

Frequency of Preeclampsia Induced Acute Kidney Injury

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ABSTRACT

Objective: The purpose of this study is to ascertain the prevalence of preeclampsia-related acute renal injury among patients who report to a tertiary care facility.

Methodology: This Cross-sectional study was conducted at King Edward Medical University and allied hospitals in Department of Nephrology/Mayo hospital Lahore and department of Gynecology, Lady Atchison Hospital Lahore, affiliated with King Edward Medical University. After obtaining the patient's informed consent, if the patient is able to give it; otherwise, consent was obtained from the attending guardian; the study included all 180 pregnant females with acute kidney disease who were in the third trimester of pregnancy and were presenting for delivery. Patients' ages ranged from 15 to 50 years. Women who were pregnant and had a blood pressure reading that was greater than 140/90 mmHg after 20 weeks of pregnancy and who had proteinuria on a urine dipstick examination were recorded. This information was taken from a previous record. The laboratory at King Edward Medical University and Mayo hospital in Lahore was where all of the investigations were carried out. Following the establishment of a diagnosis, the patients were then treated in a hospital environment in accordance with the protocols.

Results: Patients' mean ages were 30.21+5.35, their mean blood pressure was 154.27+108.15 mm Hg, their mean serum creatinine was 4.39+0.28 mg/dl, the mean frequency of urine protein was 112.22 percent, and the mean frequency of preeclampsia-induced AKI in pregnancy was 26.11 percent.

Conclusion: This research led me to the conclusion that preeclampsia-induced acute kidney damage occurs frequently and must be detected and treated effectively to prevent maternal mortality and morbidity and to improve foetal outcome. A nephrological workup should be performed on women with pre-eclampsia if their proteinuria and hypertension persist longer than 6-8 weeks after delivery.

Keywords: Pre-eclampsia, acute kidney injury, frequency

INTRODUCTION

Acute kidney injury during pregnancy is a potentially fatal disorder.¹ Pregnancy-related kidney problems can arise from a wide variety of factors. Pre-eclampsia is the most prevalent renal condition in the second half of pregnancy, whereas urinary tract infections are the most common renal issue in the first half of pregnancy.² Acute kidney injury (AKI) is defined as a decrease in kidney function over the course of 48 hours, as shown by a rise in serum creatinine of more than 0.3 mg/dl, an increase in serum creatinine of more than 50%, or the onset of oliguria.³

It is estimated that one in 20,000 pregnancies in developed countries may result in a pregnancy-related acute kidney damage severe enough to require dialysis treatment.^{4,5} The value of serum creatinine drops during pregnancy as a result of a number of physiological changes. Therefore, a creatinine result of 1 mg/dl indicates renal impairment for a pregnant woman, although same number is considered to be normal for women who are not pregnant.⁶ Preeclampsia is one of the factors that might lead to renal failure during pregnancy.⁷

At or after the 20th week of pregnancy, the presence of hypertension and substantial proteinuria in an otherwise healthy pregnant woman is considered to be preeclampsia.⁵ It is one of the most important factors that contribute to maternal mortality.² The incidence of acute kidney injury during pregnancy is 7.8%, while preeclampsia is reported to be a contributing factor in 21% of cases of acute renal injury during pregnancy.⁸

In order to alleviate patients' clinical symptoms, improve their clinical state, minimise maternal mortality and morbidity, enhance foetal outcome, and avoid its conversion to chronic kidney disease, it is crucial to have a thorough understanding of preeclampsia and its effects on the kidneys. While similar research has been conducted in nations like Canada and China, the demographics and socioeconomic factors of these countries are very different from those of the United States. Since there is a lack of information on the prevalence of preeclampsia-related acute renal damage in the Pakistani population, the results of this study will be useful in

filling that information gap. That way, maternal and foetal mortality and morbidity can be decreased by early detection and treatment.

King Edward Medical University and the Nephrology/Mayo hospital and the Gynecology/Lady Atchison hospitals in Lahore participated in this cross-sectional study. All 180 pregnant females with acute renal illness between 15 and 50 years old who appeared in the third trimester for delivery were enrolled in the experiment after informed permission was acquired from the patient or her guardian. Pregnant women with preexisting hypertension (before pregnancy or identified in early pregnancy, 20 weeks), and pregnant women with diabetes mellitus assessed by history and medical record with fasting Women were not included in the study if they had high blood sugar (defined as >126 mg/dL or a random blood sugar level >200 mg/dL), a kidney disease, a history of fits during pregnancy, or fits during childbirth due to any cause (including Eclampsia).

Pregnant females with Blood Pressure > 140/90mmHg after 20 weeks of pregnancy and laboratory investigation i-e proteinuria on urine dipstick examination (on previous record), were recorded. All investigations were done from laboratory of King Edward Medical University/Mayo hospital Lahore. After the diagnosis was made, the patients were treated according to the guidelines in hospital setting. The data was entered and analyzed using SPSS 20. Frequency and percentages were calculated for the qualitative variable i-e urinary Protein & preeclampsia induced AKI in pregnancy. Quantitative variables of the study like age, blood pressure and serum creatinine were expressed as Mean + SD. To control the effect modifier patients were divided in age groups 15-32 years and 33-55 years and severity of disease was used to compare the stratified groups. All the information was presented in the front of tables and groups. A p value <0.05 was considered as significant.

RESULTS

In our study, the mean age calculated as 30.21+5.35 years. Mean blood pressure of the patients was recorded as

154.27+108.15mmHg. Mean serum creatinine of the patients was calculated as 4.39+0.28 mg/dl.

