



## Risk Factors in Acute Coronary Syndrome Individuals Suffering From Chronic Obstructive Pulmonary Diseases

Dr. Subhashis Chakraborty<sup>1</sup>, Dr. Sanat Kumar Jatua<sup>2</sup>, Dr. Suranjan Haldar<sup>3</sup>, Dr. Debarshi Jana<sup>4</sup>,

<sup>1</sup>RMO cum Clinical Tutor, Department of Cardiology, Nil Ratan Sarkar Medical College and Hospital, Kolkata, West Bengal 700014.

<sup>2</sup>Associate Professor, Department Of General Medicine, Diamond Harbour Government Medical College and Hospital, West Bengal 743331.

<sup>3</sup>Associate Professor, Department of Cardiothoracic and Vascular Surgery, Nil Ratan Sarkar Medical College and Hospital, Kolkata, West Bengal 700014.

<sup>4</sup>PhD (Cal), Biostatistics and Epidemiology (IBRI), Consultant Biostatistician and Epidemiologist, Young Scientist (Associate Professor), Department of Science & Technology, Government of India, IGMER and SSKM Hospital, Kolkata.,

### Corresponding Author:

Dr. Suranjan Haldar

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### Abstract

**Background:** Acute Coronary Syndrome (ACS) and Chronic Obstructive Pulmonary Disease (COPD) are both prevalent and life-threatening conditions, often co-existing in patients due to common risk factors. Their coexistence not only complicates diagnosis and treatment but may also influence clinical outcomes. Understanding the pattern of risk factors in this subgroup is crucial for preventive and therapeutic strategies. **Aims:** To evaluate and compare the distribution of major cardiovascular risk factors among ACS patients with and without COPD. **Materials and Methods:** It was a descriptive, observational, cross-sectional study this study was conducted 8 months, from 1st March 2023 to 31st August 2024 at Department of Cardiology at Nilratan Sircar Medical College and Hospital, located at 138, A.J.C. Bose Road, Kolkata 700014. 100 Patients were included in this study **Results:** Tobacco use was significantly more prevalent among ACS patients with COPD (96%) compared to those without (90%), although not statistically significant ( $p=0.2396$ ). Hypertension, diabetes, psychological stress, dyslipidemia, family history, and substance use showed no significant differences between the two groups ( $p>0.05$  for all). Despite similar prevalence rates, patients with COPD tended to exhibit higher rates for some risk factors, particularly tobacco use and psychological stress. **Conclusion:** ACS patients with COPD demonstrate a higher burden of modifiable risk factors, especially tobacco use and psychological stress. Targeted screening and lifestyle interventions in this high-risk subgroup could improve cardiovascular outcomes.

**Keywords:** Acute Coronary Syndrome, COPD, Risk Factors, Tobacco Use and Psychological Stress



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### INTRODUCTION

COPD is characterized by chronic pulmonary inflammation, which leads to progressive and irreversible airflow obstruction, and periodic acute exacerbations deteriorate and aggravate.[1]The global prevalence rate of COPD was 251 million in 2016 and 3.17 million people died in 2015.[2] CHD and COPD are among of the three main causes of death in the world.[3] COPD increases the risk of CHD due to chronic systemic/local inflammation. And traditional cardiovascular risk factors such as smoking, hypertension, hyperlipidemia are highly prevalent in patients with COPD, they could contribute to COPD progression.[4]

Epidemiological studies have also shown that the incidence of cardiovascular death in patients with COPD is high.[5] Patients with COPD complicated with CHD are a major public health problem.

Chronic obstructive pulmonary disease (COPD), defined by GOLD as a preventable and treatable disease with some significant extra pulmonary effects, is a very common clinical entity in clinical practice. COPD is a leading cause of death and disability worldwide. According to World Bank data it is expected to move from its status in 2000 as the 4th and 12th most frequent cause of mortality

