Original Article
DOI: https://doi.org/10.70749/ijbr.v3i2.661

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Frequency of Smoking and Smokeless Tobacco and Its Impact on In Hospital Outcomes of Patient Less Than 45 Years of Age with ACS

Sumaira Fareed Khan[1], Abiha Urooj[1], Muhammad Younis[1], Saher Ali[1], Kainat[1], Rajesh Khumar[1]

[1]Department of Cardiology, National Institute of Cardiovascular Diseases, Karachi, Sindh, Pakistan.

ARTICLE INFO

Keywords

Acute Coronary Syndrome, Cardiovascular Disease, Myocardial Infarction, Smoking, Tobbaco.

Corresponding Author: Sumaira Fareed Khan,
Resident Cardiology, National Institute of Cardiovascular Diseases, Karachi, Sindh, Pakistan.
Email: dr.sumaira7@gmail.com

Declaration

Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History

Received: 26-11-2024
Revised: 21-01-2025
Accepted: 07-02-2025

ABSTRACT

Objective: This study has been designed to determine frequency of smoking and smokeless tobacco and its impact on in-hospital MACE among acute coronary syndrome patients of age less than 45 years managed at public sector hospital in Karachi, Pakistan. **Methodology:** This cross-sectional study was performed in Department of Cardiology, National Institute of Cardiovascular Diseases, Karachi from 1st January 2024 to 30th July 2024. Patients of both the gender of age at least 18-45 years and presenting with ACS were studied. Patients were followed till their discharge or in-hospital mortality to record final outcome. **Results:** Total 172 patients were studied with mean age of 40.5 ± 4.8 years. Majority of participants were males (89%). Most of the patients were smokers (39.5%) while some were consuming smokeless tobacco (12.2%) and few were using both (3.5%). Smoking was higher in males (100% versus 0%) whereas smokeless tobacco consumption was higher in females (38.1% versus 61.9%). Among smokers, STEMI (60.3%) was more prevalent followed by nSTEMI (23.5%) and unstable angina (16.2%). In smokeless tobacco users, unstable angina (61.9%) was more common followed by nSTEMI (28.6%) and STEMI (9.5%). Multiple level disease was more common in smokers (66.2%) while among smokeless tobacco users single level was common (66.7%). Education and comorbidity was significantly different. **Conclusion:** The present study found that STEMI and multi-level vessel disease was common in smokers whereas in consumers of smokeless tobacco, unstable angina and single-level disease was frequent. No differences were found in terms of mortality among smokers, consumers of smokeless tobacco and those who were not smoking.

INTRODUCTION

The most consistently reported cardiovascular risk factor is smoking (1). People of all ages use different kinds of smokeless tobacco (ST) products, such as chewing tobacco and snuff. within the previous few years. Worldwide, a variety of SLT products are offered. SLT products can be applied topically to teeth and gums, ingested orally, inhaled or chewed, or swigged. The goods made with chewed tobacco are pan masala with zarda and gutkha (2) and betel quid with tobacco (Mainpuri and others).

Even though almost everyone is aware of the negative effects of smoking cigarettes, 933 million people smoked worldwide in 2015 (3). More than 80 percent of smokers worldwide reside in low- and middle-income nations (4). It's possible that the distribution and prevalence of smokeless tobacco usage around the world are underestimated. Over 350 million people worldwide—67% of them are men—use smokeless tobacco, and they reside in 121 different countries. Approximately 95% of people are living in developing nations, with 82.7% of them in the World Health Organization's (WHO) South-East Asia Region, where smokeless tobacco usage occasionally predominates over cigarette smoking (5).

Users of SLT products may be exposed to some of the same dangerous substances as those present in cigarette smoke, such as carcinogens and nicotine (6,7). However, the overall health risks associated with smoking cigarettes are far higher than those connected with using SLT because burning tobacco exposes the user to more toxicants (8).

