

Smoking Status Among Patients with Acute Coronary Syndrome Admitted to the Intensive Care Unit: A Cross-Sectional Study

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Abstract:

Background: Smoking is an important modifiable cardiovascular risk factor and is frequently observed among patients with acute coronary syndrome (ACS). However, the distribution of smoking status across ACS subtypes may vary according to population and clinical setting. **Objective:** This study aimed to describe smoking status among patients with ACS admitted to an intensive care unit (ICU) and to describe its distribution across ACS subtypes. **Methods:** A descriptive observational study with a cross-sectional design was conducted among 57 patients diagnosed with ACS and admitted to the ICU of RSI Jemursari, Surabaya, from January 2023 to December 2024. Smoking status was classified as active smoker or non-smoker based on the patient's status at admission. Data were analyzed descriptively using frequencies and percentages, including cross-tabulation of smoking status according to ACS subtype. **Results:** Of the 57 patients, 22 (38.6%) were active smokers and 35 (61.4%) were non-smokers. The most common ACS subtype was unstable angina pectoris (UAP), accounting for 35 patients (61.4%), followed by non-ST-elevation myocardial infarction (NSTEMI) in 18 patients (31.6%) and ST-elevation myocardial infarction (STEMI) in 4 patients (7.0%). Active smoking was documented in 14 (40.0%) patients with UAP and 8 (44.4%) patients with NSTEMI, whereas none of the patients with STEMI were active smokers. **Conclusion:** Active smoking was documented in 38.6% of ACS patients admitted to the ICU and was observed primarily among patients with UAP and NSTEMI. Given the descriptive design and the small number of STEMI cases, these findings should not be interpreted as evidence of an association between smoking status and ACS subtype. Nevertheless, documenting smoking status and providing smoking cessation support remain important components of comprehensive cardiovascular care.

Keywords: Acute Coronary Syndrome; Smoking Status; Unstable Angina Pectoris; Non-ST-Elevation Myocardial Infarction; Intensive Care Unit.

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Introduction

Acute Coronary Syndrome (ACS) comprises unstable angina pectoris (UAP), non-ST-elevation

myocardial infarction (NSTEMI), and ST-elevation myocardial infarction (STEMI), conditions that share a common pathophysiological mechanism of coronary artery obstruction due to atherosclerotic plaque

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rupture and thrombus formation (Timmis et al., 2023). ACS remains a major cause of death worldwide, accounting for over 7 million deaths annually, with its burden projected to rise due to population aging, lifestyle factors, and persistent risks such as smoking (Benjamin et al., 2019).

In low- and middle-income countries like Indonesia, ACS often affects younger, economically productive populations, leading to significant indirect costs (Chan et al., 2016). Regional studies in Southeast Asia show high rates of premature ACS associated with tobacco use, poor diet, and limited physical activity (Ng et al., 2014).

Smoking is widely recognized in previous epidemiological and clinical studies as one of the major modifiable risk factors for cardiovascular disease, including Acute Coronary Syndrome (ACS). Tobacco smoke contains nicotine, carbon monoxide, and oxidative compounds that contribute to endothelial dysfunction, platelet activation, vascular inflammation, and the progression of atherosclerosis (Rezkalla & Kloner, 2022; Aminuddin et al., 2023). Although previous studies have established smoking as an important cardiovascular risk factor, the present study was designed to provide a descriptive overview of smoking status among patients with ACS admitted to an intensive care unit rather than to evaluate causal or statistical associations.

To date, ICU-based evidence describing the smoking status of patients with different ACS subtypes in Indonesia remains limited. Describing this distribution may provide useful baseline information for clinical practice, smoking cessation counseling, and future analytical studies involving larger populations.

Therefore, this study aimed to describe the distribution of smoking status among patients with Acute Coronary Syndrome admitted to the Intensive Care Unit of RSI Jemursari Surabaya and to present the distribution of smoking status across ACS subtypes.

Materials and Methods

Study Design and Population

This was a descriptive observational study with a cross-sectional design. The study included 57 patients diagnosed with ACS and admitted to the Intensive Care Unit (ICU) of Rumah Sakit Islam (RSI) Jemursari Surabaya, Indonesia, from January 2023 to December 2024.

Materials

Data were obtained from hospital medical records, including demographic variables (age, sex), smoking status, and ACS subtype (UAP, NSTEMI, STEMI). Standard diagnostic instruments used in the hospital, such as electrocardiography (ECG) and laboratory testing for cardiac biomarkers (troponin, CK-MB), confirmed ACS diagnoses.

Smoking status was categorized as “smoker” if patients were documented as actively smoking at admission, and “non-smoker” otherwise. A limitation of this classification is that it did not capture smoking intensity, duration, or pack-years, potentially underestimating risk variation.

Data collection procedures

Data extraction was conducted in March 2025 using a standardized form. Inclusion criteria were: (1) confirmed ACS diagnosis; (2) complete demographic and clinical data; (3) ICU admission during the study period. Patients with congenital heart disease or incomplete records were excluded.