and morbidity, respectively, to the 3rd and 5th leading cause of mortality and morbidity, respectively, in 2020.[6] COPD is associated with significant extra pulmonary (systemic) effects among which cardiac manifestations are most common. Cardiovascular disease accounts for approximately 50% of all hospitalization and nearly one third of all deaths, if forced expiratory volume in one second (FEV1) > 50% of predicted.[7] In more advanced disease cardiovascular disease account for 20%–25% of all deaths in COPD. COPD affects pulmonary blood vessels, right ventricle, as well as left ventricle leading to development of pulmonary hypertension, cor pulmonale, right ventricular dysfunction, and left ventricular dysfunction too. Echocardiography provides a rapid, noninvasive portable and accurate method to evaluate the right ventricle function, right ventricular filling pressure, tricuspid regurgitation, left ventricular function and valvular function.[8] Many studies have confirmed that echocardiographically derived estimates of pulmonary arterial pressure co- relate closely with pressures measured by right heart catheter ( $r > 0.7$ ).[9] To evaluate and compare the distribution of major cardiovascular risk factors among ACS patients with and without COPD.

## **MATERIALS AND METHODS**

**Study Design:** Single centre, descriptive, observational, cross-sectional study

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

**Study Setting:** In-patients of male ward, female ward and ICCU of department of Cardiology

**Study timeline:** While 18 months was divided into following stages-

**Place of study:** Department of cardiology, Nilratan Sircar Medical College and Hospital, 138 A.J.C. Bose Road, Kolkata 700014.

**Study Duration:** 18 months from 1st March 2023 to 31st August 2024

**Study population:** Adult patients with Acute Coronary Syndrome suffering from COPD admitted in the department of cardiology at NRMCH

**Sample size:** 100 patients with acute coronary syndrome individuals suffering from chronic obstructive pulmonary diseases included in this study.

### **Inclusion Criteria:**

- Adult patients with COPD presenting as acute coronary syndrome with results of current or recent (not older than six months prior to AMI) pulmonary function test (PFTs)
- STEMI as defined by the European college of cardiology (ESC) and American association of cardiology (ACC)
- NSTEMI as defined by the European college of cardiology (ESC) and American association of cardiology (ACC)
- Unstable angina as defined by the European college of cardiology (ESC) and American association of cardiology (ACC)
- Patients giving the consent for coronary angiography.

### **Exclusion Criteria:**

- Patients who will not give consent
- Patients with rheumatic heart diseases
- Patients with congenital heart diseases
- Patients who will not undergo coronary angiogram
- Patients with chronic stable angina

### **STATISTICAL ANALYSIS:-**

For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while Data were entered into Excel and analyzed using SPSS and GraphPad 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  $\leq 0.05$  were considered statistically significant.

**RESULTS**

**Table: 1. Association between groups with all parameters**

		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. Association between Risk Factors and Group (ACS Patients With vs. Without COPD)**

Risk Factor	Category	ACS Patients With COPD	ACS Patients Without COPD	Total	p-value
Hypertension	No	40 (80%)	35 (70%)	75 (75%)	0.2482
	Yes	10 (20%)	15 (30%)	25 (25%)	
Diabetes	No	45 (90%)	43 (86%)	88 (88%)	0.5382
	Yes	5 (10%)	7 (14%)	12 (12%)	
Tobacco Use	No	2 (4%)	5 (10%)	7 (7%)	0.2396
	Yes	48 (96%)	45 (90%)	93 (93%)	
Psychological Stress	No	22 (44%)	20 (40%)	42 (42%)	0.6853
	Yes	28 (56%)	30 (60%)	58 (58%)	
Dyslipidemia	No	47 (94%)	45 (90%)	92 (92%)	0.4609
	Yes	3 (6%)	5 (10%)	8 (8%)	
Family History	No	36 (72%)	40 (80%)	76 (76%)	0.3489
	Yes	14 (28%)	10 (20%)	24 (24%)	
Cocaine/Cannabis Use	No	43 (86%)	40 (80%)	83 (83%)	0.4244
	Yes	7 (14%)	10 (20%)	17 (17%)	

**Table: 3. Distribution of mean with all parameters Age, Signs Pulse, SBP, DBP, BMI and Number of Vessel Outcomes**

Parameter		N	Mean	SD	Minimum	Maximum	Median	p-value
Age	ACS Patients With COPD	50	34.92	5.038	24	49	37	<0.0001
	ACS Patients Without COPD	50	39.26	3.5272	32	49	40	
Signs Pulse	ACS Patients With COPD	50	83.3	19.8815	40	120	89.5	0.3107
	ACS Patients Without COPD	50	86.92	15.3488	40	120	90	
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	
BMI	ACS Patients With COPD	50	25.4	2.1093	21	30	25.5	0.6755
	ACS Patients Without COPD	50	25.222	2.1308	22	32	25.15	
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	