Research shows that using smokeless tobacco reduces the risk of cardiovascular disease (CVD) compared to smoking cigarettes (9). However, the

American Heart Association advises against using smokeless tobacco due to data showing higher chances of fatal myocardial infarction (MI) and stroke, as well as worse outcomes following MI and stroke (10). According to the latest meta-analysis, using smokeless tobacco increases the risk of CVD mortality by 13% for fatal myocardial infarction (95% CI: 6%, 21%) and 40% for fatal stroke (95% CI: 28%, 54%) (11).However, Frobert O's analysis revealed that the use of Snus at the time of admission for a first PCI was not linked to an increased risk of hospitalisation for heart failure, new revascularization, or all-cause mortality (12).

The 2009 Family Smoking Prevention and Tobacco Control Act, which provided the U.S. Food and Drug Administration the authority to regulate tobacco products, including SLT, has made it even more important to understand SLT use and potential health repercussions (13). Whether people who move from cigarettes to ST products lower their risk of disease is the primary unsolved question. Sadly, only one study has looked at this issue so far, and its conclusions showed that those who went from smoking cigarettes to quitting tobacco entirely had a lower death rate from all causes, including coronary artery disease, than those who stayed with tobacco (14). Therefore, this study has been designed to determine frequency of smoking and smokeless tobacco and its impact on in-hospital MACE among acute coronary syndrome patients of age less than 45 years managed at public sector hospital in Karachi, Pakistan.

METHODS

This cross-sectional study was performed in Department of Cardiology, National Institute of Cardiovascular Diseases, Karachi from 1st January 2024 to 30th July 2024. The study was approved institutional review board letter Ref# IRB-13/2024, Dated February 28, 2024. Patients of both the gender of age at least 18-45 years and presenting with ACS were studied. Patients with past history of MI or any other cardiovascular disease which required hospitalization, chronic illness such as kidney diseases, arthritis, liver diseases and malignancies, cardiogenic shock, leaving against medical advice and those who were second hand smokers were excluded. Patients were enlisted with their written informed consent.

Previous conducted similar study found that among patients with acute cardiac event, frequency of smoking was 95.8% (15). At 95% confidence interval and margin of error of 3%, a sample size of 172 was yielded. Online calculator Open-Epi was used to estimate sample size. Consecutive sampling technique was employed to enroll study participants.

Participants were approached from emergency or out-patient department. Detailed history was taken by consultant regarding their smoking and other addictions and past medical history. Patients were evaluated via electrocardiogram investigation. After establishing the diagnosis, the assigned data collector recorded the data from patients' medical record file. Patients were followed till their discharge or in-hospital mortality to record final outcome.

STEMI is characterized by the release of biomarkers of myocardial necrosis, such as creatine kinase isomer-MB and troponin I, after a patient has electrocardiographic ST-segment elevation in at least two contiguous leads (12-lead ECG) and persistent chest pain or other symptoms suggestive of myocardial ischemia. NSTEMI was characterized as the absence of ST-segment elevation on the index or qualifying electrocardiogram, together with cardiac signs and symptoms consistent with myocardial ischemia. The term "unstable angina" refers to angina that lasts longer than 15 minutes while at rest, typically accompanied by reversible ischemic electrocardiographic abnormalities, and that necessitates surgery during the same hospital stay due to an inability or inadequate response to maximal medicinal therapy.

Data was entered and analyzed using SPSS version 27. Computations were performed to obtain percentages and frequencies for categorical variables. Mean with standard deviation was figured out for summarizing numerical variables. Categorical variables were compared among cigarette smokers and smokeless tobacco users using Chi-square or Fisher-exact test. P-value ≤0.05 was taken as statistically significant.

RESULTS

Total 172 patients were studied with mean age of 40.5 ± 4.8 years. Majority of participants were males (89%), belonging to urban areas (83.7%) and most them availed education from primary to secondary class (44.8%). Table 1 displays summary of sociodemographic features of study participants.

