https://doi.org/10.29309/TPMJ/2026.33.06.10033 www.theprofesional.com

ORIGINAL ARTICLE

# Coronary artery disease in patients undergoing coronary angiography pre-valve surgery.

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**ABSTRACT… Objective:** This study aimed to determine the incidence of CAD in patients undergoing coronary angiography prior to valve surgery and identify associated risk factors. **Study Design:** Retrospective study. **Setting:** Conducted on adult patients who underwent coronary angiography before valve surgery. **Period:** 1st January 2022 to 31st December 2024. **Methods:** CAD was defined as ≥50% stenosis in a major coronary artery. Demographic, clinical, and angiographic data were analyzed using SPSS version 22. **Results:** Among 80 patients, (07)8.8% had significant CAD, with higher prevalence in patients with mitral valve disease. The most commonly affected vessel was left circumflex artery. Risk factors such as hypertension (HTN), diabetes mellitus (DM), and smoking were significantly associated with CAD. **Conclusion:** A substantial proportion of patients scheduled for valve surgery have concomitant CAD, emphasizing the need for routine preoperative angiography. Risk stratification based on clinical factors may help identify high-risk patients.

**Key words:** Coronary Artery Disease, Coronary Angiography, Valvular Heart Disease.

**Article Citation:** Qureshi AE, Najeeb Ullah, Chaudhary FA, Anum H, Shoukat M, Ashraf W. Coronary artery disease in patients undergoing coronary angiography pre-valve surgery. Professional Med J 2026; 33(06):981-986. https://doi.org/10.29309/TPMJ/2026.33.06.10033

## INTRODUCTION

The coexistence of coronary artery disease (CAD) and valvular heart disease (VHD) presents a significant clinical challenge in cardiac surgical management. Current guidelines universally recommend preoperative coronary angiography for patients undergoing valve surgery to assess for concomitant CAD, as its presence significantly impacts both short-term surgical planning and long-term outcomes.[1,2] Despite these recommendations, the reported incidence of CAD in this population varies widely across studies, ranging from 20% to 60% depending on patient characteristics and valve pathology.[3,4]

The clinical importance of detecting CAD prior to valve surgery cannot be overstated. Significant coronary lesions (generally defined as ≥50% stenosis) often necessitate concurrent coronary artery bypass grafting (CABG), which has been shown to improve both operative mortality and long-term survival.[5,6] This is particularly relevant in patients with aortic stenosis, where the shared risk factors and pathophysiological mechanisms between degenerative valve disease and atherosclerosis lead to particularly high rates of CAD coexistence.[7,8]

Existing literature demonstrates considerable variation in CAD prevalence based on several factors. Older patients and males show higher CAD rates.[9,10] Similarly, aortic stenosis patients have greater CAD burden than mitral valve patients.[11,12] Additionally, risk factors including diabetes, hypertension, and dyslipidemia significantly increase CAD likelihood.[13,14]

Recent advances in transcatheter valve interventions have further complicated preoperative assessment paradigms. While traditional surgical patients routinely undergo angiography, the optimal approach for transcatheter candidates remains debated, with some centers favoring computed tomography angiography as an alternative.[14,15] This evolving landscape underscores the need for contemporary data on CAD prevalence in surgical candidates.

Despite numerous studies on this topic, significant gaps remain in our understanding. Many existing

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**Article received on:**
11/08/2025
**Date of revision:**
02/01/2026
**Accepted for publication:**
10/01/2026

reports are limited by varying definitions of significant CAD, or lack of comprehensive risk factor analysis.[16,17] Furthermore, regional variations in cardiovascular risk profiles may lead to important differences in CAD prevalence that have not been thoroughly examined.[18,19]

This study aimed to determine the contemporary incidence of angiographically-proven CAD in patients undergoing preoperative evaluation for valve surgery, identify clinical and demographic predictors of significant CAD & examine variations in CAD prevalence by valve pathology.

Our findings provide crucial insights for cardiac surgeons and cardiologists in preoperative planning, while contributing to the ongoing discussion about optimal screening strategies for this high-risk population.

## METHODS

This retrospective observational study (Single Centre experience) was conducted at Rehmat-ul-lil-Alameen postgraduate institute of Cardiology (RAIC), PESSI, Lahore for 03 years (1st January 2022 and 31st December 2024). All 80 patients who underwent coronary angiography pre-valve surgery during the study period were included in the study, it included both genders and all ages.

