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Frequency of Pregnancy related Acute Kidney Injury

Jalil Kamran[1], Abid Hussain[1], Amna Shakeel[1], Eraj Irfan[2], Muhammad Shahar Yar Khursheed[3], Shehzeen Baloch[2]

[1]Department of Nephrology, Sheikh Zayed Hospital, Rahim Yar Khan, Pakistan.
[2]Department of Obstetrics and Gynaecology, Shaikh Zayed Hospital, Rahim Yar Khan, Pakistan
[3]Department of Urology, Chaudhary Muhammad Akram Teaching & Research Hospital, Lahore, Pakistan.

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Correspondence to: Jalil Kamran, Department of Nephrology, Sheikh Zayed Hospital, Rahim Yar Khan, Punjab, Pakistan.
Email: jalillegharI412@gmail.com

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ABSTRACT

Introduction: Acute kidney injury in pregnancy carries significant risk for maternal & fetal well-being. Over the last couple of decades the frequency of pregnancy related acute kidney injury has significantly reduced around the globe & especially in the developed world, owning to considerable improvement in ante-natal and overall health-care facilities. However, unlike the developed world, the prevalence of Pregnancy Related Acute Kidney Injury (PR-AKI) in the developing world is still high and in double digits in some of the underdeveloped countries due to poor health-care facilities pertinent to antenatal care. **Methodology:** This study has descriptive cross-sectional design. Therefore, considering the nature of empirical investigation, data was collected at Nephrology & Gynaecology & Obstetrics indoor and outdoor patient departments, Sheikh Zayed Medical College and teaching hospital, Rahim Yar Khan, from January 1 to 30, May 2025. A total number of 101 pregnant women were enrolled in the study using non-probability consecutive sampling, based on established inclusion and exclusion criteria. The Participants were monitored throughout pregnancy and up to six weeks postpartum to identify cases of PR-AKI. **Results:** The mean age of participants in the study was 25.35 ± 4.05 years. PR-AKI was diagnosed in 10 patients (9.9%), while the remaining 91 patients remained free of renal complications. The majority of acute kidney injury cases occurred due to late trimester or postpartum period complications, with postpartum hemorrhage identified as the most common contributing factor. **Conclusion:** The frequency of pregnancy-related acute kidney injury in this cohort was around 10%, with postpartum hemorrhage emerging as the predominant cause. Early identification and management of high-risk obstetric conditions may help reduce the burden of PR-AKI.

INTRODUCTION

Acute kidney injury is a sudden decline in kidney function which leads to deterioration of renal function. Acute kidney injury in pregnancy has proven to be a major contributing factor for adverse maternal and fetal outcomes, however, owning to significant progress in healthcare facilities in last couple of decades the around the globe, the incidence of pregnancy related Acute kidney injury has reduced from 7% to 4.68% between 2004-2014 [1]. Pregnancy related Acute kidney injury is complex disorder having wide range of causes and clinical symptoms of mild to severe intensity which can manifest at any stage of pregnancy [2]. Early trimester complications which may predispose to Acute kidney injury are septic abortion & hyperemesis gravidarum while in late trimesters conditions like HELLP syndrome, Thrombotic microangiopathy, post-partum hemorrhage & puerperal sepsis are the major causes of pregnancy associated acute kidney injury [3]. Comparatively, the frequency of PR-AKI is much high(4-26 %) in developing part of the world compared to the developed one (1.0-2.8 %) [4]. A nation-wide study conducted across 25 hospitals of China between 1/1/2013 to 31/12/2015 showed that out of total pregnant women (n = 10,920) included in the study about 7.3% (n = 795) pregnant women had the incidence of Acute kidney injury [5]. Similarly, as per an Indian study PR-AKI indicators , the frequency of PR-AKI drastically reduced from 15% in 1980 to 1.5 % in 2010 among admitted patients [6]. Other than imposing the financial burden of dialysis on resource-scarce countries it also carries a significant risk to the progression of Chronic Kidney disease [7]. A local study conducted in 2023 showed that in cases of Pregnancy-related AKI 14% patients had persistent renal failure meanwhile 7% patients showed partial recovery [8] . Additionally, it has been seen as well that babies born to women with underlying pregnancy-related AKI are premature, having comparatively lower birth weight and are at increased risk of peri-natal death [9]. The Burden of Pregnancy-related AKI on local Healthcare setup is still high. A recent

Pakistani study data revealed 11% to 36% of cases of PR-AKI during the last decade [10]. A study conducted at Sindh institute of Urology & Transplant (SIUT) between January 1990 to December 2014, found that there were 1,441 cases of Pregnancy-related AKI which was 25.62% of total Acute Kidney Injury cases brought to that institution [11]. Another study conducted at local level showed the incidence of Pregnancy associated Acute kidney injury as 7 percent [12].

Prompt diagnosis and timely initiation of treatment has significant role in the outcome of recovery from renal insult. In Pakistan there has not been carried out enough research work to determine the exact burden of this disease. This is the reason The current study has been undertaken to estimate the exact frequency of PR-AKI in our local setup. This study will not only highlight the true prevalence of pregnancy associated acute kidney injury but also help to tackle significantly avoidable pregnancy induced complications which usually predispose to acute kidney injury. This study will also pave a way to carry out relevant studies in future.

