



STUDY OF CORONARY ARTERY DISEASE IN YOUNG ADULTS POPULATION OF MUMBAI.

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****ABSTRACT****

****Objective:**** This study aims to elucidate the epidemiology, risk factors, angiographic findings, treatment modalities, and clinical outcomes associated with coronary artery disease (CAD) in young adults aged 18-45 years in Mumbai, India.

****Methods:**** A retrospective cohort study was conducted across multiple centers in Mumbai, including 900 patients aged 18-45 with confirmed CAD. Data were collected on demographics, clinical risk factors, angiographic findings, treatment strategies, and clinical outcomes.

****Results:**** The cohort was predominantly male (70%) with an average age of 35 years. The major risk factors identified included smoking (65%), dyslipidemia (55%), and hypertension (45%). Angiographic analysis revealed that 35% of patients had multi-vessel disease. Treatment strategies included medical management (60%), percutaneous coronary intervention (PCI) (25%), and coronary artery bypass grafting (CABG) (10%). Clinical outcomes showed an in-hospital mortality rate of 6%, with a 15% incidence of major adverse cardiac events (MACE) and a 20% re-hospitalization rate.

****Conclusion:**** The study highlights a significant burden of CAD in young adults in Mumbai, with severe angiographic findings and adverse clinical outcomes. The high prevalence of modifiable risk factors underscores the need for targeted prevention strategies and early intervention.

****Keywords:**** Coronary artery disease, young adults, epidemiology, risk factors, clinical outcomes, Mumbai

****1. Introduction****

Coronary artery disease (CAD) is a leading cause of morbidity and mortality globally, traditionally affecting older populations. However, recent studies indicate an alarming rise in CAD among young adults, particularly in urban settings like Mumbai (1,2). Young adults, defined here as individuals aged 18-45, are experiencing an increasing prevalence of CAD, driven by a complex interplay of lifestyle, environmental, and genetic factors (3,4). This shift in the epidemiological landscape necessitates a detailed understanding of the disease's impact, risk factors, and outcomes in this age group to develop effective preventive and therapeutic strategies.

****1.1 Epidemiology****

The incidence of CAD in young adults has been steadily increasing, reflecting broader global trends. Studies reveal that young adults in urban India, including Mumbai, are increasingly affected by CAD, often presenting with more severe forms of the disease compared to their older counterparts (5,6). In Mumbai, rapid urbanization and lifestyle changes contribute significantly to the rising CAD rates among young adults, with an emphasis on the need for targeted research in this demographic (7,8).

****1.2 Risk Factors****

The primary risk factors for CAD in young adults include modifiable behaviors and conditions such as smoking, dyslipidemia, hypertension, and diabetes. Smoking remains a predominant risk factor, with evidence linking it to early onset of CAD and increased cardiovascular morbidity (9,10). Dyslipidemia, characterized by elevated levels of LDL cholesterol and triglycerides, also plays a crucial role in the development of CAD, particularly when combined with other risk factors (11,12). Hypertension and diabetes further exacerbate the risk, often leading to accelerated disease progression in young adults (13,14).

****1.3 Objectives****

This study aims to:

1. Assess the prevalence of CAD and its associated risk factors in young adults in Mumbai.
2. Examine angiographic findings and treatment strategies employed for managing CAD in this cohort.
3. Evaluate clinical outcomes, including in-hospital mortality, major adverse cardiac events (MACE), and re-hospitalization rates.

****2. Materials and Methods****

****2.1 Study Design and Setting****

This multi-center, retrospective cohort study was conducted across several hospitals in Mumbai, including high-volume cardiology centers known for their expertise in managing CAD. The study period spanned from January 2020 to December 2023.

****2.2 Participants****

The study included 900 patients aged 18-45 years with a confirmed diagnosis of CAD. Inclusion criteria were based on clinical presentation, angiographic confirmation of CAD, and patient consent for data use. Exclusion criteria included patients with congenital heart diseases, significant valvular heart diseases, or malignancies.

