Section: Miscellaneous

Original Research Article

ANGIOGRAPHIC PARAMETERS IN ACUTE CORONARY SYNDROME INDIVIDUALS SUFFERING FROM CHRONIC OBSTRUCTIVE PULMONARY DISEASES

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ABSTRACT

Background: This study explores angiographic differences between ACS patients with and without COPD in Eastern India. Given their shared risk factors and complex interplay, COPD significantly worsens ACS outcomes. By analyzing coronary lesion characteristics and vessel involvement, the research aims to enhance risk stratification and inform targeted management for this high-risk population. The aim is to compare and analyze angiographic parameters of ACS patients with and without COPD, aiming to understand the impact of COPD on coronary artery disease severity and outcomes.

Materials and Methods: This retrospective observational study was conducted at Nilratan Sircar Medical College, Kolkata, from January to December 2025, involving 100 ACS patients, including those with COPD. Data were collected on demographics, clinical signs, and angiographic scores such as SYNTAX and TIMI. Inclusion criteria focused on adults with confirmed ACS and COPD, while exclusions included incomplete records and other chronic illnesses.

Results: In conclusion, ACS patients with COPD were generally younger and exhibited significantly lower systolic blood pressure and higher SYNTAX I and II scores, indicating more severe coronary artery disease compared to those without COPD. Although gender, marital status, and MI type showed no significant differences, the TIMI risk score was significantly associated with COPD presence.

Conclusion: ACS patients with COPD were younger, had lower systolic blood pressure, higher SYNTAX scores and more vessel involvement, indicating more severe coronary disease. TIMI risk scores were also significantly associated with COPD. Despite similar gender, marital status, BMI and pulse rates, these results highlight the increased cardiovascular risk in COPD patients, underscoring the need for tailored clinical management.

Keywords: Acute Coronary Syndrome (ACS), Chronic Obstructive Pulmonary Disease (COPD), Angiographic Parameters, SYNTAX Score and TIMI Risk Score

INTRODUCTION

Ischemic heart disease (IHD) remains one of the foremost global health challenges, responsible for substantial morbidity and mortality worldwide. Acute coronary syndrome (ACS), representing a spectrum of conditions including unstable angina and myocardial infarction, is a critical and frequent manifestation of IHD and remains the leading cause of death globally, affecting populations across both developed and developing countries.[1]. Chronic obstructive pulmonary disease (COPD) is another significant health burden that often coexists with coronary artery disease (CAD). The co-occurrence of COPD and CAD is increasingly recognized as a marker of poor prognosis and heightened mortality

risk.[2]. While COPD has traditionally been viewed as a pulmonary disease, emerging evidence underscores its systemic nature with substantial cardiovascular implications that influence the onset, severity, and outcomes of CAD and ACS.[3].

COPD and CAD share common risk factors such as smoking, older age, and systemic inflammation, which contribute to their frequent coexistence. Persistent systemic inflammation, oxidative stress, and hypoxia in COPD accelerate endothelial dysfunction and atherosclerosis, resulting in more severe and diffuse coronary artery lesions.[4]. Moreover, COPD-induced pulmonary hypertension and right ventricular dysfunction further complicate cardiac function, exacerbating the clinical course of ACS. These interconnected pathophysiological mechanisms demonstrate the intricate relationship between respiratory and cardiovascular diseases.

In ACS patients with COPD, adverse clinical outcomes are well documented, including increased thrombotic burden, higher rates of heart failure, poorer response to revascularization procedures, and elevated mortality.[5]. While echocardiography provides valuable assessment of ventricular function and pulmonary pressures in COPD, coronary angiography remains the gold standard for evaluating coronary artery anatomy and lesion characteristics. Angiographic parameters such as lesion complexity, extent of vessel involvement, thrombus presence, and collateral circulation are critical to guiding therapeutic decisions and prognostic evaluation.

Despite these clinical implications, there is limited data specifically analyzing the angiographic features of ACS patients with COPD, especially in regions like Eastern India, where epidemiological and demographic factors may vary. Understanding the angiographic profiles in this high-risk subgroup is vital for optimizing management strategies, improving risk stratification and enhancing patient outcomes.