The study included all consecutive adult patients who underwent coronary angiography as part of preoperative evaluation before valve surgery.

Patients with a prior history of coronary artery disease were excluded.

### Variables

The variables studied included demographic data such as age and gender, indications, diagnosis and severity of CAD, type of valvular involvement and severity of valve involved.

### Data Source / Measurement

After obtaining approval form the Institutional Review board & Ethical Committee & (IRB&EC) (RAIC PESSI/Estt/2025/2987), data were extracted from-electronic medical records (EMRs), angiography reports, and surgical databases and included: Demographic & Clinical Characteristics: Age, gender, body mass index (BMI). Cardiovascular risk factors: hypertension (HTN), diabetes mellitus (DM), smoking, family history of CAD. Echocardiographic Data: Type & severity of valvular lesion. Left ventricular ejection fraction (LVEF). Coronary Angiography Findings: Presence of significant CAD (defined as ≥50% luminal stenosis in ≥1 major coronary artery). Vessel involvement (left main, LAD, LCx, RCA). Extent of disease (single-vessel, double-vessel, triple-vessel, or left main disease)

### Bias

Complete data collection was ensured to avoid selection & informational bias.

### Statistical Analysis

Statistical analysis was performed using SPSS Version 22. Mean and standard deviations were presented for quantitative variables and frequency with percentage was calculated for qualitative variables.

### Ethical Considerations

The study was approved by the Institutional Review Board (IRB) / Ethics Committee.

## RESULTS

A total of 80 patients underwent preoperative coronary angiography before valve surgery during the study period. The mean age was 53.6 ± 13.5 years, and 51.2% were male. Mean age among males was 57.7 ± 12.9 years while mean age among females was 48.9 ± 10.8 years. Youngest patient was 39-year-old while oldest was 79 years old. The most common valvular indication was mitral valve disease (MVD) requiring surgery.

Most frequently involved coronary artery among patients with significant CAD was left circumflex artery 06 (42.8%). Most frequently involved valve among patients with coronary artery disease was mitral valve (six out of 07 patients with CAD had mitral valve disease-85.6%). Out of 07 patients two patients had 2 risk factors each (1. Diabetes & hypertension; 2. Hypertension & smoking), four patients had only one risk factor each (two of them had hypertension, one was diabetic and one was smoker), one patient had no traditional risk factor.

**TABLE-I**

**Indications for pre-valve surgery coronary angiography:**

| S. No | Valve Involved | Number (Percentage) |
|---|---|---|
| 1 | Pre-MVR (Mitral valve replacement/repair) | 49 (61.3%) |
| 2 | Pre-AVR (Aortic valve replacement/repair) | 20 (25.0%) |
| 3 | Pre-MVR+AVR (Mitral& Aortic valve replacement/ repair) | 11 (13.7%) |
| 4 | Pre-TVR (Tricuspid valve replacement/repair) | 00 (00.0%) |
| 5 | Pre-PVR (Pulmonary valve replacement/repair) | 00 (00.0%) |

**TABLE-II**

**Cardiovascular risk factors included:**

| S.No | Risk Factor | Number (Percentage) |
|---|---|---|
| 1 | Hypertension | 35 (43.7%) |
| 2 | Diabetes mellitus | 08 (10.0%) |
| 3 | Current or former smoking: | 18 (22.5%) |
| 4 | Family history of CAD: | 02 (02.5%) |

The mean left ventricular ejection fraction (LVEF) was 44.09 ± 13.70 %, with 21% (16) of patients having LVEF <50%.

**TABLE-III**

**Prevalence of coronary artery disease (CAD)**

| S. No | Coronary Artery Disease (CAD) | Number (Percentage) |
|---|---|---|
| 1. | No Coronary artery Disease | 73 (43.7%) |
| 2. | Coronary artery Disease | 07 (08.8%) |
| 3. | Single Vessel CAD | 03 (42.8%) |
| 4. | Double Vessel CAD | 02 (28.6%) |
| 5. | Double Vessel CAD + LMS (Left mainstem disease) | 01 (14.3%) |
| 6. | Triple Vessel CAD | 00 (00.0%) |
| 7. | Triple Vessel CAD + LMS (Left mainstem disease) | 01 (14.3%) |

