influenced by the perceived clinical importance of improvements in the dialysis group. When determining whether to start dialysis or choose conservative treatment, healthcare providers may take into account variables such the degree of renal failure, hemodynamic stability, and responsiveness to initial management²⁰.

Pregnancy-related acute renal failure (PRARF) has been associated with maternal death rates in conservative group 1.3% and dialysis group 8%. Overall, the decline in maternal mortality brought on by PRARF is indicative of advancements in the field of obstetrics and highlights the need for ongoing initiatives to strengthen maternal health services, increase access to care, and encourage teamwork in the management of obstetric problems²¹. Improvement in renal function was observed in a considerable number of patients suffering from pregnancy-related acute renal

failure (PRARF), with 98.6% and 70% of cases improvement in both group. This is a promising discovery since it shows that supportive care, conservative management, and dialysis were successful therapies in faster recovery. Supportive methods like blood pressure control, hydration management, and attentive observation are common in conservative therapy. The dialysis group's 70% recovery rate were showed improvements in their renal function after receiving hemodialysis. For patients with severe renal impairment, dialysis is essential in eliminating waste materials and extra fluid from the blood, which supports kidney function²². In order to demonstrate the results without the need for renal replacement therapy, it is critical to identify PRARF early, initiate supportive measures promptly, and closely follow the patient. This is demonstrated by the conservative care group's high recovery rate²³.

CONCLUSION

In conclusion, renal failure and maternal difficulties interact intricately to cause PRARF. To get the greatest results, the management strategy whether conservative or incorporating dialysis should be customized to the unique clinical circumstances of each patient. Improving maternal and newborn health outcomes and reducing the hazards connected with PRARF require early detection, timely intervention, and comprehensive treatment.

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This article may be cited as: Abdullah SH, Aziz A, Kanwal S, Kousar S, Ahmad S, Ghani N: Pregnancy Related Acute Renal Failure: An Experience at a Tertiary Care Hospital. *Pak J Med Health Sci*, 2023; 17(12): 123-126.