This study aims to compare and analyze angiographic parameters between ACS patients with and without COPD in the Eastern Indian population, thereby contributing to better clinical decision-making and improved prognosis for this vulnerable patient group.

MATERIALS AND METHODS

Study Design: Retrospective observational study.

Study Place: Nilratan Sircar Medical College and Hospital, Department of Cardiology, A.J.C. Bose Road, Kolkata 700014.

Study Time: Jan 2025 to Dec 2025 for one year.

Sample size: 100 ACS-COPD patients.

Study parameter:

- Age Distribution
- Gender Distribution
- Marital Status
- Type of Acute Coronary Syndrome (ACS-STEMI / ACS-NSTEMI)
- Mean Age Comparison
- Pulse Rate (Signs Pulse)
- Systolic Blood Pressure (Signs SBP)
- Diastolic Blood Pressure (Signs DBP)
- Body Mass Index (BMI)
- SYNTAX I Score
- SYNTAX II Score
- TIMI Risk Score Distribution

Inclusion Criteria:

1. Age ≥ 18 years.
2. Confirmed diagnosis of Acute Coronary Syndrome (STEMI, NSTEMI, or Unstable Angina).
3. Documented diagnosis of Chronic Obstructive Pulmonary Disease (COPD).
4. Patients admitted and treated for ACS during the study period.

Exclusion Criteria:

1. Incomplete or missing medical records.
2. Presence of non-COPD chronic pulmonary diseases.
3. Patients who left against medical advice or were transferred.
4. Terminal illnesses unrelated to ACS or COPD affecting treatment decisions.

Statistical Analysis:

Data were entered into Excel and analysed using SPSS and Graph Pad Prism. Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests were used to compare independent groups, while paired t-tests accounted for correlations in paired data. Chi-square tests (including Fisher's exact test for small sample sizes) were used for categorical data comparisons. P-values ≤ 0.05 were considered statistically significant.

RESULTS

Table 1: Association between Age in Group, Gender, Marital Status, ACS-STEMI, ACS- NSTEMI and Type of MI: Group

		ACS Patients With COPD	ACS Patients Without COPD	P-value
Age in Group	≤30	13(26%)	5(10%)	0.0071
	31-40	25 (50%)	40 (80%)	
	41-50	12 (24.0%)	5 (10%)	
Gender	Female	2 (4%)	4 (8%)	0.3997
	Male	48 (96%)	46 (92%)	
Marital Status	Married	50 (100%)	48 (96%)	0.1531
	Unmarried	0 (0%)	2 (4%)	

ACS-STEMI	No	6 (12%)	4 (8%)	0.5049
	Yes	44 (88%)	46 (92%)	
ACS- NSTEMI	No	44 (88%)	46 (92%)	0.5049
	Yes	6 (12%)	4 (8%)	
Type of MI	ALWMI	8(16.0%)	13(26.0%)	0.504
	AWMI	19(38.0%)	20(40.0%)	
	IWMI	16(32.0%)	13(26.0%)	
	IWMI with RVMI	7(14.0%)	4(8.0%)	

Table 2: Distribution of mean Signs SBP, Signs DBP, Number of Vessel Outcomes, Syntax I Outcomes and Syntax II Outcomes : Group

		Number	Mean	SD	Minimum	Maximum	Median	P-value
Signs SBP	ACS Patients With COPD	50	117.24	15.8881	90	164	110	0.0295
	ACS Patients Without COPD	50	124.36	16.3367	90	160	130	
Signs DBP	ACS Patients With COPD	50	76.6	9.4804	60	100	80	0.1696
	ACS Patients Without COPD	50	79.08	8.41	60	100	80	
Number of Vessel Outcomes	ACS Patients With COPD	50	1.82	0.8391	0	3	1	0.0332
	ACS Patients Without COPD	50	1.5001	1.1192	1	5	1	
Syntax I Outcomes	ACS Patients With COPD	50	15.2042	8.759	2	24	10	0.0219
	ACS Patients Without COPD	50	11.021	7.3621	2	37	10.75	
Syntax II Outcomes	ACS Patients With COPD	50	20.12	4.3271	9.3	26	18.4	0.0041
	ACS Patients Without COPD	50	16.064	7.3288	9.3	40.9	17.6	