Table 1

Summary of patients' sociodemographic and clinical features

Variables	Frequency (%)
Age (in years)#	40.5 ± 4.8
Body mass index#	27.3 ± 3.4
Gender	
Male	144(83.7)
Female	28(16.3)
Education	
Illiterate	38(22.1)
Primary to secondary	77(44.8)
Intermediate	24(14)
Graduation and above	33(19.2)
Residence	
Ruran	35(20.3)
Urban	137(79.7)
Family history	
Yes	16(9.3)
No	156(90.7)

Comorbidity	
Hypertension	74(43)
Diabetes	30(17.4)
Dyslipidemia	6(3.5)
ACS types	
STEMI	105(61)
nSTEMI	43(25)
Unstable angina	24(14)
Vessel involved	
1 VSD	80(46.5)
2 VSD	55(32)
3 VSD	37(21.5)
No	71(41.3)
Currently using tobacco	
Yes	95(55.2)
No	77(44.8)
Tobacco type	
Smoking	68(39.5)
Smokeless	21(12.2)
Both	6(3.5)
None	77(44.8)
Duration of tobacco use (in years)	
Smokers	13.3 ± 7.3
Smokeless	15.2 ± 9.3
Both	19.5 ± 10.9

#: Numerical variables presented as mean ± SD

Table 2 displays summary of smoking features. More than half ever smoked (58.7%) and currently consuming tobacco products (55.2%). Most of the patients were smokers (39.5%) while some were consuming smokeless tobacco (12.2%) and few were using both (3.5%). Overall mean duration of tobacco consumption was 14.2 ± 8.1 years.

Table 2

Summary of smoking features

Variables	Frequency (%)
Ever smoked	
Yes	101(58.7)

Table 3 compares patients' features with smoking features. Smoking was higher in males whereas smokeless tobacco consumption was higher in females. Smoking frequency was significantly higher in patients belonging to urban areas whereas smokeless tobacco was higher in rural areas. Among smokers, STEMI was more prevalent followed by nSTEMI and unstable angina. In smokeless tobacco users, unstable angina was more common followed by nSTEMI and STEMI. Multiple level disease was more common in smokers while among smokeless tobacco users single level was common. Education and comorbidity was significantly different.

Table 3

Comparison of patients' features with smoking features

Variables	Groups	Tobacco type				p-value
		Smoking n(%)	Smokeless n(%)	Both n(%)	None n(%)	
Gender	Male	68(100)	8(38.1)	6(100)	62(80.5)	*<0.001
	Female	0(0)	13(61.9)	0(0)	15(19.5)	
Education	Illiterate	13(19.1)	7(33.3)	3(50)	15(19.5)	0.676
	primary to secondary	30(44.1)	10(47.6)	3(50)	34(44.2)	
	Intermediate	11(16.2)	2(9.5)	0(0)	11(14.3)	
	Graduation or above	14(20.6)	2(9.5)	0(0)	17(22.1)	
Residence	Rural	13(19.1)	11(52.4)	2(33.3)	9(11.7)	*<0.001
	Urban	55(80.9)	10(47.6)	4(66.7)	68(88.3)	
Hypertension	Yes	28(41.2)	7(33.3)	3(50)	36(46.8)	0.707
	No	40(58.8)	14(66.7)	3(50)	41(53.2)	
Diabetes	Yes	7(10.3)	7(33.3)	0(0)	16(20.8)	0.051
	No	61(89.7)	14(66.7)	6(100)	61(79.2)	
Dyslipidemia	Yes	2(2.9)	0(0)	0(0)	4(5.2)	0.78
	No	66(97.1)	21(100)	6(100)	73(94.8)	
ACS type	STEMI	41(60.3)	2(9.5)	6(100)	56(72.7)	*<0.001
	NSTEMI	16(23.5)	6(28.6)	0(0)	21(27.3)	
	Unstable angina	11(16.2)	13(61.9)	0(0)	0(0)	
Vessel involved	1.00	23(33.8)	14(66.7)	2(33.3)	41(53.2)	*0.030
	2.00	30(44.1)	3(14.3)	1(16.7)	21(27.3)	
	3.00	15(22.1)	4(19)	3(50)	15(19.5)	

Out of 172 patients, only two mortalities were seen. Both of them were smokers. One patients developed stent thrombosis whereas other developed cardiogenic shock. Table 4 displays details of patients who did not survive.

