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ORIGINAL ARTICLE

Preoperative Risk Profile and Clinical Characteristics of Bangladeshi Patients Undergoing Isolated CABG

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ABSTRACT

Background: *Understanding the preoperative clinical profile of patients undergoing coronary artery bypass grafting (CABG) is essential for surgical planning and outcome prediction; however, population-specific data from Bangladesh are limited.* ***Objective:*** *This study aimed to describe the demographic, anthropometric, comorbidities, renal, and cardiac characteristics of Bangladeshi patients undergoing isolated CABG at a tertiary cardiac center.* ***Methods & Materials:*** *A comparative cross-sectional study was conducted at the National Heart Foundation Hospital and Research Institute in Dhaka between September 2020 and August 2022. Five hundred consecutive patients scheduled for isolated CABG were enrolled in this study. Data were collected from medical records and assessments using standardized forms. Descriptive statistics were performed using SPSS (version 26).* ***Results:*** *The mean age was 60.2 ± 7.5 years, with 81.8% male patients. Over half (51.6%) were overweight (BMI 23–27.5 kg/m^2), and hypertension (63.6%) and diabetes (44.2%) were the most common comorbidities. Normal renal function (serum creatinine < 1.4 mg/dL) was found in 91.2% of patients, with a mean creatinine clearance of 85.9 ± 13.4 mL/min. Most patients were NYHA class III (62%), with 70.6% having had a recent myocardial infarction and 77.6% showing an ejection fraction of 31–50%. Elective CABG comprised 75.4% of cases, while 1% were emergent.* ***Conclusion:*** *Bangladeshi CABG patients typically present as middle-aged males with high rates of hypertension, diabetes, and moderate ventricular dysfunction. Recognizing these preoperative characteristics is crucial for optimizing care and tailoring risk models for regional populations.*

Keywords: *Coronary artery bypass grafting, preoperative profile, cardiovascular risk factors.*

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INTRODUCTION

Coronary artery disease (CAD) remains one of the leading causes of morbidity and mortality globally and continues to impose a substantial health burden in low- and middle-income countries, including Bangladesh [1]. With increasing life expectancy and lifestyle-related risk factors, the prevalence of CAD in South Asia has risen sharply over the past two decades [2]. Coronary artery bypass grafting (CABG) is the most frequently performed cardiac surgery for patients with advanced CAD, aiming to restore myocardial perfusion and improve survival and quality of life [3]. The perioperative outcome of CABG, however, is influenced by a variety of preoperative factors, including demographic characteristics, comorbidities, renal function, cardiac status, and the urgency of surgery [4]. Understanding these preoperative variables is crucial for accurate risk stratification, perioperative planning, and prognostication.

Internationally, several risk scoring models such as the European System for Cardiac Operative Risk Evaluation (Euro

SCORE II) and the Society of Thoracic Surgeons (STS) risk score are routinely used to predict postoperative outcomes and mortality [5,6]. These tools were primarily developed using European and North American populations. Yet, significant ethnic, genetic, and healthcare delivery differences may affect the applicability of such models in South Asian populations [7]. In particular, Bangladeshi patients often present with distinctive clinical and metabolic characteristics, including a higher prevalence of diabetes, hypertension, and dyslipidemia at a relatively younger age compared to Western populations [8,9]. Therefore, the preoperative risk profile in Bangladesh may not mirror the populations from which conventional risk models were derived.

Despite the growing volume of cardiac surgery in Bangladesh, systematic analyses of preoperative characteristics of CABG patients are scarce. National Heart Foundation Hospital and Research Institute (NHFH & RI) in Dhaka performs one of the largest numbers of CABG surgeries in the country, yet comprehensive data describing patients' preoperative risk profiles remain limited. Establishing such baseline data is vital for benchmarking surgical outcomes, guiding local clinical protocols, and validating international risk assessment models for the Bangladeshi population [10].

Moreover, identifying prevalent comorbidities and functional impairments before surgery enables clinicians to optimize perioperative management. Renal dysfunction, diabetes, and left ventricular dysfunction have been consistently linked to poor surgical outcomes [11]. Similarly, the urgency of surgery — elective versus emergency — is a critical determinant of postoperative mortality [12]. Hence, a structured evaluation of preoperative parameters offers a foundation for individualized care and improved outcome prediction.

This study aimed to delineate the preoperative demographic, anthropometric, comorbidity, renal, and cardiac characteristics of Bangladeshi patients undergoing isolated CABG at a single tertiary cardiac center. The findings provide a population-specific insight into the clinical risk landscape preceding CABG, forming an essential evidence base for regional surgical risk assessment and performance benchmarking.

