

Original Article**Prevalence of diabetes mellitus in a cohort of CABG patients**¹Nadesan Sasiharan, ¹GAC.Amerasena¹Department of Cardiothoracic Surgery, Unit-1, National Hospital of Sri Lanka**Abstract**

Diabetes mellitus is a major comorbidity among patients awaiting coronary artery bypass surgery. A major burden of adult cardiac surgery is spent on coronary revascularization for myocardial ischemia, the most important cause of heart disease in adults worldwide.

The objectives were to explore the prevalence of diabetes in patients who are undergoing CABG in our unit. Identify the risk groups preoperatively and proactive optimize glycemic control.

The data collection was carried out among patients who are admitted for CABG in our unit at the National Hospital of Sri Lanka, Colombo. Pre-tested an interviewer-administered questionnaire used to collect the data.

In our study, we found a 55.4% prevalence of diabetes mellitus, and 12.7% of them were newly diagnosed to have DM, 8.9% of the patients had elevated serum creatinine levels, and 10.4% of the DM patients were already on insulin preoperatively. Almost 32.1% of them had HbA1c more than 7. Most of the patients were followed up by a General Practitioner, 28.6% or a General Physician 26.8%. Only 10.7% of the DM patients were under the care of an Endocrinologist before CABG.

The prevalence of DM in CABG patients in our study is 55.4%. Pre-operative HbA1c screening helped us to diagnose pre diabetes and unmasked new patients to have good glycemic control perioperatively and to have good results postoperatively. The endocrinologist's input was taken as early as possible to optimize the management.

Key Words

Prevalence, diabetes, CABG patients

Introduction

Diabetes mellitus is a major comorbidity among patients who are undergoing cardiac surgery, especially those

who are awaiting coronary artery bypass surgery. A significant burden of adult cardiac surgery is spent on coronary revascularization for myocardial ischemia, the most important cause of heart disease in adults worldwide. Even though it is among the preventable cardiovascular diseases, those who develop it need optimized management to prevent or delay its major complications.

Diabetes mellitus (DM) and coronary artery disease (CAD) are closely related. DM is a risk factor for CAD. The prevalence of DM and CAD is growing primarily due to the rising prevalence of obesity. The rapidly changing lifestyle, especially in developing countries, plays a major role in the occurrence of these diseases. The prevalence of diabetes in patients with CAD is up to 50% in many countries. The impact of tighter control of diabetes on cardiovascular morbidity and mortality has been controversial with conflicting results, which attracted special attention in current diabetes management guidelines. Cardiovascular disease (CVD) is a major cause of death and disability among people with diabetes 1. Adults with diabetes have a higher prevalence rate of CVD than adults without diabetes 2, and the risk of CVD increases continuously with rising fasting plasma glucose levels, even before reaching levels sufficient for a diagnosis 3. Thus, an increasing burden of diabetes will likely be followed by an increasing burden of CVD. Surgical revascularization by coronary artery bypass graft surgery (CABG) is a key factor in the management of multi-diseased coronary arteries. 4 Hyperglycemia during cardiac bypass reflects a state of insulin resistance that develops during surgical intervention and that might contribute to poor outcome. 5 In the present study greater ICU and hospital stay could be either a cause or an effect of the underlying conditions. Diabetic patients tend to exhibit other risk factors for CAD, like hypertension and obesity. Patients with diabetes have lipid-rich