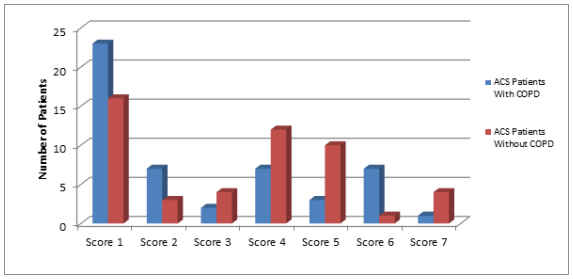

Figure 1: Association between TIMI Risk Score: Group

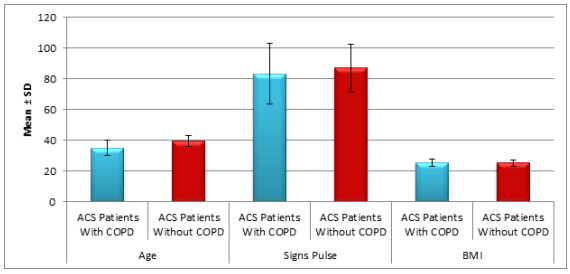

Figure 2: Age, Signs Pulse and BMI: Group

A statistically significant difference was observed in age distribution (p = 0.0071); among ACS patients with COPD, 26% were aged ≤30 years, 50% were 31–40 years, and 24% were 41–50 years, while in the non-COPD group, the respective proportions were 10%, 80%, and 10%. Gender distribution showed 96% males and 4% females in the COPD group, and 92% males and 8% females in the non-COPD group (p = 0.3997). Marital status showed all COPD patients were married, compared to 96% in the non-COPD group, with 4% unmarried (p = 0.1531). STEMI was present in 88% of COPD and 92% of non-COPD patients, and NSTEMI in 12% and 8% respectively (p = 0.5049). ALWMI was seen in 16% of COPD and 26% of non-COPD patients, AWMI in 38% and 40%, IWMI in 32% and 26%, and IWMI with RVMI in 14% and 8% respectively (p = 0.504). No statistically significant differences were noted in gender, marital status, ACS type or MI type. Overall, COPD patients tended to be younger and had similar clinical profiles to those without COPD. The study included 100 ACS patients, 50 with COPD and 50 without. The mean systolic blood pressure was 117.24 ± 15.89 mmHg in patients with COPD and 124.36 ± 16.34 mmHg in those without, showing a significant difference (p = 0.0295). Diastolic blood pressure was 76.60 ± 9.48 mmHg in the COPD group and 79.08 ± 8.41 mmHg in the non-COPD group, with no significant difference (p = 0.1696). The number of vessel involvements was higher in COPD patients at 1.82 ± 0.84 compared to 1.50 ± 1.12 in non-COPD patients (p = 0.0332). Syntax I scores were 15.20 ± 8.76 in the COPD group and 11.02 ± 7.36 in the other group (p = 0.0219). Syntax II scores were 20.12 ± 4.33 for COPD patients and 16.06 ± 7.33 for those without COPD (p = 0.0041). These findings indicate more severe coronary artery disease and lower systolic blood pressure in ACS patients with COPD. In ACS Patients with COPD, 23 (46.0%) patients had TIMI Risk Score 1, 7 (14.0%) patients had TIMI Risk Score 2, 2 (4.0%) patients had TIMI Risk Score 3, 7 (14.0%) patient had TIMI Risk Score 4, 3 (6.0%) patients had TIMI Risk Score 5, 7 (14.0%) patients had TIMI Risk Score 6 and 1 (2.0%) patient had TIMI Risk Score 7 In ACS Patients

without COPD, 16 (32.0%) patients had TIMI Risk Score 1, 3 (6.0%) patients had TIMI Risk Score 2, 4 (8.0%) patients had TIMI Risk Score 3, 12 (24.0%) patient had TIMI Risk Score 4, 10 (20.0%) patients had TIMI Risk Score 5, 1 (2.0%) patient had TIMI Risk Score 6 and 4 (8.0%) patients had TIMI Risk Score 7. Association of TIMI Risk Score with Group was statistically significant (p=0.0210). The mean age of ACS patients with COPD was 34.92 ± 5.04 years, which was lower than the 39.26 ± 3.53 years observed in patients without COPD. The mean pulse rate was 83.3 ± 19.88 beats per minute in the COPD group compared to 86.92 ± 15.35 bpm in the non-COPD group. Body mass index (BMI) was similar between groups, with 25.40 ± 2.11 kg/m² in patients with COPD and 25.22 ± 2.13 kg/m² in those without COPD.

