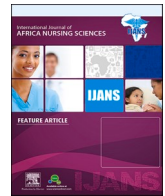


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## Prevalence of postpartum acute kidney injury among patients undergoing hemodialysis at Edward Francis Small Teaching hospital

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### ABSTRACT

**Background:** Postpartum acute kidney injury is a critical condition that can pose a great challenge to the health of pregnant women and can have fatal consequences (Patel, Rekha Sachan, Radheshyam, and Pushpalata Sachan, 2013)

**Objective:** The main objective is to find out the prevalence of acute kidney injury among patient undergoing hemodialysis treatment at EFSTH.

**Methodology:** The research is a retrospective cross-sectional study in which the data was collected from the main register of the hemodialysis unit. The sample includes patients diagnosed with postpartum acute kidney injury from January 2018 to December 2019. A checklist was used as a guide for the data collection on the age, gravida, parity causes and outcomes of hemodialysis treatment. SPSS version 20 was used to analyze the data and the results. Ethical approval was sought from the EFSTH research and ethical committee.

**Results:** The main finding of the study has shown that the prevalence rate of postpartum acute kidney injury is 23 (21.3%). The mean age of the patients diagnosed with postpartum related acute kidney injury was 29.22 while the mean parity was 3.3. The youngest patient was 15 years old and the oldest patient was 40 years of age. The majority of the patients are multigravida 18 (78.3%). Pre-eclampsia, as a cause was found, to constitute more than half of the postpartum acute kidney injury constituting about 12 (52.2). Maternal mortality among the group was 5(21.7%). The rest of the patients 11(47%) successfully regain renal function and were discharged. There was no a significant relationship between the causes of acute kidney injury and the outcomes as well as the gravidas and outcomes with p values more than 0.05.

**Conclusion:** There is a high prevalence of postpartum acute kidney injury among patient undergoing hemodialysis treatment in EFSTH.

### 1. Introduction

Acute Kidney injury can be defined by a rapid (over hours to days) decline in the glomerular filtration rate (Mir et al., 2017). The first consensual definition was developed in 2002 by a group of nephrologists and intensivists. They form a group called the Acute Dialysis Quality Initiative (ADQI). From their meeting, they developed the Risk, Injury, Failure, Loss of Kidney Function, and End-stage Kidney Disease (RIFLE) classification for the definition of acute kidney injury (Bellomo et al., 2004). Postpartum acute kidney injury is a critical condition that can pose a great challenge to the health of women and can have fatal

consequences (Patel et al., 2013). A major cause of Kidney Injury in developing countries is due to pregnancy-related complications and it is said to cause 15–20% of the total acute kidney injury cases (Bharani et al., 2014). There has been a decline in the incidence and mortality associated with pregnancy-related acute kidney injury in developed countries from 40 to 20% in 1960 to 10% in recent times (Mir et al., 2017). However, the incidence of acute kidney injury is still high in developing countries, with morocco experiencing an incidence rate of 6.6 per 10,000 deliveries (Arrayhani et al., 2012). The overall incidence in developing countries is said to be around 4.5–15% (Goplani et al., 2008). Acute renal injury can be a major source of morbidity and

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mortality and it is more often due to pregnancy-related diseases (Jonard et al., 2014). The major causes of acute kidney injury in low-resource countries are maternal and puerperal sepsis, which mainly happens in the first trimester while other causes such as preeclampsia, elevated liver enzyme, and low platelet count (HELLP) syndrome, acute fatty liver disease of pregnancy and postpartum haemorrhage tend to happen in the third trimester.

Pregnancy can be challenging and can lead to women requiring critical care in certain instances. It is believed that up to 1% of pregnant women do require critical care in low and middle-income countries (Soubra & Guntupalli, 2005). The major disorders that lead to antenatal and postnatal women been admitted to intensive care units were postpartum haemorrhage, preeclampsia and related diseases and sepsis (Rios et al., 2012).

Patients with severe postpartum-related acute kidney injury usually require hemodialysis therapy. Despite the reduced incidence of pregnancy-related acute injury, 30% of pregnant women in India conditions were severe enough to require hemodialysis treatment (Rao & Jim, 2018). With the improvement in obstetric care and septic abortion, there has been a dramatic reduction in pregnancy-related renal failure. However, the magnitude of this problem remains unknown in the Gambia due to the paucity of data and lack of adequate research that looks into the problem. Acute kidney injury in pregnancy and postpartum periods can significantly contribute to maternal morbidity and mortality in a country. The maternal mortality attributed to acute kidney injury in pregnancy in developing countries is still unacceptably high, with China and India reporting 4–5.8% of deaths related to this condition respectively (Liu et al., 2015; Prakash et al., 2016). The situation might be worst in the Gambia compared to India and China. Lack of knowledge about the contribution of pregnancy-related acute renal failure to the high maternal morbidity and mortality burden may stall efforts to reduce maternal mortality in the country.