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atherosclerotic plaques, which are more vulnerable to rupture than the plaques seen in non-diabetic patients.⁶ Given the clinical burden that CVD complications have on DM patients, there has been an increased focus on the joint management of T2DM and CVD. Good glycemic control remains the main foundation for managing DM. Although the importance of intensive glycemic control for protection against microvascular complications and CVD in people with T1DM is well established, its role for reducing cardiovascular risk has not been established as clearly in people with T2DM. Hence, the most effective approach for prevention of macrovascular complications appears to be multifactorial risk factor reduction. Several cardiovascular outcomes trials (CVOT) have been completed, which demonstrate that certain anti-diabetic treatments are associated with a lower risk of CVD. The increased focus on adequately treating patients with both CVD and T2DM requires that we have updated prevalence rates of T2DM among patients with CVD. The prevalence of DM is increasing globally, and the International Diabetes Federation (IDF) estimated that there were 387 million people with DM in 2013, and this incidence is expected to rise to 592 million by 2035.⁶ However, there is no recent local review on the prevalence of T2DM among adults with CVD. Therefore, the objective of this study is to quantitatively study rates of prevalence of T2DM in adults with CVD admitted for CABG. A significant proportion of non-diabetic patients are unmasked after Coronary Artery Bypass Graft (CABG). This is more likely in those with impaired glucose tolerance and prolonged period in intensive care and hospital. Some new patients would require specialized diabetes education including self-monitoring of blood glucose, insulin adjustments and hypoglycemia management prior to discharge just like a known diabetic. Obtaining HbA1c prior to surgery in nondiabetic patients or in those patients who are at a risk for postoperative hyperglycemia will help to optimize glycemic control. It will also identify those patients who might require more aggressive glycemic control after surgery and at the time of hospital discharge. Our study has multiple strengths and limitations. We use a cohort of patients underwent a similar type of surgery

(CABG) and intra-operative and post-operative care. postoperative results of coronary surgery in diabetic patients are classically less compared to non-diabetic patients. The improvement in management of DM patients will lead to acceptable operative mortality post-CABG and decrease the incidence of complications and events. Improved perioperative management and surgical techniques significantly improved clinical outcomes

The objectives were to explore the prevalence of diabetes in patients who are undergoing CABG and identify the risk groups preoperatively and proactive optimization of glycemic control.

Methodology

A prospective descriptive study was conducted among a cohort of CABG patients. The data collection was carried out among patients who were admitted for CABG in wards at National Hospital of Sri Lanka from January 2022 to November 2022. A Pre-tested interviewer-administered questionnaire was used to collect the data. A total of 56 patients were recruited for the study during the study period.

Statistical Package for Social Science (SPSS) software and Microsoft Excel software were used to analyze the collected data. Significance was determined by using appropriate statistical tests, and the critical value for significance was set at 5%. All the collected data was uploaded to Google Forms and downloaded to a private computer. Confidentiality was maintained. That data will be deleted after five years of study.

Ethical clearance was obtained from the institution and consent was obtained from all the participants.

Results

In the analysis of 56 patients who underwent a CABG procedure, 69.6% (n=39) were males and 30.4% (n=17) were female patients. 60.0% (n=33) of patients fall within the range of Body Mass Index (BMI) less than 25 Kg/m², 38.2% (n=21) of patients are in the 25 to 29 Kg/m² BMI range, and only 1.8% (n=1) was in the 30 to 34 Kg/m² BMI range.

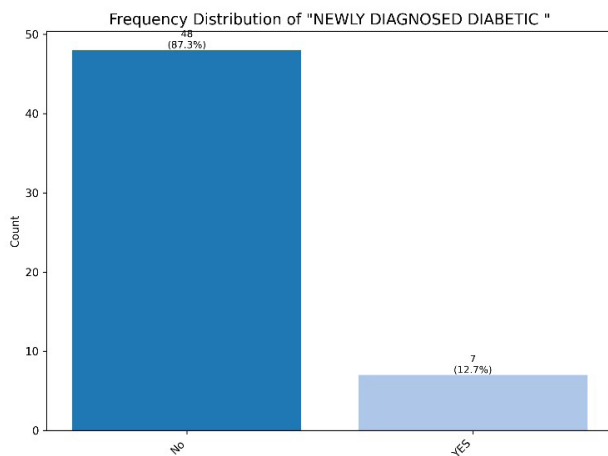


Figure 1 - Newly diagnosed diabetic mellitus patients

Study shows 55.4%(n=31) of patients were having DM pre operatively and among all patients 12.7% (n=7) newly diagnosed to have DM [Figure 1]. 48.1%(n=13) were having DM for 15 or more years, 22.2%(n=6) of patients having DM for 10 to 14 years, 14.8%(n=4) were having DM for 5 to 9 years and another 14.8%(n=4) were being with DM for less than 5 years.