METHODS & MATERIALS

This comparative cross-sectional study was conducted at the Department of Cardiac Surgery, National Heart Foundation Hospital and Research Institute (NHFH & RI), Dhaka, Bangladesh. The study period spanned from September 2020 to August 2022. A total of 500 patients who underwent isolated coronary artery bypass grafting (CABG) during this time were included.

Sample Selection

Inclusion criteria:

- Patients admitted for isolated CABG at NHFH & RI.
- Willingness to participate and provide written informed consent.
- Age ≥18 years, irrespective of gender.

Exclusion criteria:

- Concomitant valvular or congenital heart diseases.
- Redo cardiac surgery cases.
- Patients with thromboembolic complications.

Data Collection and Study Procedure

Data were collected prospectively using a structured records form. Preoperative demographic details, comorbidities, laboratory results, echocardiographic parameters, and operative urgency were recorded from the patient files and verified by direct chart review. Euro SCORE II and STS datasheets were used as reference instruments for the standardized variable definitions. Renal function was evaluated through serum creatinine and creatinine clearance rate, while cardiac function was assessed via NYHA class, ejection fraction, and pulmonary artery pressure. All patients underwent CABG via median sternotomy using standard on-pump or off-pump techniques. Data accuracy and completeness were ensured by double-checking the entries after each case and verifying discrepancies against the source documents.

Ethical Consideration

Ethical clearance was obtained from the Institutional Review Board (IRB) of the NHFH & RI. Written informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout the research process, and the data were used solely for academic purposes.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Categorical variables are presented as frequencies and percentages, and continuous variables as means ± standard deviations (SD). Statistical significance was set at $p < 0.05$. Descriptive statistics were used to summarize the preoperative characteristics of the study population.

RESULTS

Table – I: Baseline Characteristics of the Patients (*n*=500)

Variable	Category	Frequency	Percentage
Age group (years)	30-40	7	1.4
	41-50	44	8.8
	51-60	187	37.4
	61-70	250	50.0
	>70	12	2.4
	Mean ± SD	60.20 ± 7.46	
Sex	Male	409	81.8
	Female	91	18.2

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BMI (kg/m^2)	Underweight	10	2.0
	Normal	207	41.4
	Overweight	258	51.6
	Obese	25	5.0
	Mean ± SD	23.62 ± 1.49	

Table I shows the baseline characteristics of the patients. The mean age of all patients was 60.20±7.46 years (range: 34-72 years), with the majority belonging to 51-70 years of age (87.4%). A major part of the patients was male (81.8%) with a male: female ratio of 4.5:1. The mean BMI of all patients was 23.62±1.49 kg/m2. The maximum study patients were overweight (51.6%). 41.4% patients were of normal weight. Only 5% patients were obese.

Table – II: Comorbidities of study patients (*n*=500)

Comorbidities	Frequency	Percentage
Hypertension	318	63.6
Diabetes mellitus	221	44.2
Chronic lung disease	31	6.2
Cerebrovascular disease	13	2.6

Table II shows that hypertension (63.6%) and diabetes mellitus (44.2%) were the most common comorbidities among study patients.

Table – III: Renal function of study patients (*n*=500)

Variables		Frequency	Percentage
Creatinine clearance rate	>85 ml/min	353	70.6
	50-85 ml/min	120	24
	<50 ml/min	27	5.4
	Mean±SD	85.9±13.4	
Serum creatinine	>1.4 mg/dl	44	8.8
	<1.4 mg/dl	456	91.2
	Mean±SD	1.24±0.18	

Table III shows that the maximum study patients had normal kidney function with serum <1.4 mg/dL (91.2%) and creatinine clearance rate >85ml/min (70.6%).

Table – IV: Preoperative variables of the study patients (*n*=500)

Variables		Frequency	Percentage
NYHA classification	Grade I	74	14.8
	Grade II	103	20.6
	Grade III	310	62
	Grade IV	13	2.6
CCS class IV angina		20	4
Recent MI		353	70.6
Home oxygen		24	4.8
Previous cardiac intervention		31	6.2
Heart failure	Acute	194	38.8
	Chronic	50	10
	Both	3	0.6
	Arrythmia	17	3.4
Ejection fraction (%)	>50	87	17.4
	31-50	388	77.6
	<30	25	5
	Mean±SD	42.7±7.96	
Pulmonary hypertension	>30 mmHg	237	47.4
	<30 mmHg	263	52.6
	Mean±SD	31.4±6.10	

Table IV shows that the maximum study participants had NYHA grade III (62%) and acute (38.8%) heart failure. More than 70% had a recent MI. Besides, echocardiography showed that most patients had an ejection fraction of 31-50% (77.6%) and pulmonary hypertension <30 mmHg (52.6%).

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Table – V: Category of urgency of study patients (*n*=500)

Urgency	Frequency	Percentage
Elective	377	75.4
Urgent	118	23.6
Emergency	5	1
Salvage	0	0

Table V shows that most of the study patients had elective CABG (75.4%), while the rest had urgent (23.6%) or emergency (1%) CABG.