This study aims to find out the prevalence of postpartum acute kidney injury among women undergoing hemodialysis treatment at Edward Francis Small Teaching Hospital (EFSTH). The study will shed light on the burden of this disease in the country since EFSTH is the only dialysis centre in the Gambia. Since this study is going to be the first study to look at this particular problem it may serve as an impetus for a nationwide study to find out the burden of postpartum acute renal failure in the country. This study can also influence policy and strategy formulation as the findings shall be made available to relevant authorities in the country.

### 1.1. Aim

To assess the prevalence of postpartum acute renal failure among patients undergoing hemodialysis treatment at EFSTH

### 1.2. Objectives

- To describe the demographic characteristics of patients undergoing hemodialysis treatment at EFSTH
- To describe the major causes of postpartum acute kidney injury among this patient
- To find out the outcome of patients diagnosed with postpartum acute kidney injury undergoing hemodialysis

### 1.3. Methodology

This study was a retrospective cross-sectional study design that collected data from patient records at the hemodialysis unit. The study population comprised patients admitted at the hemodialysis unit from January 2018 to December 2019. This included patients diagnosed with postpartum acute renal failure during the period and are receiving maintenance hemodialysis therapy.

The data was collected from the patient register at the hemodialysis

unit of EFSTH. Patients folders and antenatal records were reviewed to obtain additional information about the patient.

The data were collected on demographic variables such as age, parity, and gravida. It also included disease conditions that caused postpartum acute kidney injuries such as pre-eclampsia, eclampsia, HELLP syndrome, puerperal sepsis and other infections. The outcome characteristics that were measured include the discharge from hemodialysis treatment (recovery of full renal function), patients requiring chronic hemodialysis (meaning patient has developed end-stage renal diseases) and finally death.

The data was processed and entered into SPSS version 20 for analysis. A descriptive statistical analysis was conducted and the results were presented as mean and in percentages. A Chi-Square test was done to determine the association between the demographic variables and outcomes of hemodialysis treatment.

## 2. Results

A total of 108 patients were admitted for dialysis treatment from January 2018 to December 2019. Out of this 23(21.3%) had postpartum related acute renal failure/injury. The mean age of the patients diagnosed with postpartum related acute renal failure/injury was 29.22 while the mean parity was 3.3. The youngest patient was 15 years old and the oldest patient was 40 years of age. The majority of the patients are multigravidas 18 (78.3%) and 5 (21.7%) are primigravidas as shown in Table 1.

Table 2 below shows the causes of acute kidney injury among the patients admitted for hemodialysis. Pre-eclampsia, as a cause was found, to constitute more than half of the postpartum acute kidney injury 12 (52.2%). Four 17.4% had eclampsia, 3 patients 13.0% had abruptio placenta. Severe anaemia and HELLP syndrome constitute 8.7% respectively.

All the patients received hemodialysis treatment and the maternal mortality among the group was 5(21.7%). Four (17.4%) patients ended up developing End-stage renal failure and would require chronic maintenance hemodialysis since it is the only form of renal replacement therapy in the Gambia. Three (13%) discharge themselves from the hemodialysis treatment without regaining full recovery. The rest of the patients 11(47%) successfully regain renal function and were discharge from hemodialysis treatment. Among the mortality cases, preeclampsia and eclampsia share equal percentages each constituting 2(40%) while abruptio placenta contributed 1(20%) to the mortality. The data is presented in Table 3.

A chi-square test was done to determine the relationship between the variables and the outcome of dialysis treatment. There was no significant relationship between the causes of acute kidney injury and the outcomes as well as the gravidas and outcomes as shown in Table 4 below

## 3. Discussion

This study looks at the prevalence of postpartum acute kidney injury among patients receiving intermittent and maintenance hemodialysis treatment at the Edward Francis Small Teaching Hospital. The youngest mother among the patients was 15 years while the eldest was 40 years old. The same age range of 15–40 years was reported by (Arrayhani

**Table 1**  
Demographic characteristics of the study patients.

Variables	Mean	N(%)
age	29.22	
gravida	3.65	
parity	3.17	
Multigravida		18(78.3)
primigravida		5(21.7)

**Table 2**  
Causes of Acute Renal Failure/injury.

Causes	Count	Column N %
pre-eclampsia	12	52.2%
HELLP syndrome	2	8.7%
abruptio placenta	3	13.0%
eclampsia	4	17.4%
severe anaemia	2	8.7%

Note: HELLP = Haemolysis elevated liver enzymes low platelets.