Frequency of urinary protein was recorded as 62.22%(112) while 37.78%(n=68) had no urinary protein. (Table No. 1)

Frequency of preeclampsia induced AKI in pregnancy was recorded in 26.11%(n=47) while 73.89%(n=133) had no findings of the morbidity. (Table No. 2)

Table 1: Frequency of Urinary Protein (n=180)

Urinary protein	No. of patients	%
Yes	112	62.22
No	68	37.78
Total	180	100

Table 2: Frequency of Preeclampsia Induced Aki In Pregnancy (n=180)

Preeclampsia induced AKI	No. of patients	%
Yes	47	26.11
No	133	73.89
Total	180	100

DISCUSSION

No specific data in Pakistan regarding acute kidney injury is available, especially, frequency of preeclampsia induced acute kidney injury in our population so this study may help to find out the frequency of preeclampsia induced acute kidney injury in our population. So that it can be detected and managed timely and maternal and fetal mortality and morbidity can be reduced.

In our study, out of 180 cases, 65.56%(n=118) were between 15-32 years of age whereas 34.44%(n=62) were between 33-55 years of age, mean+sd was calculated as 30.21+5.35 years, mean blood pressure of the patients was recorded as 154.27+108.15mmHg, mean serum creatinine of the patients was calculated as 4.39+0.28 mg/dl, frequency of urinary protein was recorded as 62.22%(112) while 37.78%(n=68) patients did not have any proteinuria, frequency of preeclampsia induced AKI in pregnancy was recorded in 26.11%(n=47).

Gopalakrishnan N and others revealed that incidence of acute kidney injury in pregnancy is 7.8% and preeclampsia is found as a cause of acute kidney injury 21% of the causes.⁸ The findings of our study are in agreement with their study.

The incidence of pregnancy induced acute kidney injury is a more common problem in the developing nations.⁹ In the developed nations, the lesser incidence of this problem is due to the improvement in antenatal care,^{9,10} and the reduction of septic abortion due to its legalization.¹⁰ Socioeconomic factors contributing to Pregnancy induced acute kidney Injury in the underdeveloped countries are mainly due to poverty, poor obstetrics care, lack of proper healthcare facilities and awareness of the condition, delayed referral process, multiparity and the increasing population number.⁹

All over the world, a decline in the incidence of Pregnancy induced acute kidney injury was observed over the past 50 years.^{11,12} The incidence reduced from 20% to 40% in the 1960s to less than 10% in the recent years.¹⁰ An increased drop in the incidence was seen in the western countries such as countries in Europe and North America. Some studies summarized that the incidence of Pregnancy induced acute kidney Injury was 1.0%–2.8% in developed nations versus 4%–26% in developing nations.¹⁰⁻¹²

In the developed nations, a study done in France demonstrated a decrease in rate of Pregnancy induced acute kidney Injury from 40.0% to 4.5% over a 12-year period following the legalization of abortion. Nevertheless, not all studies reported similar results. A recent retrospective cohort study carried out in Canada illustrated that the incidence of obstetric Acute kidney injury was elevated in both Canada and the United States. The rate of Pregnancy induced acute kidney injury in Canada increased from 1.6 per 10 000 deliveries in 2003 to 2.3 per 10 000 deliveries in 2007. Data from the United States also showed that the rate increased from 2.3 to 4.5 per 10 000 deliveries over a 10-year

period between 1998 and 2008.¹³ The reason for the growing rate of Pregnancy induced acute kidney Injury, that is possibly not actual incidence, might be due to the increasing sensitivity of Acute kidney injury diagnosis with close obstetric observation, particularly in high risk pregnancy. Moreover, the incidence of dialysis required Pregnancy induced acute kidney injury also declined.¹⁵

Despite several small studies showing recovery of renal function after so-called pure pre-eclampsia,¹⁶ a population-based study from Norway suggested that women who had had pre-eclampsia were at a four-to-five-times increased risk of development of end-stage renal disease during a follow-up of 35 years.¹⁷ The risk was significant after exclusion of women with known kidney disease, diabetes, hypertension, or rheumatic disease before pregnancy. Other studies^{18,19} showed that pre-eclampsia was a significant risk marker for development of kidney disease, requiring a diagnostic kidney biopsy, but that previous pre-eclampsia was not associated with rapid progression of established kidney disease to end-stage renal disease, suggesting that pre-eclampsia is more strongly associated with the development of kidney disease than with subsequent progression. A Taiwanese study²⁰ also noted an increased risk of chronic kidney disease and end-stage renal disease in women with previous pre-eclampsia. In line with these findings, a meta-analysis concluded that women with previous pre-eclampsia had a four-times increased risk of microalbuminuria 5–10 years after a pre-eclamptic pregnancy compared with women without previous pre-eclampsia.²¹ This meta-analysis was, however, restricted by inclusion of small studies of variable quality and most of the women either had severe pre-eclampsia or underlying disease such as diabetes mellitus. Associations between pre-eclampsia and subsequent microalbuminuria, which suggest renal injury resulting from pre-eclampsia, need to be verified in large population-based studies.

Pre-eclampsia is probably an important cause of acute kidney injury and an important risk marker for subsequent chronic kidney disease. Women with previous pre-eclampsia should receive long-term follow-up, especially with respect to hypertension, insulin resistance, and obesity. However, pre-eclampsia might also unmask underlying primary renal disease, and women with pre-eclampsia should be monitored for proteinuria and hypertension within 6–8 weeks of delivery and have a nephrological work-up if these disorders do not resolve.

CONCLUSION

We concluded that the frequency of preeclampsia induce acute kidney injury is very high and it must be diagnosed and treated appropriately in time to reduce maternal mortality and morbidity and to improve fetal outcome. Women with pre-eclampsia should also be monitored for proteinuria and hypertension within 6–8 weeks of delivery and have a nephrological work-up if these disorders do not resolve.

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