Data analysis

Data were entered and analyzed using IBM SPSS Statistics version 29.0. Descriptive statistical analyses were performed to summarize demographic characteristics, smoking status, and ACS subtype using frequencies and percentages. Cross-tabulation was used solely to present the distribution of smoking status across ACS subtypes. No inferential statistical analyses (such as chi-square tests, odds ratios, or regression analyses) were performed because the study was designed as a descriptive cross-sectional study and did not include a comparison group.

Result and Discussion

Result

Table 1. shows the total of 57 patients diagnosed with Acute Coronary Syndrome (ACS) were included in this study. The majority of patients were in the age group of 51–60 years, accounting for 22 individuals (37.9%), followed by the age group of 61–70 years with 13 individuals (22.4%), and those aged 71–80 years with 9 individuals (15.5%). Patients aged below 40 years represented the smallest proportion of the sample.

Table 1. Distribution of ACS Patients by Age Group

Age Group (years)	n	%
<40	3	5.3
41–50	10	17.5
51–60	22	37.9
61–70	13	22.4

>70	9	15.5
Total	57	100.0

In terms of sex distribution, the majority of ACS patients were male, with 41 individuals (71.9%), while female patients accounted for 16 individuals (28.1%). This finding reflects a higher prevalence of ACS among men in this ICU population.

Table 2. Distribution of ACS Patients by Sex

Sex	n	%
Male	41	71.9
Female	16	28.1
Total	57	100.0

Regarding smoking status, 22 patients (38.6%) were identified as active smokers at the time of admission, whereas the remaining 35 patients (61.4%) were non-smokers. The classification of ACS types showed that Unstable Angina Pectoris (UAP) was the most prevalent, with 35 cases (61.4%), followed by Non-ST-Elevation Myocardial Infarction (NSTEMI) with 18 cases (31.6%), and ST-Elevation Myocardial Infarction (STEMI) with 4 cases (7.0%).

Table 3. Distribution of ACS Patients by Smoking status

Smoking Status	n	%
Smoker	22	38.6
Non-smoker	35	61.4
Total	57	100.0

The classification of ACS types showed that Unstable Angina Pectoris (UAP) was the most prevalent, with 35 cases (61.4%), followed by Non-ST-Elevation Myocardial Infarction (NSTEMI) with 18 cases (31.6%), and ST-Elevation Myocardial Infarction (STEMI) with 4 cases (7.0%).

Table 4. Distribution of ACS types

ACS Type	n	%
UAP	35	61.4
NSTEMI	18	31.6
STEMI	4	7.0
Total	57	100.0

Cross-tabulation between smoking status and ACS type revealed that among UAP patients, 14 individuals (40.0%) were smokers and 21 individuals (60.0%) were non-smokers. In NSTEMI cases, 8 individuals (44.4%) were smokers and 10 individuals (55.6%) were non-smokers. Notably, all four patients with STEMI were non-smokers.

Table 5. Cross Tabulation Between Smoking status and ACS Types

ACS Type	Smoker n (%)	Non-Smoke n (%)	Total n (%)
UAP	14 (40.0)	21 (60.0)	35 (100.0)
NSTEMI	8 (44.4)	10 (55.6)	18 (100.0)
STEMI	0 (0.0)	4 (100.0)	4 (100.0)
Total	22 (38.6)	35 (61.4)	57 (100.0)

These results describe the distribution of smoking status among ICU patients with different ACS subtypes. Active smokers were documented among patients with UAP and NSTEMI, whereas none of the four STEMI patients were recorded as active smokers during admission.

Discussion

Of the 57 patients with Acute Coronary Syndrome (ACS) included in this study, the largest age group was 51–60 years (37.9%), followed by 61–70 years (22.4%) and >70 years (15.5%). Male patients predominated, accounting for 71.9% of the study population, while female patients accounted for 28.1%. Active smoking was documented in 22 patients (38.6%), whereas 35 patients (61.4%) were classified as non-smokers. This demographic profile describes the characteristics of ACS patients admitted to the ICU at the study site.

The distribution of ACS types showed that Unstable Angina Pectoris (UAP) was the most common subtype (61.4%), followed by Non-ST-Elevation Myocardial Infarction (NSTEMI) at 31.6% and ST-Elevation Myocardial Infarction (STEMI) at 7.0%. Regarding smoking status, active smoking was documented in 40.0% of patients with UAP and 44.4% of patients with NSTEMI, while none of the four patients with STEMI were recorded as active smokers. These findings describe the distribution of smoking status across ACS subtypes in this ICU population. However, given the descriptive cross-sectional design and the small number of STEMI cases, these findings should not be interpreted as evidence of an association between smoking status and ACS subtype.