**Table 3**  
The outcome of hemodialysis.

Outcome	No (%)
recovered	11(47.8)
ERSD	4(17.4)
died	5(21.7)
Left hemodialysis	3(13.0)

Note: End-stage renal disease

**Table 4**  
Association between causes, demographic variables and outcomes of hemodialysis treatment.

Variables	Recovered n (%)	ESRD n (%)	Died n (%)	Left treatment n (%)	P-value
<b>Causes</b>					0.442
pre-eclampsia	7(63.6)	2(50)	2(40)	1(33.3)	
hellp syndrome	0(0)	1(25)	0(0)	1(33.3)	
abruptio placenta	1(9.1)	1(25)	1(20)	0(0)	
eclampsia	2(18.2)	0(0)	2(40)	0(0)	
severe anemia	1(9.1)	0(0)	0(0)	1(33.3)	
<b>Gravidas</b>					0.231
multigravida	8(72.7)	2(50)	5(100)	3(100)	
primigravida	3(27.3)	2(50)	0(0)	0(0)	
<b>Age</b>					0.663
<30	5(45.5)	1(25)	2(40)	2(66.7)	
greater than30	6(54.5)	3(75)	3(60)	1(33.3)	

et al., 2012; Makusidi et al., 2016). This finding indicates that teenage pregnancy mostly due to early marriage is still existing in the Gambia despite the Ban (Nabaneh, 2018). The majority of the respondents are multigravida and multiparity also highlights the high fertility rate in the Gambia, which is reported to be 4.4 (The Gambia Bureau of Statistics, 2021).

The prevalence of postpartum acute renal failure was 21.3% among the patients undergoing hemodialysis at the Edward Francis Small Teaching Hospital. This prevalence is quite lower in the Gambia as compared to studies done in India 60–70% (Arora et al., 2010; Eswarappa et al., 2016). Some studies done in other developing countries look at the incidence of postpartum acute renal failure and found out the incidence rate of 4.27 (Jonard et al., 2014; Mir et al., 2017). The major cause of postpartum acute renal failure was Pre-eclampsia, which constitute more than half of the 12 (52.2%). Four 17.4% had eclampsia, 3 patients 13.0% had abruptio placenta. Severe anaemia and Haemolysis elevated liver enzymes low platelets (HELLP syndrome) constitute 8.7% respectively. In contrast to studies done in many developing countries, sepsis was the leading cause of postpartum acute renal failure (Bharani et al., 2014; Eswarappa et al., 2016; Tanwar et al., 2018), while other studies show that postpartum haemorrhage is the leading cause of acute renal failure (Hassan et al., 2009; Jonard et al., 2014; Tanwar et al., 2018).

The maternal mortality among the patient with postpartum acute kidney injury undergoing hemodialysis was 5(21.7%). This was quite

high and is similar to other researches done in other developing countries like India and Pakistan (Bharani et al., 2014; Eswarappa et al., 2016; Mir et al., 2017). This high incidence may be because acute renal failure has already been established to be associated with a high mortality rate (Johnson et al., 2013; Wiggins & Johnsons, 2012). The high mortality among these patients undergoing hemodialysis patient might be due to the lack of effective hemodialysis treatment due to constant lack of materials and a shortage of adequately trained nephrologist nurses. Despite the high mortality the recovery rate was quite good as 11 (47%) successfully regain renal function and were discharge from hemodialysis treatment. A recovery rate of 54.8% was seen among patients with postpartum acute kidney injury in a study done by (Goplani et al., 2008). The study also discovered that majority of the patients that died are above the age of 30 as well as being multigravida. Preeclampsia and eclampsia constitute the major cause of mortality. Preeclampsia and eclampsia are hypertensive disorders of pregnancy and are among the major causes of maternal mortality globally (Filippi et al., 2016).

### 3.1. Limitation of the study

This study is the first kind of study done in The Gambia and its look at the prevalence of postpartum acute kidney injury among patients undergoing haemodialysis treatment as well as the outcome of postpartum acute renal failure. The study would have been interesting and would find out the magnitude of the problem of postpartum kidney injury if both prevalence and incidence studies were carried out.

### 3.2. The implication of the study to nursing practice

This study highlights the prevalence of postpartum acute kidney injury in the Gambia. It has shown that most of the causes of postpartum acute kidney injury are preventable. The study would create awareness among nurses and midwives about the causes of postpartum acute kidney injury. This will make them employ preventive strategies such as providing improved antenatal care service, encouraging women to do the early booking as well as carry out more health education about the causes of postpartum acute kidney injury.

The study will also improve the practice as it will enable nurses to take extra precautions and provide effective management of patients with risk factors of postpartum acute renal injury.

## 4. Conclusion

There is a high prevalence of postpartum acute kidney injury in the Gambia and it has a high maternal mortality rate. Preeclampsia has been identified as the major cause of postpartum acute kidney injury among this patients.

### 4.1. Recommendations

Patients who develop pregnancy complications that lead to postpartum acute kidney injury are usually in critical conditions and they always require intensive care. Therefore, nurses and midwives require capacity building to become critical care nurses and midwives to provide high-quality care for these patients.

Midwives should be providing more comprehensive antenatal services to pregnant women during antenatal visits.

More research should be done on the pregnancy related complications that usually lead to postpartum acute kidney injury among pregnant women in The Gambia.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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