Table 4

S.no	Age	Gender	ACS types	Disease level	Duration of smoking	Cause of death
1	45	Male	STEMI	3 VSD	30 years	cardiogenic shock
2	40	Male	STEMI	3 VSD	14 years	stent thrombosis

DISCUSSION

The present study evaluated frequency of smoking and smokeless tobacco in ACS patients. Knowing the smoking pattern in acute coronary syndrome (ACS) patients is crucial for assessing their cardiovascular risk, guiding treatment decisions, and improving outcomes. Smoking is a major modifiable risk factor for ACS,

contributing to endothelial dysfunction, inflammation, platelet aggregation, and increased oxidative stress (16). Understanding whether a patient is a current smoker, former smoker, or non-smoker helps clinicians gauge the severity of vascular damage and determine appropriate interventions. Smoking history also influences treatment choices, as smokers may respond differently to medications like antiplatelet agents and statins. Furthermore, smoking is associated with worse outcomes in ACS patients, including higher rates of recurrent events and mortality (17). Identifying smoking behavior allows for tailored smoking cessation programs, which significantly reduce the risk of future cardiovascular events. Ultimately, understanding a patient's smoking pattern enables more personalized care, better risk stratification, and improved long-term prognosis for ACS patients.

The present study found that frequency of smoking is higher in our patients than consumption of smokeless tobacco. This finding is consistent with other similar studies (15,18,19). Higher smoking rates in ACS patients compared to smokeless tobacco use may be due to the more immediate and potent cardiovascular effects of smoking and its greater association with systemic inflammation, and the more widespread cultural acceptance of cigarette smoking over smokeless alternatives.

In this study it was noted smokeless tobacco was consumption was frequent in females mainly among those belonging to rural areas. Several similar studies reported the similar finding (18,19). Females in rural areas are more likely to consume smokeless tobacco due to a combination of cultural, social, and economic factors (20,21). In many rural regions, smokeless tobacco is often seen as more socially acceptable for women, as it is perceived as less disruptive or stigmatized than smoking. Limited access to education and healthcare further contributes to the lack of awareness about the health risks associated with smokeless tobacco. Additionally, lower socioeconomic status and traditional gender roles may restrict women's access to information or healthcare resources, making smokeless tobacco an easily accessible, low-cost alternative to smoking.

The most common trend among smokeless tobacco users in the current study was unstable angina, which was followed by STEMI and NSTEMI. On the other hand, among smokers, STEMI was the most common pattern, followed by NSTEMI, unstable angina, and chronic stable angina. This result is in line with earlier research of a similar kind (18,19). In line with previous research, smokers were more likely to have multi-vessel disease, while smokeless tobacco users were more likely to have single valve disease (18,19).

The current investigation showed that there was no difference in mortality between smokers, users of smokeless tobacco, and non-smokers. Among smokers, there were only two deaths. Smokers are more likely than non-smokers to develop coronary artery disease earlier in life due to the numerous negative consequences of tobacco use on the cardiovascular system. Despite this, there is conflicting information about how smoking affects survival after myocardial infarction (22, 23). The primary causes of the non-significant mortality rate among smokers as compared to smokeless tobacco users are younger patient ages and, consequently, low-risk baseline features. Additionally, it is hypothesized that smokers who experienced STEMI had a higher risk of sudden cardiac death prior to being admitted to the hospital. Consequently, patients with STEMI who are admitted smokers may be low-risk individuals with a lower death rate (24). However, this study did not investigate pre-hospital mortality data.

The number of cigarettes smoked daily and the duration of each patient's smoking history were not ascertained in this investigation. Although different cigarette brands can contain different chemicals, we were not aware of the brands that patients were using. It should be noted that out-of-hospital mortality from STEMI were not available, and we only included patients who came to our hospital. The results of our survey, which was a single-center observational study with a small patient population, should be confirmed in a bigger study that addresses the limitations of the current investigation.

CONCLUSION

The present study found that STEMI and multi-level vessel disease was common in smokers whereas in consumers of smokeless tobacco unstable angina and single-level disease was frequent. No differences were found in terms of mortality among smokers, consumers of smokeless tobacco and those who were not smoking.

