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ORIGINAL ARTICLE

Influence of Smoking on The Location of Acute Myocardial Infarctions

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ABSTRACT

Objective: To determine the frequency of smokers and to compare the frequency of smokers among patients with inferior and anterior acute myocardial infarction amongst patients presenting with acute myocardial infarction at a Tertiary Care Hospital.

Subjects And Methods: This cross-sectional study was conducted on 226 at the Adult Cardiology Department of the National Institute of Cardiovascular Disease (NICVD), Karachi for six months from 20-07-2019 till 20-01-2020. After obtaining verbal consent, researchers prospectively collected data from the participants. The study included 226 patients who were diagnosed with the appropriate conditions. Frequency and percentages were used to present qualitative data, while mean and standard deviation were used to present quantitative data. To see how to effect modifiers affected the outcome, researchers used stratification to keep track of them. For statistical significance, the post-stratification chi-square test was used.

Results: A total of 226 presenting with acute myocardial infarction were included in this study. The mean age in our study was 55.92±10.49 years. Out of 226 patients with acute myocardial infarction, 130 (57.5%) and 96 (42.5) smoked and did not smoke respectively. Comparison of smoking status in patients who had anterior and inferior myocardial infarction showed that 39 (53.4%) and 51 (51%) smoked respectively.

Conclusion: Smoking is a well-recognized strong modifiable risk factor and predictor of multivessel disease. Smoking cessation has been consistently associated with a mortality benefit in both stable coronary artery disease and post-acute coronary syndromes. Consequently, smoking cessation is one of the cornerstones of secondary prevention despite the improvement in the management of ACS with PCI and pharmacotherapy

Keywords: Smoking, coronary vessels, territory and ST elevated myocardial infarction.

INTRODUCTION

An estimated 18 million people die each year as a result of cardiovascular diseases around the world (CVD). Cardiovascular disease rates rose in high-income countries from the 1930s to the 1950s, but they remained low in the middle- and low-income countries during this period.[1] As a result of reduced risk factors and better cardiovascular disease management since the mid-1970s, the mortality rate from cardiovascular diseases has dropped significantly in several high-income countries.[2] According to estimates, low- and middle-income countries account for more than 80% of cardiovascular disease-related deaths; however, the reasons for this are not well-known.[1]

South Asia, in particular Pakistan, pays little attention to the prevention of cardiovascular disease risk factors despite the seriousness of cardiovascular diseases in low- and middle-income countries (LMICs).[3] cardiovascular risk factors in the country are rising, and non-communicable disease (NCD) and communicable disease rates in the country are close to parity (or even higher). This shift in epidemiology may have an impact on Pakistan's distribution of modifiable risk factors for cardiovascular diseases, such as stress, unhealthy eating habits, inactivity, and smoking.[3] Obesity and hypertension are particularly common in low-income urban Pakistani adults, according to a recent study. The study also shows that certain types of dietary patterns may be linked to CVD risk factors, but not consistently for all
CVD risk factors and in all population groups, according to the results.[4]

According to the results of a local study, people, particularly the elderly and those from lower socioeconomic status, have inadequate knowledge about the risk factors for cardiovascular disease.[5] Smoking has a direct link to cardiovascular disease, and it's a major public health problem in the modern world.[6] According to a WHO report from 2015, 22.2% of Pakistani men and 2.1% of Pakistani women smoke.[7] Smoking increases the risk of death in heart patients by three times.

When you smoke a cigarette, you increase your risk of having a stroke because it damages the lining of your blood vessels, lowers your HDL (high-density lipoprotein) cholesterol, and raises your triglyceride levels.[8] Cigarette smoking raises the risk of acute myocardial infarction in the inferior wall more than in the anterior wall, according to the study findings. Smoking appears to have a greater negative impact on the right coronary arterial circulation than the left coronary arterial circulation through an unknown mechanism.[9] More research revealed that 54.85% of patients with inferior AMI smoked, compared to 46.86% of those with anterior AMI. Among smokers, the odds ratio for an inferior-to-antecedent AMI was 1.38 (95% CI: 1.20–1.58).[9]

A study by Assali AR et al.[10] reported inferior AMI in 45.49% of the smoker patients and 43.73% in non-smoker patients given the odds ratio (OR) of 1.07 (95% confidence interval, 0.775–1.487) for inferior AMI in smokers. However, it's unclear if smoking-induced heart disease causes equal damage to the right and left coronary arteries, or whether

smoking tightens the arteries in healthy people and those with the disease at the same rate.[9]

To the best of our knowledge, no study has been conducted in our local population on the influence of smoking on the location of acute myocardial infarctions, finding in our population are expected to vary from the reported frequencies for other parts of the world due to variations in smoking behavior and lifestyle, differences in disease prevalence, and low socioeconomic status. The study's goal is to see if smoking has an impact on where AMI occurs in our population. So that informed management strategies can be formulated.