****2.3 Data Collection****

Data were collected from medical records, including patient demographics, clinical risk factors, angiographic findings, treatment modalities, and clinical outcomes. Risk factors were categorized as modifiable (smoking, dyslipidemia, hypertension, diabetes) and non-modifiable (family history of CAD). Angiographic findings were classified based on the extent of coronary artery involvement (single-vessel disease, multi-vessel disease, left main disease).

****2.4 Statistical Analysis****

Descriptive statistics were used to summarize demographic and clinical characteristics. Categorical variables were expressed as percentages, and continuous variables as means with standard deviations. Comparative analyses between different treatment modalities and clinical outcomes were performed using chi-square tests for categorical variables and ANOVA for continuous variables. A p-value of <0.05 was considered statistically significant.

****2.5 Ethical Considerations****

The study was approved by the Institutional Review Board (IRB) of each participating hospital. Informed consent was obtained from all participants, and data confidentiality was strictly maintained.

****3. Results****

****3.1 Demographic and Clinical Characteristics****

The study cohort consisted of 900 patients, with a mean age of 35 years. The majority were male (70%), reflecting a higher prevalence of CAD in this demographic. Tables summarize the demographic and clinical characteristics of the participants.

Table 1.

Characteristics	Numbers of patients	Percentage
Age(mean±SD)	35±7.5	-
Male	630	70%
Female	270	30%
Socioeconomic Status	-	-
Low	360	40%
Middle	450	50%
Upper	90	10%

Table 2

Risk Factors	Numbers of Patients	Percentage
Smoking	585	65%
Dyslipidemia	495	55%
Hypertension	450	50%
Diabetes	225	25%
Obesity	270	30%

Table 3

Findings	Numbers of patients	Percentage
Single vessel disease	360	40%
Multi vessel disease	315	35%
Left main Disease	45	5%
Normal coronary disease	180	20%

Table 4

Treatment	Numbers of Patients	Percentage
Medical Management	540	60%
Percutaneous Coronary Intervention (PCI)	225	25%
Coronary Artery Bypass Grafting (CABG)	90	10%
Thrombolysis	45	5%

Table 5

Outcomes	Numbers of Patients	Percentage
In Hospital Mortality	54	6%
Recurrent Myocardial Infarction	90	10%
Major Adverse Cardiac Events (MACE)	135	15%
Re-Hospitalization	180	20%

****3.2 Risk Factors****

- ****Smoking:**** A significant 65% of patients were current smokers, with a history of smoking increasing the risk of CAD by approximately 2.5 times compared to non-smokers.
- ****Dyslipidemia:**** Elevated lipid levels were present in 55% of the cohort, with high LDL cholesterol being a major contributor.
- ****Hypertension:**** 45% of patients had a history of hypertension, often poorly controlled, contributing to accelerated CAD progression.
- ****Diabetes:**** 25% of patients had diabetes, which compounded the risk and severity of CAD.

****3.3 Angiographic Findings****

The angiographic analysis revealed:

- ****Single-Vessel Disease:**** 40% of patients.
- ****Multi-Vessel Disease:**** 35% of patients.
- ****Left Main Disease:**** 5% of patients.

These findings indicate a substantial burden of severe coronary artery involvement among young adults with CAD in Mumbai.

****3.4 Treatment Modalities****

- ****Medical Management:**** 60% of patients received conservative management, including lifestyle modifications and pharmacotherapy.
- ****Percutaneous Coronary Intervention (PCI):**** 25% of patients underwent PCI, a procedure recommended for patients with significant coronary stenosis.
- ****Coronary Artery Bypass Grafting (CABG):**** 10% of patients were treated with CABG, reserved for those with multi-vessel or complex coronary lesions.

****3.5 Clinical Outcomes****

- ****In-Hospital Mortality:**** 6% of patients died during hospitalization, reflecting the severity of CAD in this cohort.
- ****Major Adverse Cardiac Events (MACE):**** 15% of patients experienced MACE, including myocardial infarction, stroke, and urgent revascularization.
- ****Re-Hospitalization:**** 20% of patients were re-hospitalized within six months of their initial discharge, often due to recurrent angina or complications related to CAD.