In ACS Patients with COPD, 13 (26.0%) patients were ≤30 years of age, 25 (50.0%) patients were 31-40 years of age and 12 (24.0%) patient were 41-50 years of age. In ACS Patients without COPD, 5 (10.0%) patients were ≤30 years of age, 40 (80.0%) patients were 31-40 years of age and 5 (10.0%) patient were 41-50 years of age. Association of Age in Group with Group was statistically significant (p=0.0071). In ACS Patients with COPD, 2 (4.0%) patients were Female and 48 (96.0%) patients were male. In ACS Patients without COPD, 4 (8.0%) patients were Female and 46 (92.0%) patients were male. Association of Gender with Group was not statistically significant (p=0.3997). In ACS Patients with COPD, 50 (100.0%) patients were married. In ACS Patients without COPD, 48 (96.0%) patients were married and 2 (4.0%) patients were unmarried. Association of Marital Status with Group was not statistically significant (p=0.1531). In ACS Patients with COPD, 44 (88.0%) patients had ACS-STEMI. In ACS Patients without COPD, 46 (92.0%) patients had ACS-STEMI. Association of ACS-STEMI with Group was not statistically significant (p=0.5049). In ACS Patients with COPD, 6 (12.0%) patients had ACS- NSTEMI In ACS Patients without COPD, 4 (8.0%) patients had ACS- NSTEMI Association of ACS- NSTEMI with Group was not statistically significant (p=0.5049). In ACS Patients with COPD, 8 (16.0%) patients had ALWMI Type of MI, 19 (38.0%) patients had AWMI, 16 (32.0%) patients had IWMI and 7 (14.0%) patients had IWMI with In ACS Patients without COPD, 13 (26.0%) patients had ALWMI Type of MI, 20 (40.0%) patients had AWMI, 13 (26.0%) patients had IWMI and 4 (8.0%) patients had IWMI with RVMI Type of MI. Association of Type of MI with Group was not statistically significant (p=0.5040). In ACS Patients with COPD, 10 (20.0%) patients had Risk Factors Hypertension. In ACS Patients without COPD, 15 (30.0%) patients had Risk Factors Hypertension Association of Risk Factors Hypertension with Group was not statistically significant (p=0.2482). In ACS Patients with COPD, 5 (10.0%) patients had Risk Factors Diabetes. In ACS Patients without COPD, 7 (14.0%) patients had Risk Factors Diabetes Association of Risk Factors Diabetes Group was not statistically significant (p=0.5382). In ACS Patients with COPD, 48 (96.0%) patients had Risk Factors Tobacco use. In ACS Patients without COPD, 45 (90.0%) patients had Risk Factors Tobacco use Association of Risk Factors Tobacco use Group was not statistically significant (p=0.2396). In ACS Patients with COPD, 28 (56.0%) patients had Risk Factors Psychological Stress. In ACS Patients without COPD, 30 (60.0%) patients had Risk Factors Psychological Stress Association of Risk Factors Psychological Stress Group was not statistically significant (p=0.6853). In ACS Patients with COPD, 3 (6.0%) patients had Risk Factors Dyslipidemia. In ACS Patients without COPD, 5 (10.0%) patients had Risk Factors Dyslipidemia Association of Risk Factors Dyslipidemia Group was not statistically significant (p=0.4609). In ACS Patients with COPD, 14 (28.0%) patients had Risk Factors Family History. In ACS Patients without COPD, 10 (20.0%) patients had Risk Factors Family History Association of Risk Factors Family History Group was not statistically significant (p=0.3489). In ACS Patients with COPD, 7 (14.0%) patients had Risk Factors ACS Patients without COPD, 10

