

# Acute Kidney Injury Epidemiological Aspects in Gravido-Puerperal Period in Parakou

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Received date: October 10, 2017; Accepted date: October 20, 2017; Published date: October 28, 2017

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## Abstract

**Introduction:** Pregnancy related Acute Kidney Injury (AKI) accounts for a heavy fetal and maternal mortality and morbidity.

**Objective:** The purpose is to study the epidemiological aspects of Acute Kidney Injury in gravido-puerperal period.

**Patients and method:** It was a cross-sectional, descriptive and analytical study conducted in the city of Parakou from 1<sup>st</sup> March to 31<sup>st</sup> August 2016. Data collection was carried out on prospective basis. Patients included in the study were new and expectant mothers to day 41 post-partum seen in hospital with the concept of previously normal kidney function. Acute Kidney Injury (AKI) is defined according to the criteria of Acute Kidney Injury Network (AKIN) by elevated serum creatinine 3 mg/l or 1.5x baseline serum creatinine.

**Results:** Among 324 women included in the study, there were 38 cases of AKI representing 11.73%. The mean age was 24.15 ± 6.55 years with 15 and 44 as extremes. The age group 20-25 years represented 31.56% of cases. 31.56%, 44.71%, 63.12%, 31.56% and 31.56% of the women respectively had secondary education, were crafts women, bigravida, nulliparous and biparous. 47.34% of the respondents were in the 3<sup>rd</sup> quarter of pregnancy, 55.23% had poor fruits and vegetables diet, 57.86% took herbal tea regularly, 55.23% were physically inactive during gestational period, 36.82% developed hyperemesis gravidarum, 44.71% had oliguria, 42.08% high blood pressure and 28.93% proteinuria. Proteinuria prevalence was significantly high in women with edema (45.68% with p=0.000).

**Conclusion:** AKI is frequent in gravido-puerperal period in Parakou. It is a multifactorial disorder which requires special care through screening.

**Keywords:** Acute kidney injury; Pregnancy; Creatinine; Public health; Metabolic acidosis

determine the factors associated with AKI in gravido-puerperal period in Parakou.

## Introduction

Acute Kidney Injury (AKI) is known as the sudden decline in the glomerular filtration rate (GFR). It is usually reversible in patients with normal kidney function and those affected by preexisting chronic nephropathy. It cuts across all social classes [1]. AKI is a real public health issue considering its burden and severity, especially in pregnant women [2]. Its incidence varies from one geographical region to another. In India in the year 2010, pregnancy related AKI represented over 20% of all AKI cases [3].

In Senegal in 2006, pregnancy related AKI accounted for 50% of adult AKI and occurred in the 3<sup>rd</sup> quarter of pregnancy more often than not. The maternal and fetal vital prognosis depends on how early it is diagnosed and the swiftness of the treatment [4]. To do this, there is need to search associated factors. The purpose of this study is to

## Patients and Study Methodology

It was a cross-sectional, descriptive and analytical study conducted in the city of Parakou from 1<sup>st</sup> March to 31<sup>st</sup> August 2016. Data collection was carried out on prospective basis. Patients included in the study were new and expectant mothers to day 41 post-partum, with kidney function previously known as normal. They all attended prenatal or postnatal consultation in the city of Parakou.

Acute Kidney Injury (AKI) is defined according to the criteria of Acute Kidney Injury Network (AKIN) by elevated serum creatinine 3 mg/l or 1.5x baseline serum creatinine [5]. New and expectant mothers with chronic kidney disease or those undergoing hemodialysis were excluded. All patients who did not give their informed consent were also disqualified. The sample size was calculated based on Schwartz formula and it was estimated at 216 pregnant women.

The sampling was comprehensive. The health structures were selected through simple random sampling without replacement of five public health structures among the 10 operational during the study period, using EPI Table module (EPI 6). The public health structures selected included HIA/Parakou, CHUD/Borgou, Parakou Community Health Clinic (CSCoM), Kpébié Health Center (CS) and Banikanni Health Center (CS).

Then, the second step consisted in extensive recruitment of pregnant women admitted during the study period. Socio-demographic, behavioral and clinical data were collected. A questionnaire was used for the purpose of data collection. Data processing and analysis was carried out through Excel 2007 and Epi Info Version 7 with a significance threshold  $p < 0.05$ .

### Outcomes

During the study period, 38 women out of 324 had Acute Kidney Injury representing 11.73% prevalence with serum creatinine extremes ranging from 12.51 to 54 mg/L. The mean age was  $24.15 \pm 6.55$  years (15 and 44 years as extremes).

About 31.56% of cases represented the age group 20-25 years. Table 1 highlights the distribution of AKI patients in accordance with the socio-demographic characteristics (Table 1).

Age group (years)	Total	Percentage (%)
15 - 20	4	10.52
20 - 25	12	31.56
25 - 30	11	28.93
30 - 35	7	18.41
35 - 40	3	7.89
35 - 45	1	2.63
Level of Education		
No schooling	9	23.67
Primary education	11	28.93
Secondary education	12	31.56
Higher education	6	15.78
Marital Status		
Married	32	84.16
Single	2	5.26

**Table 1:** Distribution of IRA patients in accordance with the socio-demographic characteristics (N=38).

Table 2 highlights the distribution of IRA patients in accordance with personal history and lifestyle. Among the patients, 14 (36.84%) developed hyperemesis gravidarum, 10(26.32%) diarrhea and 04 (10.52%) post-partum or pregnancy-induced bleeding.