METHODS AND MATERIALS

This Cross-sectional study was conducted on 226 at the Adult Cardiology Department of the National Institute of Cardiovascular Disease (NICVD), Karachi for six months from 20-07-2019 till 20-01-2020. Male patients of between 40 to 80 years diagnosed with Acute Myocardial Infarction (AMI) as per operational definition and undergoing Primary Percutaneous Coronary Intervention (PCI) were included in this study whereas those patients with prior history of Acute Myocardial Infarction (AMI) as per operational definition, had previous heart surgery and location of MI other than Anterior or Inferior Myocardial Infarction were excluded.

For this study, we included male patients presented with acute myocardial infarction (AMI) undergoing Primary Percutaneous Coronary Intervention (PCI) at the adult cardiology department, NICVD, Karachi, and also fulfilled the inclusion and exclusion criteria. Before inclusion, the purpose, and benefits of the study were explained to all participants and verbal informed consent was taken by the principal investigator from all patients. Information about the author's characteristics. The patient was given their age in years, height in centimeters, and weight in kilograms when they arrived at the hospital, and a body mass index (BMI) of kg/m2 was calculated using the formula (weight in kilograms/height in meters). According to the operational definitions, information was gathered on the patients' medical histories, including blood pressure, diabetes, family history, and obesity. All the primary PCI procedures were performed by a consultant cardiologist of experience more than 5 years. 12-lead electrocardiogram (ECG) was obtained for all the patients and to control the business in ECG reading, the location of myocardial infarction was classified by three independent cardiologists and the final diagnosis was recorded based on the agreement of at least two cardiologists. The inclusion and exclusion criteria and stratification were strictly followed to minimize the impact of confounding variables. Only authorized individuals had access to patient information, which was kept secure.

Data Analysis: We used IBM's SPSS version-21 to enter and analyze our data (released in 2012). In Armonk, New York: IBM Corp.'s IBM SPSS Statistics for Windows, Version 21.0 Shapiro-Wilk test was applied to check the hypothesis of normality for age (years), height (cm), weight (kg), and BMI (kg/m2) was expressed using descriptive statistics such as mean ± SD, median (IQR), maximum and minimum. Frequency and percentages were calculated for categorical variables such as age group, hypertension, diabetic Mellitus, family history, obesity, location of myocardial infarction. Comparison between inferior and anterior acute myocardial infarction patients was done for the frequency of smoking using the chi-square test. Effect modifiers like age group, hypertension, diabetic Mellitus, family history, and obesity were controlled through stratification. It was decided to use the post-stratification chi-square test. A p-value of 0.05 was considered a significant level.

RESULT

A total of 226 presenting with acute myocardial infarction were included in this study. Out of 226 patients, the mean age of the patients was 55.92±10.49 years (ranged 40 to 80 years) whereas mean BMI, height, and weight in our study was 26.72±1.56 kg/m2, 158±7.28 cm, and 78.7±9.87 kg respectively. As shown in Table 1.

Out of 226 patients with acute myocardial infarction, 130 (57.5%) and 96 (42.5) smoked and did not smoke respectively. As shown in Table 1.

Frequency distribution of the location of anterior myocardial infarction showed that out of 226 patients with acute myocardial infarction, 73 (32.3%) and 153 (67.7%) patients had anterior myocardial infarction respectively. As presented in Table 1.

Frequency distribution of the location of inferior myocardial infarction showed that out of 226 patients with acute myocardial infarction, 100 (44.2%) and 126 (55.8%) patients had inferior myocardial infarction respectively. As presented in Table 1.

Table-1: Baseline characteristics of patient (n=226)

Variable	Mean ± SD	Range
Age (in years)	55.92±10.49	40 to 80 years
Body Mass Index (Kg/m^2)	26.72±1.56	23 to 29 Kg/m^2
Height (in cm)	158±7.281	48 to 62 cm
Weight (in Kg)	78.7±9.87	68 to 115 kg
Variables	Number	Percentage
Smoking:		
Yes	130	57.5%
No	96	42.5%
Location of MI:		
Anterior		
Yes	73	32.3%
No	153	67.7%
Inferior		
Yes	100	44.2%
No	126	55.8%
Age in groups:		
40 to 50 years	30	13.3%
51 to 60 years	153	67.7%
61 to 80 years	43	19.0%
Diabetic Mellitus:		
Yes	73	32.3%
No	153	67.7%
Hypertension:		
Yes	108	47.8%
No	118	52.2%
Obesity:		
Yes	98	43.4%
No	128	56.6%
Family history of IHD:		
Yes	74	32.7%
No	152	67.3%

Out of 226 patients with acute myocardial infarction, 30 (13.3%), 153 (67.7%), and 43 (19%) patients were in the age group 40-50 years, 51-60 years, and 61-80 years respectively. As presented in Table 1. Out of 226 patients with acute myocardial infarction, 73 (32.3%) and 153

(67.7%) had and did not have diabetes mellitus respectively. Table 1.

