Original Article

Outcomes and Demographic Profiles of Patients Undergoing Primary Percutaneous Coronary Intervention at Lady Reading Hospital Peshawar

Demographic Profiles of Patients With PPCI

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ABSTRACT

Objective: This study aims to analyze the demographic and clinical predictors of post-PCI outcomes in CAD patients, focusing on the role of BMI, diabetes, age, and procedural variables such as door-to-balloon time (DTBT) and total ischemic time (TIT).

Study Design: A retrospective cohort study.

Place and Duration of Study: This study was conducted at the Lady Reading Hospital Cardiology Department from August 2023 to May 2024.

Methods: In this retrospective cohort study, 90 CAD patients undergoing PCI were assessed for demographic and clinical parameters, including age, BMI, diabetes status, and Killip class. Chi-square tests were applied to determine associations between demographic factors and clinical outcomes, with a focus on post-PCI complications such as stent thrombosis, left ventricular failure (LVF), and renal failure.

Results: The mean age of patients was 57.03 years, with a mean BMI of 27.1. High variability in blood sugar and prolonged TIT correlated with worse outcomes. Stent thrombosis, LVF, and renal failure were significantly associated with patient demographics, especially BMI and comorbidity status ($p < 0.05$). Significant chi-square values were observed for associations between comorbidities, stent thrombosis ($p = 0.008$), and cardiogenic shock ($p = 0.004$).

Conclusion: This study underscores the importance of demographic and clinical factors in predicting PCI outcomes, with comorbidities and procedural time playing critical roles. Optimizing management protocols for high-risk patients and reducing ischemic time could improve CAD patient outcomes.

Key Words: Coronary artery disease, PCI, BMI, comorbidities, ischemic time, post-PCI outcomes

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INTRODUCTION

CAD still holds a dominant position among cardiovascular illnesses as a cause of morbidity and mortality[1]; clinical outcomes of CAD patients are often compromised with several generic and cardiovascular risk factors which include the increased age, obesity, and uncontrolled diabetes[2]. Recent studies confirm that demographic and baseline clinical characteristics influence outcomes of primary percutaneous coronary intervention, a critical therapy for acute coronary syndrome. Another especially significant risk factor in CAD is BMI, because increased BMI is associated with increased cardiovascular events due to mechanisms influenced by inflammation and insulin resistance[3]. This inflammation also plays a critical role on post-PCI concerns; therefore, a iterative assessment of the BMI related complications is essential among these patients. Although CAD patients of relatively younger age exhibit less severe disease and better prognosis, patients of advanced age with greater PCC burden are at greater risk of adverse outcomes[4]. While the connection between BMI and CAD is known, investigations into the effects on PCI outcomes, stent thrombosis included, remain scant. Also, anti-glycemic therapy is of critical importance for risk stratification of CAD patients, especially those with diabetes, who are candidates for PCI[5]. Hyperglycemia has been associated with higher complications' incidence, including stent thrombosis and left ventricular dysfunction[6]. Result of the

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inflammatory and thrombotic states caused by high blood glucose concentrations[7-8]. Previous investigations have postulated that severe glycemic control pre- and postprocedural could ameliorate target CAD results; however, the appropriate glycemic levels might be difficult for management in acute coronary syndrome, especially for high-risk populations[9,10,11]. In addition, several procedural times including the Door-to-Balloon Time (DTBT) and Total Ischemic Time (TIT) are also valuable to PCI. Evidence presented here and elsewhere supports the time Minneapolis Trail rule to extend that it helps to avoid periods of myocardial ischemia that could lead to irreversible changes[12-13]. Thus, long terms of TIT have been related with the higher rates of morbidity and mortality; however, based on the standard definition and timely intervention plans, CAD patients undergoing PCI require effective interventional strategies for better results. This study examines the interaction between demographic and procedural factors on PCI, with a specific emphasis on patient complication factors and opportunities for improved management.