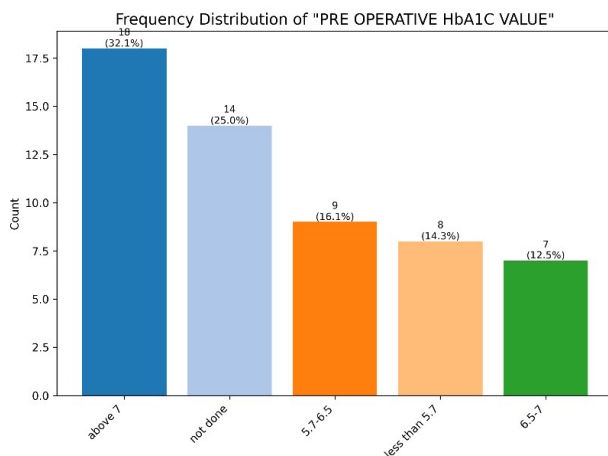


Figure 2 - Pre operative HbA1c value of CABG patients

Among the patients having DM 43.8%(n=21) were on oral hypoglycemic drugs, 10.4%(n=5) were on insulin dose and 6.2%(n=3) were on both insulin and oral hypoglycemic drugs. 32.1%(n=10) of the patients are having pre operative HbA1c value more than 7, 25%(n=14) of patients not underwent HbA1c test, 16.1%(n=9) were having test value between 5.7 to 6.5, 14.3%(n=8) were having HbA1c value less than 5.7 and 12.5%(n=7) were having HbA1c values between 6.5 to 7 [Figure 2].

Pre operatively 28.6%(n=16) of patients were followed up by general practitioners [GP], 26.8%(n=15) of patients were followed up by General Physicians/

Visiting Physicians [VP], 19.6%(n=11) were not on any medical follow up, 14.3%(n=8) were followed up by Cardiologists and only 10.7%(n=6) patients having DM were followed up preoperatively by Endocrinologists (Figure 3)

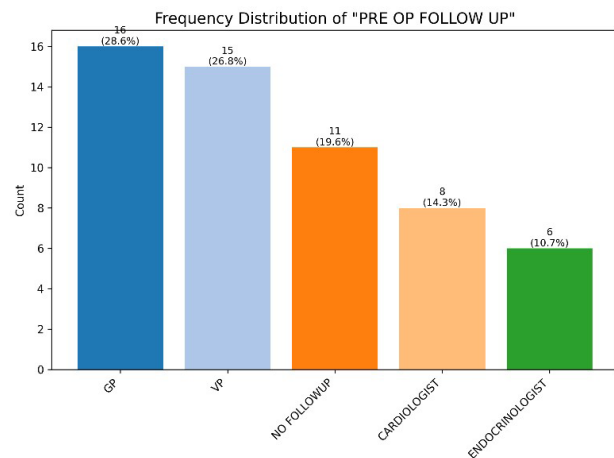


Figure 3 - Pre operative follow up

Nearly 77.6%(n=52) of patients admitted were having Triple vessel disease [TVD] findings in angiogram pre operatively 16.4%(n=11) of patients among the total were having Chronic Total Occlusion [CTO], and 6%(n=4) of them were having single vessel disease [SVD] pre operatively [Figure 4].

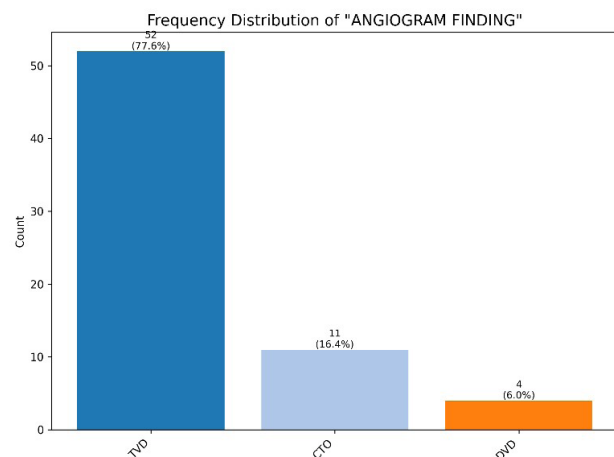


Figure 4 - Frequency analysis of angiography findings

Among 56 patients, 39.3%(n=22) patients were having family history of DM. Chi-square static value for gender and angiogram finding at the 95% confidence interval is 1.4816. degree of freedom was 02 and P-value was 0.4767 and the critical value is 5.9915. as the P-value is 0.4767 was greater than 0.05, there is no statistically significant association between pre operative DM and angiogram finding.