Out of 226 patients with acute myocardial infarction, 108 (47.8%) and 118 (52.2%) had and did not have hypertension respectively. Table 1.

Out of 226 patients with acute myocardial infarction, 98 (43.4%) and 128 (56.6%) had and did not have obesity respectively. Table 1.

Out of 226 patients with acute myocardial infarction, 74 (32.7%) and 152 (67.3%) had and did not have a family history of ischemic heart disease respectively. Table 1.

Comparison of smoking status in patients who had anterior and inferior myocardial infarction showed that 39 (53.4%) and 34 (46.6%) patients smoked and did not smoke in patients who had an anterior myocardial infarction. Whereas 51 (51%) and 49 (49%) patients smoked and did not smoke in patients who had an inferior myocardial infarction (P-value 0.09). Table 2.

Stratification for age concerning smoking status showed that 18 (13.8%), 94 (72.3%), and 18 (13.8%) who were in the age group 40-50 years, 51-60 years, and 61-80 years smoked respectively. Whereas 12 (12.5%), 59 (61.5%) and 25 (26%) who were in the age group 40-50 years, 51-60 years and 61-80 years did not smoke respectively (P-value 0.69). Table 2.

Stratification for type 2 diabetes mellitus concerning smoking status showed that 37 (28.5%) and 36 (37.5%) smoked and did not smoke in patients who had type 2 diabetes mellitus respectively. Whereas 93 (71.5%) and 60 (62.5%) smoked and did not smoke in patients who did not have type 2 diabetes mellitus respectively (P-value was 0.09). in Table 2.

Stratification for hypertension concerning smoking status showed that 58 (44.6%) and 50 (52.1%) smoked and did not smoke in patients who had hypertension respectively. Whereas 72 (55.4%) and 46 (47.9%) smoked and did not smoke in patients who did not have hypertension respectively (P-value 0.16). Table 2.

Stratification for obesity status concerning smoking status showed that 56 (43.1%) and 42 (43.8%) smoked and did not smoke in patients who had obesity respectively. Whereas 74 (56.9%) and 54 (56.2%) smoked and did not smoke in patients who did not have obesity respectively (P-value 0.51). Table 2.

Stratification for family history of IHD concerning smoking status showed that 51 (39.2%) and 23 (24%) smoked and did not smoke in patients who had a family history of IHD respectively. Whereas 79 (60.8%) and 73 (76%) smoked and did not smoke in patients who did not have a family history of IHD respectively (P-value 0.01). Table 2.

Table 2: Comparison of smoking status of patients with baseline characteristics (n = 226)

Variables	Smoking Status		Total	P value
	Yes	No		
Location of MI:				
Anterior	39(53.4%)	34(46.6%)	73(32.3%)	0.09
Interior	51(51.0%)	49(49.0%)	100(67.7%)	
Age in Groups:				
40 to 50 years	18 (13.8%)	12 (12.5%)	30 (13.3%)	0.06
51 to 60 years	94 (72.3%)	59 (61.5%)	153(67.7%)	
61 to 80 years	18 (13.8%)	25 (26%)	43 (19%)	
Diabetic Mellitus:	37 (28.5%)	36 (37.5%)	73(32.3%)	
Yes	93 (71.5%)	60 (62.5%)	153(67.7%)	0.09
No				
Hypertension:				
Yes	58 (44.6%)	50 (52.1%)	108(47.8%)	0.16
No	72 (55.4%)	46 (47.9%)	118(52.2%)	
Obesity:				
Yes	56 (43.1%)	42 (43.8%)	98(43.4%)	0.51
No	74 (56.9%)	54 (56.2%)	128(56.6%)	
Family history of IHD:				
Yes	51 (39.2%)	23 (24%)	74(32.7%)	0.01
No	79 (60.9%)	73 (76%)	152(67.3%)	

DISCUSSION

STEMI is one of the deadliest forms of CAD presentation, with a mortality rate as high as 40%. Acute STEMI-induced myocardial damage occurs over time. Prospective studies have consistently and causally linked cigarette smoking to coronary heart disease. In terms of risk, there was a dose-response relationship, with an increase in daily cigarette consumption and duration linearly increasing. Smoking-related CVD symptoms include myocardial infarction, angina, stroke, aneurysms of the aorta, and peripheral artery disease, among others. There are a growing number of global health issues associated with congestive heart failure, chronic kidney disease, and atrial fibrillation All of these manifestations wreak havoc on health systems already under strain, particularly in low- and middle-income countries (LMICs).