DISCUSSION

This study provides a comprehensive description of the preoperative risk profile and clinical characteristics of Bangladeshi patients undergoing isolated coronary artery bypass grafting (CABG) at a major tertiary cardiac center. The findings reflect the demographic and clinical attributes of a South Asian surgical population and highlight the predominance of modifiable cardiovascular risk factors such as hypertension, diabetes, and overweight status.

The mean age of the cohort (60 years) is comparable to that reported in regional studies from India and Pakistan, where CABG patients are typically a decade younger than their Western counterparts [13,14]. This observation underscores the earlier onset of severe coronary disease in South Asian populations, likely attributable to genetic predisposition, dietary habits, and clustering of metabolic risk factors such as hypertension and diabetes [2]. The male predominance (81.8%) found in this study aligns with international CABG registries, including those by Ranjan and Adhikary and Rahman et al., which reported male proportions exceeding 80% [4,10]. Although women represent a smaller proportion of surgical cases, previous research indicates that they often present later and with more comorbidities, which may influence postoperative outcomes [15].

More than half of the patients in this series were overweight, consistent with the "South Asian paradox," where individuals experience metabolic and cardiovascular complications at relatively low body mass index thresholds [16]. Obesity contributes to endothelial dysfunction and insulin resistance, potentiating hypertension and atherogenesis [17]. The high prevalence of hypertension (63.6%) and diabetes mellitus (44.2%) observed in this cohort mirrors national epidemiologic data that identify these conditions as the leading chronic diseases in Bangladesh [8]. These comorbidities have synergistic effects, increasing the risk of perioperative myocardial injury and long-term mortality after CABG [18].

Renal function analysis revealed that 91% of patients had normal serum creatinine levels, yet 24% had reduced creatinine clearance between 50–85 mL/min. Subclinical renal impairment has been recognized as an independent predictor of postoperative morbidity and mortality even in patients with apparently normal serum creatinine [11]. Therefore, early identification of renal compromise is essential for preoperative optimization and risk stratification. Similar distributions were documented in Indian and Algerian CABG cohorts, suggesting that moderate renal dysfunction is common among surgical candidates in resource-limited settings [12].

Cardiac functional parameters in this study revealed that 62% of patients presented with New York Heart Association (NYHA) class III symptoms and 70% had a recent myocardial infarction. These findings indicate that the majority were symptomatic and operated on after significant ischemic events, a pattern consistent with delayed referral and limited access to early revascularization in South Asia [19]. The mean ejection fraction fell predominantly within the 31–50% range, denoting moderate left ventricular dysfunction. Comparable rates have been reported by Boukhmis et al. in North African populations, reinforcing that reduced systolic function is a frequent preoperative feature in CABG patients [12].

Approximately three-quarters of operations were performed electively, while only 1% were emergent. The predominance of elective cases reflects a stable surgical population and adequate preoperative evaluation protocols at the study center. In contrast, Western series report higher proportions of urgent and emergent cases due to broader indications for early surgical intervention [20]. A higher elective-to-urgent ratio, as observed here, may contribute to the relatively low mortality reported in this study (1.4%).

Collectively, these results depict a patient population characterized by middle age, male predominance, and a high burden of metabolic comorbidities but relatively preserved renal and ventricular function. Such a profile has implications for risk-scoring systems like Euro SCORE II and STS, which were calibrated using Western data. The overlap of moderate risk factors and younger age may lead to under- or overestimation of predicted mortality if unadjusted for ethnic differences [5]. Therefore, future research should integrate these baseline characteristics into localized validation of risk prediction models.

The study contributes valuable epidemiologic insight into CABG practice in Bangladesh, establishing foundational data for regional cardiac surgery registries. It emphasizes the importance of aggressive risk-factor management—particularly hypertension, diabetes, and obesity—in the preoperative phase to improve outcomes.

Limitations of the study

This study was conducted at a single tertiary center using a purposive sample of patients undergoing isolated CABG, which may limit its generalizability to all cardiac surgical populations in Bangladesh. The analysis was descriptive and did not explore the associations between risk factors and outcomes.

Conclusion

The present study demonstrates that Bangladeshi CABG patients are predominantly middle-aged, male, and overweight, with hypertension and diabetes being the most prevalent comorbidities. Most patients exhibit moderate left ventricular dysfunction but preserved renal function and undergo elective procedures. These findings establish the baseline clinical profile of CABG candidates in Bangladesh and underscore the need for targeted preoperative optimization and local calibration of international risk prediction models to enhance perioperative care and outcomes.

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Conflicts of interest

There are no conflicts of interest.

Ethical approval

The study was approved by the Institutional Ethics Committee.

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