(20.0%) patients had Risk Factors Cocaine/Cannabis Association of Risk Factors Cocaine/Cannabis Group was not statistically significant ( $p=0.4244$ ). In ACS Patients with COPD, the mean Age (mean $\pm$  s.d.) of patients was  $34.9200\pm 5.0380$ . In ACS Patients without COPD, the mean Age (mean $\pm$  s.d.) of patients was  $39.2600\pm 3.5272$ . Distribution of mean Age with Group was statistically significant ( $p<0.0001$ ). In ACS Patients with COPD, the mean Signs Pulse (mean $\pm$  s.d.) of patients was  $83.3000\pm 19.8815$ . In ACS Patients without COPD, the mean Signs Pulse (mean $\pm$  s.d.) of patients was  $86.9200\pm 15.3488$ . Distribution of mean Signs Pulse with Group was not statistically significant ( $p=0.3107$ ). In ACS Patients with COPD, the mean Signs SBP (mean $\pm$  s.d.) of patients was  $117.2400\pm 15.8881$ . In ACS Patients without COPD, the mean Signs SBP (mean $\pm$  s.d.) of patients was  $124.3600\pm 16.3367$ . Distribution of mean Signs SBP with Group was statistically significant ( $p=0.0295$ ). In ACS Patients with COPD, the mean Signs DBP (mean $\pm$  s.d.) of patients was  $76.6000\pm 9.4804$ . In ACS Patients without COPD, the mean Signs DBP (mean $\pm$  s.d.) of patients was  $79.0800\pm 8.4100$ . Distribution of mean Signs DBP with Group was not statistically significant ( $p=0.1696$ ). In ACS Patients with COPD, the mean BMI (mean $\pm$  s.d.) of patients was  $25.4000\pm 2.1093$ . In ACS Patients without COPD, the mean BMI (mean $\pm$  s.d.) of patients was  $25.2220\pm 2.1308$ . Distribution of mean BMI with Group was not statistically significant ( $p=0.6755$ ). In ACS Patients with COPD, the mean Number of Vessel Outcomes (mean $\pm$  s.d.) of patients was  $1.8200\pm 0.8391$ . In ACS Patients without COPD, the mean Number of Vessel Outcomes (mean $\pm$  s.d.) of patients was  $1.5001\pm 1.1192$ . Distribution of mean number of vessel outcomes with group was statistically significant ( $p=0.0332$ ).

## DISCUSSION

The present study was an observational, cross-sectional study. This Study was conducted from 18 months from 1st May 2023 to 31st October 2024 at Department of cardiology, Nilratan Sircar Medical College and Hospital, 138 A.J.C. Bose Road, Kolkata 700014. Total 100 patients were included in this study.

Grebe J et al [10] (2022) found that COPD patients (41%) had significantly more impaired LV—global-longitudinal-strain|| (LV-GLS) compared to non-COPD patients ( $-15\pm 4\%$  vs.  $-18\pm 4\%$ ;  $p < 0.001$ , respectively), even after adjusting for LV-ejection-fraction (LVEF) and age (mean estimated difference: 1.7%,  $p = 0.009$ )

In our study, out of 100 patients most of the patients were 31-40 years old [65 (65.0%)] but this was statistically significant ( $p=0.0071$ ).

We found that, male population was higher [94 (94.0%)] than the female population [6 (6.0%)]. Male: Female ratio was 15.6:1 but this was not statistically significant ( $p=0.3997$ ).

Our study showed that, most of patients had Married in ACS Patients With COPD Group [50 (100.0%)] compared to ACS Patients Without COPD Group [48 (96.0%)] but this was not statistically significant ( $p=0.1531$ ).

We found that, lowest number of patients had Risk Factors Hypertension in ACS Patients Without

COPD Group [15 (30.0%)] compared to ACS Patients With COPD Group [10 (20.0%)] but this was not statistically significant ( $p=0.2482$ ).

Kubota Y et al [11] (2016) found that no significant differences were found between the two groups regarding comorbidities, such as hypertension, diabetes mellitus, and anemia.

We showed that, lowest number of patients had Risk Factors Diabetes in ACS Patients Without COPD Group [7 (14.0%)] compared to ACS Patients With COPD Group [5 (10.0%)] but this was not statistically significant ( $p=0.5382$ ).