The presence of active smokers among patients with UAP and NSTEMI can be considered in the context of the established biological effects of tobacco exposure on the cardiovascular system. Cigarette smoke contains nicotine, carbon monoxide, and numerous oxidative compounds that can adversely affect vascular function. Nicotine stimulates sympathetic activity and may increase heart rate and blood pressure, while carbon monoxide reduces oxygen-carrying capacity. Tobacco-related oxidative stress can also contribute to endothelial dysfunction

and vascular inflammation (Rezkalla & Kloner, 2022; Wicaksono, 2020). In addition, smoking has been described as a contributor to processes involved in atherosclerotic plaque development and instability (Aminuddin et al., 2023). These mechanisms provide biological context for the presence of smokers among patients with ACS, although the present study was not designed to determine the contribution of smoking to the development of ACS.

The demographic distribution observed in this study should also be interpreted in the context of the characteristics of the study population. The predominance of male patients and the concentration of cases among middle-aged and older adults are consistent with established epidemiological patterns of coronary disease. Previous literature has reported differences in cardiovascular risk profiles between men and women, including differences in smoking exposure and the age at which coronary disease commonly presents (Pracilia et al., 2019). However, the present study was descriptive and did not examine the independent effects of age, sex, smoking, or other cardiovascular risk factors. Therefore, the observed demographic pattern should be regarded as a description of the study population rather than evidence of a specific risk relationship.

The absence of active smokers among the four patients with STEMI warrants cautious interpretation. Only four patients in the study were classified as having STEMI, and all were recorded as non-smokers. With such a small subgroup, this distribution may reflect the characteristics of the study population or random variation. The finding should therefore not be interpreted as indicating that smoking is unrelated to STEMI or that smoking status differentiates STEMI from other ACS subtypes. A larger study population with a greater number of STEMI cases would be required to examine this pattern more reliably.

Previous studies have established smoking as an important modifiable cardiovascular risk factor and have described its contribution to coronary heart disease and ACS at the population level (Yusuf et al., 2020; Rezkalla & Kloner, 2022). The present study, however, addresses a different question by describing smoking status among patients who had already been diagnosed with ACS and admitted to an ICU. Consequently, the proportion of active smokers observed in this study should not be interpreted as an estimate of the risk of developing ACS associated with smoking. Differences between the 38.6% smoking proportion observed in this cohort and smoking

prevalence reported in other populations may be influenced by differences in age, sex, geographic setting, healthcare setting, and study population.

From a clinical perspective, the identification of active smokers among ICU patients with ACS provides an opportunity to document smoking status and initiate smoking cessation counseling during hospitalization. Smoking cessation is an established component of cardiovascular prevention, and previous evidence indicates that cessation is associated with substantial reductions in cardiovascular morbidity and mortality among patients with coronary heart disease (Critchley & Capewell, 2003). Accordingly, although the present study cannot establish an association between smoking and ACS subtype, documenting smoking status remains clinically relevant for comprehensive cardiovascular risk management.

From a public health perspective, the findings also reinforce the importance of tobacco-control and smoking-cessation efforts, particularly in populations with a high prevalence of tobacco use. Previous population-based research has demonstrated the substantial contribution of smoking to cardiovascular disease burden, while international tobacco-control efforts have emphasized taxation, restrictions on tobacco advertising and promotion, smoke-free policies, and access to cessation support as important components of tobacco control (Ng et al., 2014; World Health Organization, 2023). In the context of the present study, these measures should be regarded as broader cardiovascular prevention strategies rather than interventions demonstrated by this study to specifically prevent a particular ACS subtype.

This study has several limitations that should be considered when interpreting the findings. First, its descriptive cross-sectional design does not allow conclusions regarding associations or causal relationships between smoking status and ACS subtype. Second, the study included only 57 patients from a single ICU in one hospital, which limits the generalizability of the findings to other hospitals and populations. Third, smoking status was classified only as smoker or non-smoker and did not include information regarding smoking duration, intensity, or pack-years. This limited classification may not fully characterize the level of tobacco exposure. Finally, the number of STEMI cases was small ($n = 4$), making the smoking distribution within this subgroup particularly unstable. Future studies involving larger, multicenter populations and more detailed smoking

exposure measurements are needed to examine potential relationships between smoking and ACS characteristics using appropriate inferential statistical methods.

Overall, this study provides a descriptive profile of smoking status among patients with ACS admitted to an ICU. Active smoking was documented in 38.6% of the study population and was observed among patients with UAP and NSTEMI, whereas no active smokers were identified among the four STEMI cases. These observations should be interpreted within the limitations of the study design and sample size and should not be considered evidence of an association between smoking status and ACS subtype. Nevertheless, documenting smoking status and providing smoking cessation support remain relevant components of cardiovascular care for patients with ACS.

Conclusion

Most patients with Acute Coronary Syndrome admitted to the ICU were middle-aged men, and Unstable Angina Pectoris was the most frequently documented ACS subtype. Active smoking was documented in 38.6% of the study population and was observed primarily among patients with UAP and NSTEMI. Given the descriptive cross-sectional design and the small number of STEMI cases, this study does not establish an association between smoking status and ACS subtype. The findings provide descriptive information that may support smoking cessation counseling and serve as a basis for future analytical studies with larger and more representative samples.

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