Out of a total of 226 presenting with acute myocardial infarction. The mean age in our study was 55.92±10.49 years. Out of 226 patients with acute myocardial infarction, 130 (57.5%) and 96 (42.5) smoked and did not smoke respectively. Comparison of smoking status in patients who had anterior and inferior myocardial infarction showed that 39 (53.4%) and 51 (51%) smoked respectively.

When it came to STEMI, the majority of patients (98% in this study) had inferior or anterior wall lesions. Only four patients (2%) had AMI due to the left bundle branch block. Over 80% of patients with inferior AMI had a clogged right coronary artery, while 95% of patients with anterior AMI had a clogged left anterior descending artery. Among the five cohorts studied, smoking prevalence varied greatly from one to the next. Smoking was found to be more common in patients with inferior AMI (41.9% to 84.7%), as well as anterior AMI (36.4 percent to 74.4 percent). When

comparing the anterior AMI groups to the inferior AMI groups, smokers outnumbered nonsmokers in each of the cohorts. When it came to smokers having a lower AMI than non-smokers, the odds ratios ranged from 1.15 to 2.01. (median, 1.32).[9]

ACS 250 patients were included in another cross-sectional study. Dyslipidemia (91.2 percent) was the most common risk factor, followed by hypertension (70.4 percent), diabetes (51.2 percent), a family history of CAD (40.0 percent), and smoking (40.0 percent) (29.2 percent). Nearly all of the patients (98.4%) had at least one factor raising their risk. Females were more likely than males to have diabetes or hypertension, with smoking being more prevalent in the former group. Patients over the age of 65 were more likely to have diabetes or dyslipidemia. Low levels of HDL (High-Density Lipoprotein) were the most common lipid change (HDL). Females had higher levels of HDL cholesterol and triglycerides than males. Patients over the age of 65 had lower HDL levels and higher cholesterol levels.[11]

Another study looked at patients who had undergone primary PCI after being admitted with an acute STEMI condition. During this period, there were 1715 STEMIs reported from 1680 patients. There was 96.2 percent of those surveyed who had smoked cigarettes. Tobacco use was found to be prevalent in all three of these groups: ex-smokers (27.2 percent) and current smokers (23.7 percent) There is a five-fold increase in acute STEMI risk when you smoke cigarettes. If you smoke, your risk of STEMI is reduced by quitting to about what it would be if you had never smoked in the past.[12] 324 people with ST-segment elevation MI have participated in another study, which found (mean age 59 years, 73 percent men, 60 percent current smokers). Older current smokers had higher rates of hypertension than younger ones (age 55.11 years as opposed to 65.10 years; p0.001) and both groups had younger smokers (age 55.11 years as opposed to 65.10 years).

Smokers have higher TIMI flow grades (2 vs. 1, p = 0.024) and better ST-segment resolution (no, partial, or complete resolution, p = 0.10 after PCI). The circulating levels of C-reactive protein, neutrophils, and monocytes were all higher in smokers after the first day. Following a MI, smoking was a reliable predictor of infarct zone hemorrhage (2 days later) (OR: 2.76; 95 percent CI: 1.42 to 5.37; p = 0.003). Tobacco use was associated with an increased risk of all-cause mortality (OR: 2.20; 95% CI: 1.07-4.54) and major adverse cardiovascular events (MACEs) after a four-year median follow-up (OR: 2.79; 95 percent CI: 2.30-5.99).[13]

CONCLUSIONS

Tobacco use raises the risk of AMI through a variety of mechanisms. Compared to anterior AMI, cigarette smoking was found to be more closely associated with inferior AMI. Tobacco's detrimental effects on coronary thermogenesis and/or endothelial dysfunction may be greater in the right coronary arterial circulation than the left, based on this finding. Anterior AMI, which is more common and more deadly than inferior AMI, has a nearly 50% smoking prevalence. To conclude, smoking is critical in the pathogenesis of both inferior and anterior AMI, and quitting smoking is essential for both primary and secondary prevention of both AMI and coronary artery disease.

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