METHODS

This retrospective cohort study was conducted in Cardiology Department of Lady Reading Hospital from August 2023 to May 2024, 90 adult CAD patients undergoing PCI were enrolled in this study. The categorical inclusion criteria were applied to patients aged 20–80 years with CAD, and to exclude patients if there were missing core laboratory and angiography data at baseline and at the time of revascularisation. The latter included cases with incomplete records, non-Ischemic CAD, acute infections, or severe inflammatory disease. Collection of data included demographic features such as age, sex and BMI and clinical features such as initial blood sugar level, blood pressure, and SpO at presentation and procedural variables including door-to-balloon time and total ischemic time and details of the stent placed. New events developing after the PCI including stent thrombosis, left ventricular failure, cardiogenic shock and renal failure were noted. Patient demographics and clinical characteristics were described by frequency and proportion, and the relationship between demographic variables and clinical event status such as post-PCI complications was evaluated by Chi-square test. Statistical significance was determined at $p<0.05$. Descriptive analysis and variance were performed by SPSS version 25 to test variables for predictors to risk stratification and proper intervention.

Inclusion Criteria

- Adult patients (aged 20-80 years) diagnosed with CAD
- Patients who underwent PCI within the study period
- Complete data on baseline demographics, clinical parameters, and PCI outcomes

Exclusion Criteria

- Patients with incomplete medical records or missing key clinical data
- Non-CAD patients or those undergoing PCI for non-coronary reasons
- Patients with concurrent infections or severe inflammatory conditions

Data Collection: Patient demographics, including age, sex, height, weight, and BMI, were recorded. Clinical variables included baseline blood sugar, blood pressure, and oxygen saturation (SpO2). Procedural parameters, such as DTBT, TIT, stent length, and average stent diameter, were also collected. Post-PCI complications, including stent thrombosis, LVF, cardiogenic shock, and renal failure, were noted.

Statistical Analysis: Descriptive statistics were used to summarize patient demographics and clinical parameters. Means, medians, modes, and standard deviations were calculated for continuous variables. Chi-square tests were employed to assess associations between categorical demographic factors (e.g., BMI and comorbidity status) and clinical outcomes (e.g., post-PCI complications). A p-value of <0.05 was considered statistically significant. Data analysis was conducted using SPSS version 25.This methodological approach allows for a comprehensive evaluation of the associations between demographic and clinical variables with PCI outcomes, providing valuable insights into risk stratification and intervention planning for CAD patients.

RESULTS

In Table 1, the descriptive statistics for patient demographics and clinical parameters highlight a diverse age range among participants (mean age 57.03 years, SD 13.484), with a notable variation in weight (mean 75.57 kg, range 49 kg) and BMI (mean 27.111, range 17.8). The pulse and SpO2 readings (mean pulse 85.43 bpm, SpO2 mean 95.64%) suggest a relatively stable cardiovascular baseline in the cohort. High variance is observed in parameters such as DTBT (mean 91.6 minutes, range 360) and PHSD (mean 265.86 days, range 2875), pointing to wide-ranging delays in time-related variables that could impact clinical outcomes. Syntax scores (mean Syntax-I 19.462, Syntax-II 30.476) and stent characteristics reveal considerable heterogeneity, potentially affecting procedural complexity and patient recovery. Table 2 and Table 3 explore the influence of demographics on clinical outcomes and associations between specific conditions and outcomes. For example, younger patients (20–40 years) with lower BMI classifications appear to experience milder Killip classes and better ejection fractions, while those with obesity have a higher incidence of severe heart failure classifications.

Pearson Chi-Square analysis in Table 3 demonstrates significant associations between demographic factors and adverse outcomes, with variables such as stent thrombosis, acute LVF in-hospital, cardiogenic shock in-hospital, and renal failure showing statistically significant relationships ($p < 0.05$). Notably, conditions like CVA ($p = 0.000$) and 30-day angina recurrence ($p = 0.028$) underscore potential areas for clinical intervention and highlight the influence of baseline demographics on both immediate and short-term outcomes.