Only 3.8%(n=2) of the patients were on SGLT2 inhibitor usage. 78.6%(n=44) of the patients were having pre operative serum creatinine level less than 1.2, 12.5%(n=7) of patients were having serum creatinine value between 1.2 to 1.5 and 8.9%(n=5) were having serum creatinine level above 1.5 preoperatively. Among 56 patients 09 of them were smokers and 22.2%(n=2) were having 15 or above pack years.

Discussion

In this study involving 56 patients undergoing coronary artery bypass grafting (CABG), we aimed to assess the prevalence of diabetes and related glycemic indicators. The findings revealed a substantial proportion of patients had either a known history of diabetes (55.4%) or were newly diagnosed (12.7%) during the preoperative evaluation. This highlights the high burden of DM in the CABG population. Only few patients (10.6%, n=6) with DM have been optimized with Endocrinologist follow up, which should be critically observed.

A notable proportion of the cohort presented with elevated HbA1c values, with several patients (32.1%) exceeding the 7% threshold, indicating suboptimal glycemic control. This aligns with previous studies (Singh GM, et al.2013) suggesting that poor preoperative glycemic control is common in patients with coronary artery disease and may be associated with adverse surgical outcomes.

Interestingly, some patients with abnormal fasting blood glucose and HbA1c levels were not on any anti-diabetic medications (39.6%), while others were managed with either oral hypoglycemic drugs (OHD) or insulin. This variation suggests differing levels of disease awareness, management strategies, and potential undiagnosed insulin resistance. Family history of diabetes (39.3%) and coexisting conditions like hypertension (57.8%) and dyslipidemia (37.8%) were also commonly observed, underscoring the need for a holistic cardiovascular risk assessment in this group.

The limitations were that the period of time to collect the data was limited due to a smaller number of cases oper-

ated due to COVID-19, and the change of subspeciality appointment rotation, which is the main limitation of the study to collect data and analyze the cohort, and to perform a large-scale study. And may reduce statistical power and increase the margin of error, leading to unreliable prevalence estimates. And the cross-sectional nature with retrospective record and history nature was also a limitation. The exclusion of patients may skew the data in minor range. Self-reported diabetic status and recall bias with underreporting may distort prevalence estimates. Usage of statins and other cardioprotective medications may influence outcomes. Temporal and geographical variability could a limiting factor of this study. Due to the small sample size, the usage of the SGLT2 inhibitor and CABG prevalence could to be assessed.

Conclusion

Angiogram findings showed no statistically significant correlation with diabetes, likely due to the small sample size; larger studies are needed to evaluate coronary occlusion patterns in diabetic patients awaiting CABG. Postoperative endocrine plans indicated more aggressive glycemic management in patients with higher preoperative HbA1c, especially those started on insulin, suggesting surgery prompts reassessment of diabetes care. Preoperative HbA1c screening helped identify undiagnosed diabetes and prediabetes, enabling better perioperative glycemic control and improved postoperative outcomes. With 55.4% of patients having diabetes, our findings support routine preoperative diabetes screening in all CABG patients to allow early intervention and improve outcomes.

References

1. International Diabetes Federation. Diabetes and cardiovascular disease. Brussels: International Diabetes Federation; 2016. p. 1–144.
2. Singh GM, et al. The age-specific quantitative effects of metabolic risk factors on cardiovascular diseases and diabetes: a pooled analysis. PLoS ONE. 2013;8:e65174.

3. Action to Control Cardiovascular Risk in Diabetes Study. Group: effects of intensive glucose lowering in type 2 diabetes. *N Engl J Med*. 2008;358:2545–59
4. Trujillo JM, Nuffer WA. Impact of sodium–glucose cotransporter 2 inhibitors on nonglycemic outcomes in patients with type 2 diabetes. *Pharmacotherapy*. 2017;37:481–91.
5. P.R. Moreno, , et al. Coronary composition and macrophage infiltration in atherectomy specimens from patients with diabetes mellitus, *Circulation*, 102 (18) (2000), pp. 2180-2184
6. J.L. Carson, P.M. Scholz, A.Y. Chen, E.D. Peterson, J. Gold, S.H. Schneider Diabetes mellitus increases short–term mortality and morbidity in patients undergoing coronary artery bypass graft surgery *J Am Coll Cardiol*, 40 (2002), p. 41823.