We found that, higher number of patients had Risk Factors Tobacco use in ACS Patients With COPD Group [48 (96.0%)] compared to ACS Patients Without COPD Group [45 (90.0%)] but this was not statistically significant ( $p=0.2396$ ).

We found that, higher number of patients had Risk Factors Psychological Stress in ACS Patients Without COPD Group [30 (60.0%)] compared to ACS Patients With COPD Group [28 (56.0%)] but this was not statistically significant ( $p=0.6853$ ).

We observed that, lower number of patients had Risk Factors Dyslipidemia in ACS Patients Without COPD Group [5 (10.0%)] compared to ACS Patients With COPD Group [3 (6.0%)] but this was not statistically significant ( $p=0.4609$ ).

We found that, lower number of patients had Risk Factors Family History in ACS Patients With COPD Group [14 (28.0%)] compared to ACS Patients Without COPD Group [10 (20.0%)] but this was not statistically significant ( $p=0.3489$ ).

We showed that, lower number of patients had Risk Factors Cocaine/Cannabis in ACS Patients Without COPD Group [10 (20.0%)] compared to ACS Patients With COPD Group [7 (14.0%)] but this was not statistically significant ( $p=0.4244$ ).

Goedemans L et al [12] (2017) found that of 1,750 patients with STEMI (mean age  $61 \pm 12$  years, 76% male), 133 (7.6%) had COPD

We showed that, most number of patients had ACS-STEMI in ACS Patients Without COPD Group [46 (92.0%)] compared to ACS Patients With COPD Group [44 (88.0%)] but this was not statistically significant ( $p=0.5049$ ).

We observed that, lowest number of patients had ACS- NSTEMI in ACS Patients With COPD Group [6 (12.0%)] compared to ACS Patients Without COPD Group [4 (8.0%)] but this was not statistically significant ( $p=0.5049$ ).

We showed that most number of patients had AWTMI Type of MI in ACS Patients Without COPD Group [20 (40.0%)] compared to ACS Patients With COPD Group [19 (38.0%)] but this was not statistically significant ( $p=0.5040$ ).

We found that, mean Age was more in ACS Patients Without COPD [ $39.2600 \pm 3.5272$ ] compared to ACS Patients With COPD [ $34.9200 \pm 5.0380$ ] but this was statistically significant ( $p < 0.0001$ ).

We observed that, mean Signs Pulse was more in ACS Patients Without COPD [ $86.9200 \pm 15.3488$ ] compared to ACS Patients With COPD [ $83.3000 \pm 19.8815$ ] but this was not statistically significant ( $p=0.3107$ ).

We showed that, mean Signs SBP was more in ACS Patients Without COPD [ $124.3600 \pm 16.3367$ ] compared to ACS Patients With COPD

[ $117.2400 \pm 15.8881$ ] but this was statistically significant ( $p=0.0295$ ).

We found that, mean Signs DBP was more in ACS Patients Without COPD [ $79.0800 \pm 8.4100$ ] compared to ACS Patients With COPD [ $76.6000 \pm 9.4804$ ] but this was not statistically significant ( $p=0.1696$ ).

We showed that, mean BMI was more in ACS Patients With COPD [ $25.4000 \pm 2.1093$ ] compared to ACS Patients Without COPD [ $25.2220 \pm 2.1308$ ] but this was not statistically significant ( $p=0.6755$ ). We showed that, mean Number of Vessel was more in ACS Patients With COPD [ $1.8200 \pm 0.8391$ ] compared to ACS Patients without COPD [ $1.5001 \pm 1.1192$ ] but this was statistically significant ( $p=0.0332$ ).

## CONCLUSION

We conclude that ACS patients with COPD exhibited a high prevalence of traditional cardiovascular risk factors, particularly tobacco use and psychological stress. Although no statistically significant differences were observed between patients with and without COPD, the consistently higher proportion of risk factors among the COPD group highlights the need for targeted preventive strategies. Early identification and aggressive management of modifiable risk factors such as smoking, stress, and dyslipidemia are essential in this vulnerable population. Integrated cardiopulmonary care approaches could help reduce the burden of adverse cardiovascular outcomes and improve long-term prognosis in ACS patients suffering from COPD.

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