- **No CAD:** 91.2% (n=73)
- **CAD:** 8.8% (n=07)
- **Severe CAD (left main or triple-vessel disease):** 02.5% (n=02)

**TABLE-IV**

**Distribution of CAD by vessel involvement (Total vessels involved: 12)**

| S.No | Vessel Involved | Number (Percentage) |
|---|---|---|
| 1 | Left mainstem | 02 (16.7%) |
| 2 | Left anterior descending artery | 03 (25.0%) |
| 3 | Left circumflex | 06 (50.0%) |
| 4 | Ramus intermedius | 00 (00.0%) |
| 5 | Right coronary artery | 01 (08.3%) |

**TABLE-V**

**Valvular disease & CAD**

| S.No | Valve Involved | Patient Number | Patients with CAD |
|---|---|---|---|
| 1 | Mitral valve disease | 49 | 06 (12.4%) |
| 2 | Aortic valve disease | 20 | 01 (12.4%) |
| 3 | Double valve disease (Mitral & aortic) | 11 | 00 (12.4%) |
| | **Total** | **80** | **07** |

## DISCUSSION

Our study reveals several important findings regarding the prevalence and clinical implications of coronary artery disease (CAD) in patients undergoing preoperative coronary angiography for valve surgery. The key observation that 8.8% of patients had significant CAD (≥50% stenosis) reinforces the critical importance of routine coronary assessment in this population, consistent with current guideline recommendations.[1,2] This prevalence does not align with previous reports ranging from 20-60%[3,4], though our findings trend toward the lower end of this spectrum, likely reflecting our cohort's younger age profile and lower prevalence of traditional cardiovascular risk factors.

The stratification by valve pathology yielded particularly noteworthy results. Patients with mitral valve disease demonstrated the highest CAD prevalence (12.24%), significantly greater than those with aortic valve disease (5.0%). This finding is against the well-established association between degenerative aortic valve disease and coronary atherosclerosis[6,7], which is traditionally explained by shared pathophysiological mechanisms including endothelial dysfunction, chronic inflammation, and similar risk factor profiles.[20,21] Aortic stenosis

has been labelled a particularly high-risk subgroup warranting meticulous coronary evaluation in previous studies.[9,10] Our study results reflect the dominant involvement of mitral valve in our population because of rheumatic nature of valvular disease which preferentially affects mitral valve.

A multivariate analysis had identified age >65 years, male sex, diabetes mellitus, and hypertension as independent predictors of CAD, consistent with established cardiovascular risk models.[22,23] Out of 07 patients with CAD in our study, six (85.7 %) had one or two established risk factors present. These findings reinforce the value of comprehensive risk factor assessment when evaluating preoperative patients.

The management consequences of our findings are substantial: 8.8% of patients required concomitant CABG, significantly altering surgical planning.

These observations strongly support current guideline recommendations for routine preoperative angiography[1,12] particularly given that unexpected CAD findings altered management in nearly nine percent of our cohort. However, our data also suggest potential opportunities for risk-stratified approaches, as patients with no traditional risk factors can undergo less invasive testing to rule out CAD.[24,13]

Our overall CAD prevalence does not align with recent multicenter registries[14,15] and our rate of multivessel disease also does not support some contemporary reports.[17,19] This discrepancy may reflect: Regional variations in etiology of valvular involvement, cardiovascular risk profile differences, differences in angiographic interpretation thresholds or evolving demographics of valve surgery candidates.

Notably, our findings do align with recent suggestions that non-invasive coronary CT angiography could replace conventional angiography in lower-risk patients.[25,26] The lower rate of significant CAD in our cohort supports adopting less-sensitive screening modalities.

## LIMITATIONS

Single-center design may limit generalizability. Secondly, retrospective nature introduces potential selection biases. Additionally, the lack of long-term follow-up data on surgical outcomes is not done.

## CONCLUSION

This study provides contemporary evidence supporting the prevalence of CAD in valve surgery candidates, particularly among patients with traditional risk factors. Our findings endorse current guideline recommendations for routine preoperative coronary assessment while identifying potential opportunities for more targeted screening strategies in lower-risk subgroups. The significant proportion of patients requiring concomitant CABG underscores the critical importance of comprehensive preoperative evaluation in this population.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.



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