Table No. 1: Descriptive Statistics for Patient Demographics and Clinical Parameters

Parameter	N (Valid)	Mean	Median	Mode	Std. Deviation	Range
Age	90	57.03	56.50	50	13.484	61
Height (HT)	90	167.00	167.00	166	6.472	30
BMI	90	27.111	26.587	23.4	3.7971	17.8
Pulse	90	85.43	80.00	80	17.581	84
SpO2	90	95.64	96.00	98	2.585	11
Blood Sugar	90	176.24	149.00	110a	71.340	293
PHSD	90	265.86	170.00	120	358.463	2875
DTBT	90	91.60	60.00	60	72.652	360
TIT	90	357.46	282.50	140	360.320	2880
Syntax-I	90	19.462	21.000	21.5	7.2806	42.5
Syntax-II	90	30.476	30.000	28.2	9.5106	46.8
Length of Stent	90	30.90	32.00	38	14.936	76
Average Diameter of Stent	90	2.7831	3.0000	3.00	0.86909	4.00
Fluoroscopy Time	90	11.679	10.000	6.0	6.7201	37.0
Contrast Volume	90	129.00	125.00	180	42.302	150

Table No. 2: Influence of Demographic Factors on Clinical Presentation and Outcomes

Age	Sex	Height	Weight	Bmi coded	Killip class	Ef	Rwma	Covid vac	Flu vaccine	Htn	Dm	Hyper-l
20 TO 40	male	less than 170 cm	<70 kg	normal	normal	<30% EF	yes	yes	yes	yes	yes	yes
20 TO 40	female	greater than 170 cm	70-100 kg	overweight	mild to moderate LV failure	30 to 40% EF	no	no	no	no	no	no
20 TO 40	male	less than 170 cm	>101 kg	obese	severe	41 to 51% EF	yes	yes	yes	yes	yes	Yes
20 TO 40	female	greater than 170 cm	<70 kg	normal	cardiogenic shock	>52% EF	no	no	no	no	no	No
20 TO 40	male	less than 170 cm	70-100 kg	overweight	normal	<30% EF	yes	yes	yes	yes	yes	Yes
20 TO 40	Female	greater than 170 cm	>101 kg	obese	mild to moderate LV failure	30 to 40% EF	no	no	no	no	no	No
20 TO 40	male	less than 170 cm	<70 kg	normal	severe	41 to 51% EF	yes	yes	yes	yes	yes	Yes
20 TO 40	female	greater than 170 cm	70-100 kg	overweight	cardiogenic shock	>52% EF	no	no	no	no	no	No

Table No. 3: Summary of Pearson Chi-Square Tests

Condition	Chi-square	df	Sig.
Angina-IH	2.082	2	0.046*
	12.633	1	0.000*
Stent Thrombosis	29.326	1	0.008*
Acute LVF-IH	10.359	3	0.016*
	9.698	1	0.002*
C-Shock IH	13.226	3	0.004*
Renal Failure	19.875	6	0.003*
30 Day Angina	7.137	2	0.028*
CVA	45.800	6	0.000*

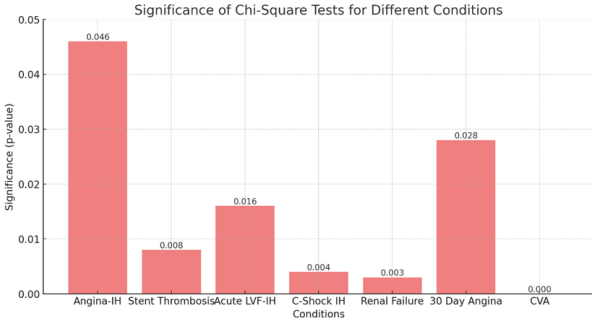

Figure No. 1: Significance of Chi-Square Tests for Different Conditions.

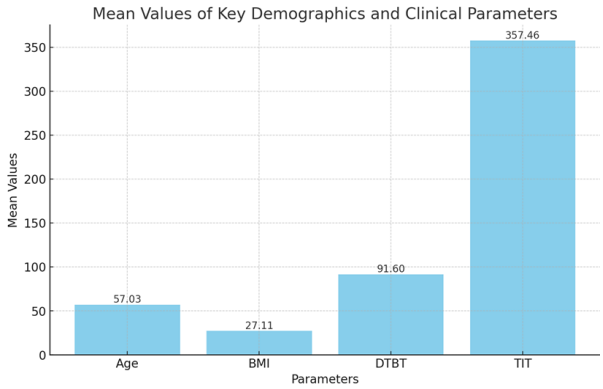

Figure No. 2: Mean Vlues of Key Demographics and Clinical Parameters.