REFERENCES

1. World Health Organization. (2011). *WHO report on the global tobacco epidemic, 2011: Warning about the dangers of tobacco: Executive summary* (No. WHO/NMH/TFI/11.3). World health organization. https://iris.who.int/bitstream/handle/10665/70680/WHO_NMH_TFI_11.3_rus.pdf
2. NCI. (2014). National Cancer Institute and Centers for Disease Control and Prevention.

Smokeless Tobacco and Public Health: A Global Perspective.

3. Reitsma, M. B., Fullman, N., Ng, M., Salama, J. S., Abajobir, A., Abate, K. H., ... & Patton, G. C. (2017). Smoking prevalence and attributable disease burden in 195 countries and territories, 1990–2015: a systematic analysis from the Global Burden of Disease Study 2015. *The Lancet*, *389*(10082), 1885-1906. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30819-X/fulltext
4. Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global cancer statistics 2020: Globocan estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, *71*(3), 209-249. https://doi.org/10.3322/caac.21660
5. Sinha, D., Agarwal, N., & Gupta, P. (2015). Prevalence of smokeless tobacco use and number of users in 121 countries. *British Journal of Medicine and Medical Research*, *9*(6), 1-20. https://doi.org/10.9734/bjmmr/2015/16285
6. Campbell, L. R., Brown, B. G., Jones, B. A., Marano, K. M., & Borgerding, M. F. (2015). Study of cardiovascular disease biomarkers among tobacco consumers, Part 1: Biomarkers of exposure. *Inhalation Toxicology*, *27*(3), 149-156. https://doi.org/10.3109/08958378.2015.1013228
7. Cheng, Y., Reyes-Guzman, C. M., Christensen, C. H., Rostron, B. L., Edwards, K. C., Wang, L., Feng, J., Jarrett, J. M., Ward, C. D., Xia, B., Kimmel, H. L., Conway, K., Leggett, C., Taylor, K., Lawrence, C., Niaura, R., Travers, M. J., Hyland, A., Hecht, S. S., … Van Bemmel, D. M. (2020). Biomarkers of exposure among adult smokeless tobacco users in the population assessment of tobacco and health study (Wave 1, 2013–2014). *Cancer Epidemiology, Biomarkers & Prevention*, *29*(3), 659-667. https://doi.org/10.1158/1055-9965.epi-19-0766
8. Cornelius, M. E., Loretan, C. G., Wang, T. W., Jamal, A., & Homa, D. M. (2022). Tobacco product use among adults — United States, 2020. *MMWR. Morbidity and Mortality Weekly Report*, *71*(11), 397-405. https://doi.org/10.15585/mmwr.mm7111a1
9. Piano, M. R., Benowitz, N. L., FitzGerald, G. A., Corbridge, S., Heath, J., Hahn, E., Pechacek, T. F., & Howard, G. (2010). Impact of smokeless tobacco products on cardiovascular disease: Implications for policy, prevention, and treatment. *Circulation*, *122*(15), 1520-1544. https://doi.org/10.1161/cir.0b013e3181f432c3
10. Henley, S. J., Thun, M. J., Connell, C., & Calle, E. E. (2005). Two large prospective studies of mortality among men who use snuff or chewing tobacco (United States). *Cancer Causes & Control*, *16*(4), 347-358. https://doi.org/10.1007/s10552-004-5519-6
11. Boffetta, P., & Straif, K. (2009). Use of smokeless tobacco and risk of myocardial infarction and stroke: Systematic review with meta-analysis. *BMJ*, *339*(aug18 2), b3060-b3060. https://doi.org/10.1136/bmj.b3060
12. Frobert, O., Reitan, C., Hatsukami, D. K., Pernow, J., Omerovic, E., & Andell, P. (2019). Smokeless tobacco, snus, at admission for percutaneous coronary intervention and future risk for cardiac events. *Open Heart*, *6*(2), e001109. https://doi.org/10.1136/openhrt-2019-001109
13. Reference US Food and Drug Administration. Family Smoking Prevention And Tobacco Control And Federal Retirement Reform. Public Law 111–31—June 22, 2009. https://www.govinfo.gov/content/pkg/PLAW-111publ31/pdf/PLAW-111publ31.pdf
14. Henley, S. J., Connell, C. J., Richter, P., Husten, C., Pechacek, T., Calle, E. E., & Thun, M. J. (2007). Tobacco-related disease mortality among men who switched from cigarettes to spit tobacco. *Tobacco Control*, *16*(1), 22-28. https://doi.org/10.1136/tc.2006.018069
15. Pericot-Valverde, I., Elliott, R. J., Priest, J. S., Barret, T., Yoon, J. H., Miller, C. C., Okoli, C. T., Haliwa, I., Ades, P. A., & Gaalema, D. E. (2019). Patterns of tobacco use among smokers prior to hospitalization for an acute cardiac event: Use of combusted and non-combusted products. *Preventive Medicine*, *128*, 105757. https://doi.org/10.1016/j.ypmed.2019.105757
16. Gallucci, G., Tartarone, A., Lerose, R., Lalinga, A. V., & Capobianco, A. M. (2020). Cardiovascular risk of smoking and benefits of smoking cessation. *Journal of Thoracic Disease*, *12*(7), 3866-3876. https://doi.org/10.21037/jtd.2020.02.47
17. Bhaumik, S. S., Placek, C., Kochumoni, R., Lekha, T. R., Prabhakaran, D., Hitsman, B., Huffman, M. D., Harikrishnan, S., & Goenka, S. (2018). Tobacco cessation among