METHODS

This descriptive cross-sectional study was undertaken at in-patient and out-patient departments of Obstetrics & Nephrology from 1st January 2025 to 30th of June 2025. The WHO sample size calculator was employed to estimate the sample size of 101 by keeping in view the frequency of Acute kidney injury in pregnancy according to the previous studies conducted at local level. Confidence interval was set at 95 %. All pregnant patients aged between 15-40 years were included in this study. Patients with known history of DM, HTN or chronic kidney disease were excluded. Detailed information regarding age, duration of Pregnancy, Blood pressure variations, history of fits along with monthly monitoring of Hemoglobin levels, Liver Enzymes, Bilirubin levels, Platelets counts, PT/APTT, LDH, Blood sugar, urine output, Urinary protein-creatinine ratio & urea/creatinine were recorded till 6 weeks postpartum. RIFLE criteria was applied to label Acute Kidney injury whenever there was rise in serum creatinine twice the range of normal level, GFR reduction by 50 percent, or reduction in urine output less than <0.5 ml/kg per hour for 12 hours.

Results

In the sample size of 101 pregnant women the mean age was 25.35± 4.05 years. Whereas mean duration of pregnancy was 4.78±1.78 months.

Table 1

Demographic & clinical variables

Age	No	%
18-30	78	77.2
30-40	23	22.8
Duration of Pregnancy(months)		
< 4	41	40.6
>4	60	59.4
Acute Kidney Injury Detection		
Yes	10	9.90
NO	91	90.1

Table 2

Stratification of Acute Kidney injury cases according to the complication of Pregnancy

Complication	No of cases
Septic Abortion	01
HELLP	02
AFLP	01
Puerperal Sepsis	02
PPH	04
Total	10

Table 3

Stratification of Acute Kidney Injury Cases According to Age & Duration of Pregnancy

Variable	Acute Kidney Injury		P Value
Age(years)	Yes	No	
18-30	5	73	0.0455
30-40	5	18	
Duration of Pregnancy (months)			
<3	1	40	0.0454
>3	9	51	

Out of 101 total pregnant females 10 females (9.90%) developed Acute kidney injury while the others 91 females' patients didn't meet the criteria of Acute kidney injury. Data analysis showed that majority of the cases of Acute Kidney injury were due to late trimester and post-partum complications of pregnancy i.e., HELLP, puerperal sepsis & post-partum hemorrhage. Participants falling within the age group of 30-40 years had comparatively higher incidence of PR-AKI cases. Post-Partum hemorrhage stood out to be the most common contributing factor among the causes of Acute kidney injury in this study. Among total 10 cases of acute kidney injury 4 (40 % of total) were due to post-partum hemorrhage.

DISCUSSION

Pregnancy is marked by numerous hemodynamic and biochemical changes which may predispose a pregnant female to incur the risk of Pregnancy associated Acute kidney injury. Incidence of Acute renal injury in pregnancy not only compromises maternal and fetal well-being but also put them at risk of later complications. Previous literature review showed that the frequency of Acute kidney Injury in pregnancy remained between 7-14 percent[8,12]. However, in this study the frequency of found to be around 10%. Moreover, the study results also showed Post-Partum Hemorrhage to be the major cause of Acute renal injury in this study (40%). Our study results also revealed that majority of the obstetrics complications which led to Acute kidney injury were of late 2nd & 3rd trimester origin, & these complications particularly occurred in older maternal age group (30-40 years) perhaps due to comparatively increased risk of obstetric complications. This was in consistent to the findings of the studies reported from other developed & developing countries [13]. A study carried in England showed that despite reduction in the overall incidence of pregnancy related acute kidney injury in England between 1998-2017, the frequency of Post-Partum Hemorrhage as a leading cause of AKI remained the same during the said period between 1998-2017[14]. As per statistics, the frequency of Pregnancy related Acute kidney has seen major reduction not only in developed countries but also

in developing countries during the last 3-4 decades. Among South Asian Countries, *as reported in a study*, China has witnessed impressive improvement with rates of PR-AKI dwindling to 0.2-1.8 Percent [15]. Higher incidence rates of Pregnancy related AKI are associated with socioeconomic consequences especially in resource scarce under-developed countries. Previously published literature showed that only 70 percent of Patients with history of Pregnancy related AKI achieved completely recovery of renal function while the rest either attained partial recovery or became Hemodialysis dependent [16]. A Study conducted at a local setup in India showed that pregnancy related AKI carries 14 percent risk of maternal mortality [17]. Likewise a study conducted in Nigeria found that due to Pregnancy related AKI about 1.8 percent of total participants incurred Chronic Kidney Disease stage-4 & around 2.7 percent participants landed to End stage kidney disease [18]. Acute Kidney injury in pregnancy also poses a danger to fetal well-being according to its stage severity. This was reported in a study carried out in Lucknow, India, that pregnancy related AKI stage-lll was associated with (37.7%) cases of Stillbirth/IUD[19]. However, in our study late trimester and post-partum complications (i.e., PPH 40% of AKI) of pregnancy were among the leading causes of acute kidney injury. Similar trend was shown in a study conducted in Nigeria in which Obstetrics hemorrhage was the major cause (66.7 %) of AKI in pregnancy [20] . Majority of these late trimester causes can be prevented with regular antenatal visit, prompt identification of the ante & Post-Partum complications, availability of expert healthcare professionals & facilities, and vigorous treatment.

CONCLUSION

According to the available data, the frequency of Pregnancy associated acute kidney injury has seen considerable decline over last four decades globally. Yet there lies a significant difference when it comes to comparison between developed and developing countries. This gap can be further reduced by imparting awareness in community regarding antenatal care, prompt identification of each trimester complications, availability Skilled birth attendance, & institutional deliveries.

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