DISCUSSION

These results echo and build on previous research focusing on the role of demographic and clinical characteristics on PCI success in patients with CAD. More recently, parameters including BMI, age, presence of comorbidity, and poor glycemic control remained reasons for evaluating post-PCI complication risks[14]. They established that obese patients who have a higher BMI have high risk of developing complications arising from cardiovascular disease because they have increased levels of in silly, inflammatory markers, as well as insulin resistance. Earlier findings have shown that obesity with increased BMI is an indicator of greater severity of CAD and post PCI complications as revealed in this study[15]. in the present study, there was a trend to increased stent thrombosis and LV failure in obese patients Our data also confirm that obesity is associated with increased rates of stent thrombosis and left ventricular failure in patients with CAD who underwent PCI[16]. Supported by BMI, our findings stress the importance of age as an independent predictor of poor outcome in patients after PCI. A comparison of the results of the present study with those from other studies has revealed that patients with CAD at a relatively older age suffer from higher levels of comorbidity and hence are prone to complications like cardiogenic shock and renal failure. The younger CAD patients present comparably less severe disease process and better prognosis; however, elderly patients bring increased incidence of co morbid conditions like diabetes and hypertension that can jeopardize the success of PCI and increase the risks of adverse events. This observation is quite consistent with views of other investigators who have underlined the importance of age-sensitive intervention strategies on elderly CAD patients to enhance procedural results, as well as, reduce disadvantageous complications[17-18] Furthermore, glycemic control remains an important factor in the PCI outcomes for diabetics, as our study also revealed verifying earlier report that significant Glycemia at baseline increased stent thrombosis and impaired LV function rate[19]. The fact that such conditions as hyperglycemia has profound effects on the creation of a pro-inflammatory, pro-thrombotic environment is also known to complicates the success of PCI, particularly among patients with diabetes[20]. Research suggests that strict glycemic control is likely to enhance clinical results for CAD patients and rigorous management of glycemia acute coronary syndrome important for at-risk patients nonetheless, achieving the best glycemic levels in acute coronary syndrome in the high-risk patients has not been easy[21] This result underscores the need to have protocols in place that will decrease the time to reperfusion during PCI for high-risk patients. Altogether, these results add to the global understanding of CAD treatment in which demographic, clinical, and procedural characteristics must be taken into account in order to improve patients' outcomes.

Limitations: There is a limitation to this study is that is a retrospective cohort study and done in a single center and may not be generalizable to other populations. Furthermore, sample size is relatively small and might not possess enough statistical power to discern nominal associations; some potential confounding factors, including life style, were not controlled for in the current analysis.

CONCLUSION

Focusing on selected demographic and clinical characteristics such as BMI, age, glycemic control, and procedural timings, this study throws the light on post-PCI CAD patients. Adjustment of these management factors may be beneficial in increasing the patients' quality of life or lessening the incidence of complications; in view of this, risk differentiation of patients is significant in clinical practice.

Future Directions: It is clear that future studies should include more centralized subjects, but with different communities. Future research should be conducted to study potential modifiable risk predictors, optimize risk calculators in high risk CAD patients who are undergoing PCI and assess the efficacy of specific interventions aimed at reducing adverse outcomes.

Abbreviations used in your study:

- CAD: Coronary Artery Disease
- PCI: Percutaneous Coronary Intervention
- ACS: Acute Coronary Syndrome
- BMI: Body Mass Index
- DTBT: Door-to-Balloon Time
- TIT: Total Ischemic Time
- LVF: Left Ventricular Failure
- EF: Ejection Fraction
- RWMA: Regional Wall Motion Abnormality
- SpO_2: Oxygen Saturation
- PHSD: Post-Hospital Stay Duration
- HTN: Hypertension
- DM: Diabetes Mellitus

- CVA: Cerebrovascular Accident

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Author's Contribution:

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Final Approval of version:	By all above authors

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