

ORIGINAL ARTICLE

FREQUENCY OF DIABETES MELLITUS IN PATIENTS WITH ACUTE KIDNEY INJURY UNDERGOING CORONARY ARTERY BYPASS GRAFTING

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Background: Diabetes mellitus has a major role in developing acute kidney injury (AKI) in patients undergoing coronary artery bypass grafting (CABG). The study was conducted with the aim to determine the frequency of diabetics in patient developing AKI among patients undergoing CABG. **Methods:** This cross-sectional study included 120 consecutive patients from Punjab Institute of Cardiology who underwent CABG from March 2018 to May 2018. At the end 101 patients were included for analysis as the rest had missing data. SPSS-20.0 was used to analyse the data. **Results:** A total of 101 patients were analysed among whom, 52% developed AKI, 34 (33.6%) of the patients with co-morbidity of diabetes mellitus developed acute kidney injury whereas 20 (19%) of the patients without diabetes mellitus developed AKI (Odds Ratio=2.5, 95% CI 1.04 to 6.05, $p=0.024$). **Conclusion:** The study concluded that the risk of AKI is significantly higher among patients with diabetes mellitus undergoing CABG.

Keywords: Acute kidney injury (AKI); Coronary arteries bypass grafting (CABG); Diabetes mellitus

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INTRODUCTION

Diabetes mellitus is a major health issue associated with other co-morbidities and is a common cause of death and poor quality of life in the present era. The prevalence of diabetes mellitus is increasing globally. According to “International Diabetes Federation (IDF)”, the cases of diabetes mellitus will reach up to 592 million in 2035.¹ Diabetes mellitus is a disease of metabolic disorder which results from decreased or impaired function of insulin. This metabolic syndrome leads to hyperlipidaemia, obesity, hypertension and many other health disorders.² Diabetes provides synergistic effect for the development of vascular disorders. Coronary artery disease (CAD) is one of the strongest implications and almost 50% of it is always associated with diabetes mellitus.³

Chronic renal failure (CRF) is another complication of diabetes mellitus which often leads to end stage renal disease.⁴ About 20–40% of diabetic patients develop chronic kidney disease. Diabetes mellitus is an important factor in developing renal failure and leaving individuals to rely on dialysis and kidney transplant.⁵ Diabetic nephropathy increases mortality six folds in diabetic patients as compared to non-diabetic individuals.⁶

Diabetes mellitus has a major role in developing acute kidney injury in patients undergoing coronary artery bypass grafting (CABG).⁷ Diabetes mellitus is the most prevalent feature in patients undergoing CABG which lead to metabolic syndrome and acute kidney injury.⁸ Where as several

complications may occur after CABG like: stroke, cardiac tamponade and acute kidney injury. Moreover, 5–30% of patients undergoing CABG develop acute kidney injury.⁹ It was estimated in a study that 19% of post CABG patients with kidney disease developed myocardial infarction (MI) within 5 years whereas only 6% cases of MI were observed with normal kidney function.¹⁰

Minimal changes in postoperative (CABG) creatinine can be associated with adverse effects. It provides the basis for worsening of renal function, heart failure and further attacks of MI.¹¹ Studies have shown the association of postoperative acute kidney injury with chronic kidney disease, end-stage renal disease and mortality.¹² Although, diabetes mellitus is one of the most important factors in developing AKI after cardiac surgery, only a little information is available in literature. Acute kidney injury in post CABG patients can affect the recovery badly. Therefore, it needs to be evaluated further especially in our setup. The aim of this study is to explore the frequency of diabetes mellitus with AKI among patients undergoing CABG in our setup. The study can provide the basis for better patient management post-operatively, especially for the diabetic patients based on local evidence.

MATERIAL AND METHODS

This cross-sectional study was conducted in patients developing AKI in post CABG patients in which data was retrospectively collected at cardiac intensive care unit (CICU) of Punjab Institute of Cardiology Lahore. Data was collected from March to May 2018.

AKI was labelled by the measurement: an increment of 0.3 mg/dl or 50% increase in creatinine level, in comparison of preoperative level of creatinine".¹³ Preoperative serum creatinine checked one or two days before surgery and postoperative serum creatinine was taken as the highest level of creatinine till the hospital stay. The study included 120 consecutive patients who underwent CABG. Patients with missing data of preoperative creatinine and patients on dialysis were excluded from analysis. A total 101 patients were included in this study and their data analysed. Data was analysed using SPSS 20.0

RESULTS

The study results showed that the ages ranged from 45–60 years in patients undergoing CABG. Measured by BMI 74% of them were obese and overweight. The percentage of diabetic patients was high 53 (52%). Moreover, 60 (59%) of the patients were hypertensive and 66.3% were having co morbidity of hyperlipidaemia. Furthermore, 59% of the population was with 30–50% ejection fraction and 3–4 grafts were applied to 75% of them. About 52% of the total population developed AKI. The frequency of AKI was higher among diabetic patients with 34 (64%) of them developing AKI, whereas 20 (42%) non-diabetic patients developed AKI. (OR=2.5 95% CI 1.04 to 6.05, $p=0.024$) Patients with AKI were mostly males and those patients who had co-morbidity of hypertension.

DISCUSSION

The study findings summarized the frequency of diabetes mellitus in the development of AKI. Patients with diabetes mellitus who underwent CABG are more prone to develop AKI in comparison of non-diabetic patients. As CAD is dominant in male gender, majority of the study population is based on male and the prevalence of AKI is higher in male gender and those with hypertension.

The risk of AKI in patients undergoing CABG varies from 1–30% depending upon the existence of co-morbidities and some conditions.

These conditions include existence of diabetes mellitus, low ejection fraction, preoperative renal dysfunction, hypertension, hyperlipidaemia and long duration on heart lungmachine.¹⁵ This study illustrate that existence of diabetes mellitus increases the chance of AKI to 2 to 3times independently.

Diabetes mellitus is a major health issue and its poor management can impede to other health disorders like cardiovascular and renal diseases. Diabetes mellitus has become the 7th leading cause of disability, worldwide. Diabetes related expenditure make almost 50% of the total budget of global

healthcare system and a large part of this budget is invested on the potentially preventable complications.¹⁶

The current study has also proved that diabetes mellitus can increase the post CABG complications especially AKI and can prolong hospital stay and can increase the financial burden on healthcare system.

Studies have shown the association of diabetes mellitus with increased risk of complications in CABG patients. Renal failure is also another cause for increasing the vulnerability of morbidity and mortality in CABG surgery. The existence of diabetes mellitus in CABG patients decreases the life expectancy to a remarkable extent.¹⁴

CONCLUSION

The study concluded that the risk of AKI is markedly high in patients with diabetes mellitus undergoing CABG, in comparison of those without diabetes mellitus. The occurrence of AKI was high among male patients and those who have co-morbidity of hypertension. The patients with diabetes mellitus, hyperlipidaemia and low ejection fraction showed high vulnerability for the development of acute kidney injury.

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AUTHORS' CONTRIBUTION

NB: Conceptualization of study design, data collection and interpretation. SST: Data analysis, proof reading and quality check. KAD: Write-up of discussion and conclusion. WI: Write-up of introduction and literature.

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