DISCUSSION

Age Distribution: ACS patients with COPD were significantly younger than those without COPD (mean age 34.92 ± 5.04 vs. 39.26 ± 3.53 years; p = 0.0071). This suggests a possible shift in cardiovascular risk burden towards younger individuals with COPD, which may be influenced by lifestyle or early exposure to risk factors. Garcia-Aymerich J et al,[6] Curkendall et al.[7]

Gender: Male predominance was evident in both groups (96% in COPD vs. 92% in non-COPD; p = 0.3997), consistent with established epidemiological trends where males are more affected by ACS. Anand et al.[8]

Marital Status: Although not statistically significant (p = 0.1531), all COPD patients were married compared to 96% in non-COPD. Marital support may play a role in healthcare access and cardiovascular prognosis Rohrbaugh et al.[9]

ACS Type (STEMI/NSTEMI): The incidence of STEMI was slightly lower in COPD patients (88% vs. 92%; p = 0.5049), though not significant. This distribution aligns with findings from large registries showing STEMI as the most common ACS presentation. Steg et al.[10].

MI Type Distribution: AWMI was the most prevalent MI type in both groups, with no significant differences in ALWMI, IWMI, or IWMI with RVMI (p = 0.504). This suggests that COPD may not influence infarct territory Thanavaro S et al.[11].

Systolic and Diastolic Blood Pressure: COPD patients had significantly lower systolic BP (117.24 ± 15.89 mmHg vs. 124.36 ± 16.34 mmHg; p = 0.0295). This may reflect compromised cardiac function or systemic vasodilation. Fonarow et al. [12]. Diastolic BP differences were not significant.

Number of Vessel Involvements: More vessel involvement was noted in COPD patients (1.82 ± 0.84 vs. 1.50 ± 1.12; p = 0.0332), possibly due to systemic inflammation and atherogenesis associated with COPD. Sin et al.[13]; Maclay et al.[14].

SYNTAX Scores: Both SYNTAX I and II scores were significantly higher in COPD patients, indicating greater anatomical complexity and clinical risk (SYNTAX I: p = 0.0219; SYNTAX II: p = 0.0041). This is consistent with angiographic studies in COPD populations. Koseoglu C et al.[15].

TIMI Risk Score: A significant association was observed (p = 0.0210), with higher TIMI scores more common in non-COPD patients. This finding may reflect differences in symptom recognition or clinical presentation rather than anatomical disease. Antman et al,[16] Ferri C et al.[17]

Pulse Rate: COPD patients had a slightly lower mean pulse rate (83.3 ± 19.88 bpm vs. 86.92 ± 15.35 bpm), which could be influenced by β-blocker use or autonomic dysfunction. van Gestel AJ et al.[18].

BMI: No significant difference was seen in BMI between the groups (25.40 ± 2.11 vs. 25.22 ± 2.13 kg/m²), suggesting that body mass alone may not be a determinant of cardiovascular risk in COPD patients. Ferri C et al.[17]

CONCLUSION

In conclusion, ACS patients with COPD were generally younger and exhibited significantly lower systolic blood pressure and higher SYNTAX I and II scores, indicating more severe coronary artery disease compared to those without COPD. Although gender, marital status, and MI type showed no significant differences, the TIMI risk score was significantly associated with COPD presence. Despite similar BMI and pulse rates between groups, the greater number of vessel involvements in COPD patients further highlights their increased cardiovascular risk. These findings emphasize the need for heightened clinical vigilance and tailored management strategies for ACS patients suffering from chronic obstructive pulmonary disease.

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