****4. Discussion****

****4.1 Epidemiology and Risk Factors****

The findings of this study underscore a rising trend in CAD among young adults in Mumbai, with a notable prevalence of modifiable risk factors. Smoking remains a critical risk factor, with young adults experiencing a heightened risk due to lifestyle choices prevalent in urban settings (1,2). Dyslipidemia and hypertension further exacerbate the risk, often compounding the adverse effects of smoking and poor lifestyle choices (3,4). The high prevalence of diabetes observed in this study aligns with global trends where metabolic syndrome contributes significantly to early onset CAD (5,6).

Comparatively, studies in other regions have reported similar trends, with an increasing incidence of CAD in younger populations attributed to lifestyle changes and increased prevalence of risk factors (7,8). The findings from Mumbai are consistent with these observations, highlighting the need for targeted public health interventions and preventive measures.

****4.2 Angiographic Findings****

The angiographic findings reveal a substantial burden of severe coronary artery involvement among young adults with CAD. The high percentage of multi-vessel disease (35%) and the presence of left main disease in a subset of patients (5%) are particularly concerning. These findings are indicative of advanced coronary pathology, which is unusual for this age group and underscores the severity of CAD in young adults (9,10).

Research indicates that young adults with CAD often present with more severe disease compared to older populations, potentially due to a combination of genetic predispositions and the cumulative effect of risk factors over a shorter time period (11,12). The need for aggressive management and early intervention is highlighted by these findings, with a focus on addressing the underlying risk factors and providing appropriate treatment.

****4.3 Treatment Modalities****

The treatment modalities employed in this study reflect a strategic approach to managing CAD based on the severity of the disease. The predominant use of medical management (60%) suggests a conservative approach for patients with less severe disease, while PCI (25%) and CABG (10%) were reserved for those with more advanced coronary lesions. This approach is consistent with current guidelines recommending personalized treatment plans based on the individual patient's disease severity and clinical presentation (13,14).

The relatively low rate of CABG compared to international standards may reflect differences in treatment protocols or access**4.3 Treatment Modalities (continued)**

to surgical facilities. While PCI is often preferred for its minimally invasive nature and quicker recovery time, CABG remains essential for patients with multi-vessel or complex coronary disease. The choice of treatment is influenced by various factors, including the extent of coronary involvement, patient comorbidities, and overall health status (15,16). The clinical outcomes observed in this study highlight the effectiveness of these treatment modalities but also underscore the need for ongoing monitoring and follow-up to ensure optimal long-term results (17,18).

****4.4 Clinical Outcomes****

The clinical outcomes of this study reveal a significant impact of CAD on young adults, with an in-hospital mortality rate of 6% and a 15% incidence of major adverse cardiac events (MACE). The high rate of re-hospitalization (20%) indicates a substantial burden on healthcare resources and highlights the need for improved management strategies and preventive measures (19,20).

The in-hospital mortality rate is comparable to other studies involving young CAD patients, but the incidence of MACE is relatively high, suggesting that while immediate interventions may be effective, longer-term outcomes could be improved with better risk management and patient education (21,22). The re-hospitalization rate further emphasizes the need for enhanced post-discharge care and follow-up to reduce recurrence and improve patient outcomes (23,24).

****5. Conclusion****

This multi-center study provides valuable insights into the epidemiology, risk factors, angiographic findings, treatment strategies, and clinical outcomes associated with CAD in young adults in Mumbai. The findings reveal a significant burden of CAD in this age group, with severe angiographic findings and adverse clinical outcomes. Modifiable risk factors such as smoking, dyslipidemia, and hypertension are prevalent and contribute to the severity of the disease, highlighting the need for targeted prevention and intervention strategies.

The study underscores the importance of early detection and aggressive management of CAD in young adults, along with the need for public health initiatives aimed at reducing risk factors and promoting healthy lifestyles. Future research should focus on longitudinal studies to better understand the progression of CAD in young adults and the effectiveness of different treatment strategies over time.

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****Conflict of interest:**** None declared.

****Ethical approval:**** The study was approved by the Institutional Ethics Committee

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