acute coronary syndrome patients in Kerala, India: Patient and provider perspectives. *Qualitative Health Research*, *29*(8), 1145-1160. https://doi.org/10.1177/1049732318817047

18. Modi, H. P., Chaudhari, R., Chaudhari, K., & Patel, P. B. (2024). A Comparative Analysis Clinicoangiographic Patterns of Coronary Artery Disease in Smokers and Smokeless Tobacco Users. *Res. J. Med. Sci*, *18*, 183-186. https://demo.makhillpublications.co/files/published-files/mak-rjms/2024/483-486.pdf
19. Budania, S. K. (2023). To compare the clinical and angiographic patterns of coronary artery disease in smokers and users of smokeless tobacco. *International Journal of Life Sciences Biotechnology and Pharma Research. 12*(2), 201-205. https://www.ijlbpr.com/uploadfiles/34vol12issue2pp201-205.20230401122749.pdf
20. Iqbal, N., Irfan, M., Ashraf, N., Awan, S., & Khan, J. A. (2015). Prevalence of tobacco use among women: A cross sectional survey from a squatter settlement of Karachi, Pakistan. *BMC Research Notes*, *8*(1). https://doi.org/10.1186/s13104-015-1455-7
21. Sharma, R., Kanaan, M., & Siddiqi, K. (2024). The diversity in tobacco use among women of reproductive age (15–49 years) in Pakistan: A secondary analysis of a multiple indicator cluster survey 2016–2018. *Nicotine and Tobacco Research*, *26*(7), 931-939. https://doi.org/10.1093/ntr/ntae016
22. Rakowski, T., Siudak, Z., Dziewierz, A., Dubiel, J. S., & Dudek, D. (2012). Impact of smoking status on outcome in patients with ST-segment elevation myocardial infarction treated with primary percutaneous coronary intervention. *Journal of Thrombosis and Thrombolysis*, *34*(3), 397-403. https://doi.org/10.1007/s11239-012-0764-0
23. Aune, E., Røislien, J., Mathisen, M., Thelle, D. S., & Otterstad, J. E. (2011). The "smoker's paradox" in patients with acute coronary syndrome: A systematic review. *BMC Medicine*, *9*(1). https://doi.org/10.1186/1741-7015-9-97
24. Toluey, M., Ghaffari, S., Tajlil, A., Nasiri, B., & Rostami, A. (2019). The impact of cigarette smoking on infarct location and in-hospital outcome following acute ST-elevation myocardial infarction. *Journal of Cardiovascular and Thoracic Research*, *11*(3), 209-215. https://doi.org/10.15171/jcvtr.2019.35