With regard to micturition disorders and diuresis, we recorded 17 cases (44.74%) of oliguria, 05 cases (13.16%) of dysuria, four cases (10.52%) of burning urination, 02 cases (5.26%) of urinary retention,

02 cases (5.26%) of urinary incontinence and 03 cases (7.89%) of urinary urgency (Table 2).

Proteinuria was significantly associated with Acute Kidney Injury. Women with proteinuria +++ were 10.79 times more exposed to the risk of experiencing Acute Kidney Injury than those with no proteinuria with  $p < 0.001$  (Table 3).

Variables	Total (N)	Percentage
Personal History		
HBP*	2	5.26
Gout	6	15.78
Surgical records	4	10.52
Gravidity		
Primigravida	13	34.19
Bigravida	24	63.12
Multigravida	1	2.63
Parity		
Nulliparous	12	31.56
Primiparous	10	26.3
Biparous	12	31.56
Multiparous	4	10.52
Gestational Age		
1 <sup>st</sup> quarter	7	18.41
2 <sup>nd</sup> quarter	5	13.15
3 <sup>rd</sup> quarter	18	47.34
Post-partum	8	21.04
Pregnancy outcomes		
Birth	34	89.42
Miscarriage	4	10.52
Lifestyle		
Regular intake of alcohol	13	34.19
Self-medication	5	13.15
Regular intake of herbal tea	22	57.86
Physical inactivity during gestational period	21	55.23
Poor fruits and vegetables diet	21	55.23

**Table 2:** Distribution of pregnant women with AKI in accordance with personal history and lifestyle (N=38) [\*HBP: High Blood Pressure].

The women with altered health status (04/05) experienced acute kidney injury 50 times more than those with good health status (IC 95%=0.0-0.27,  $p < 0.001$ ).

The respondents who had fever (04/10) and high blood pressure (16/29) were respectively 5.49 times (IC 95%=1.47-20;  $p = 0.02$ ) and

15.7 times (IC 95%=6.52-35; p<0.001) more exposed to acute kidney injury.

Proteinuria	n	Acute Kidney Injury		OR	IC 95%	P-value
		Yes	Percentage (%)			
0	286	27	9.44	1	-	-
+	17	0	0	-	-	0.37
++	6	2	33.33	4.79	[0.83-27.4]	0.11
+++	15	9	60	10.79	[3.84-30]	<0.001

**Table 3:** Correlation between the urine test strip data from the respondents and Acute Kidney Injury (AKI), Parakou 2016 (n=324).

## Discussion

AKI prevalence was 11.73%, which is significantly higher than 4.3% recorded by Sivakumar et al. in India in 2009 [6], whereas in 1987 in the same country, the incidence of pregnancy-related AKI was 15% [7]. The respondents mean age was 24.15 years  $\pm$  6.55 years with 15 and 44 years as extremes. Therefore, it was a relatively young and working population. This mean age is lower than 29  $\pm$  6 years recorded in Pakistan by Namrata et al. [7]. About 84.21% of the respondents were living a married life. The patients' age and social considerations requiring a person of the average age group of this study to be married, may account for this result. Primigravida and bigravida patients represented respectively 34.19% and 63.16%. In Pakistan, Namrata et al. observed that 7.5% of the patients were primiparous women and 17.5% multiparous [7]. In this study, women were younger and experienced only a few pregnancies. AKI was much more observed in the 3<sup>rd</sup> quarter (12.08%) and in post-partum (25.81%) period. The findings were similar in Morocco where AKI was frequently recorded in the 3<sup>rd</sup> quarter (61%) and in post-partum period (22%) [8]. In Pakistan, Namrata et al. pointed out that the majority AKI cases occurred in the 3<sup>rd</sup> quarter (86%) [7]. Consequently, it could be said that in most cases, Acute Kidney Injury occurs in the 3<sup>rd</sup> quarter and in post-partum period.

AKI was higher in patients with low fruits and vegetables intake. In United States, Solomon et al. indicated that a diet rich in fruits and vegetables would be as effective as the intake of specific food supplements to fight the metabolic acidosis responsible for exposure to kidney disease [9]. About 5.26% of the patients had HBP. In Fez, 55.6%

of the respondents had HBP with 152  $\pm$  38 mmHg and 90  $\pm$  28 mmHg respectively as average systolic and diastolic blood pressure [8]. This variation could be attributable to the fact that the study included parturient women and pregnant women regardless of the gestational age. Among our respondents, 17 women or 44.74% had oliguria. In Morocco in Fez, 37% of the patients had oligoanuria [8]. In Turkey, oliguria was recorded in all patients with AKI while in Pakistan in 2008, it was present in 83% of women [10]. Oliguria is then the most frequent type of diuresis in AKI during gravido-puerperal period. Among the patients, 11 (28.95%) had proteinuria. This figure was higher than the one recorded by Dioufetal (18.36%) in Senegal [11].

## Conclusion

Our study reveals that the prevalence of Acute Kidney Injury is high during gravido-puerperal period. Several factors contribute to its occurrence. The patients' follow-up requires special care and screening of associated factors for better management.

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