ORIGINAL ARTICLE

COMPARISON OF CLINICAL PROFILE AND OUTCOME OF MI IN SMOKERS AND NON-SMOKERS

Sumera Batool[1], Ashok Kumar[2], Nida Hussain[3], Wasfa Farooq[4], Muhammad Hamza Syed[5], Nadeem Rizvi[6]
[1]Department of Endocrinology, Aga Khan University, [2]Department of Pulmonology and Critical Care, Ziauddin Hospital, Clifton, [3]Faculty Affairs, Ziauddin University, [4]Department of Biochemistry, Ziauddin University, Clifton, [5]Student, Ziauddin University, [6]Department of Pulmonology, Jinnah Postgraduate Medical Centre, Karachi.

ABSTRACT

Background: Myocardial infarction remains a leading cause of global morbidity and mortality. One major risk factor for atherosclerosis and MI is smoking, a highly prevalent habit in South Asian adolescents and healthcare professionals; particularly in Pakistan. This study was conducted to compare clinical presentation and outcome of myocardial infarction (MI) in smokers and non-smokers.

Methodology: This study included a total of 100 patients who presented to a tertiary care centre for cardiac patients in Karachi. Patients between 18-65 years presenting with MI were included in the study (N=100). They were divided into two groups, based on smoking status. The smoking group included patients who had smoked for 10 years or more. Patients who had smoked for less than 10 years or had quit less than 5 years back were excluded from both samples. Informed consent was taken from each participant.

Results: This study observed that 46% of the non-smokers as compared to 8% smokers present with chest pain (p = 0.001). Arrhythmia was seen in 20% of the smokers compared to 4% of the non-smokers (p = 0.001). Acute heart failure was seen in 24% smokers and only 4% non-smokers (p = 0.004). Of the smoking group, 32% of the patients expired despite treatment as compared to 6% of smokers (p = 0.001).

Conclusions: Specific symptoms of myocardial infarction are more commonly seen in non-smokers, aiding early diagnosis and consequently leading to a good prognosis. Alternatively, fatal complications and death rate is a more likely outcome in smokers.

Keywords: Smoking; Myocardial infarction; Cigarettes.

Corresponding Author:
Dr. Ashok Kumar
Department of Pulmonology and Critical Care,
Ziauddin Hospital, Clifton, Karachi, Pakistan.
Email: ashoka_pj@yahoo.com

INTRODUCTION

Myocardial infarction (MI) is categorised within the realms of acute coronary syndrome (ACS) along with unstable angina, ST elevation MI and non-ST elevation MI. The diagnosis of acute MI requires an increase or decrease in cardiac enzymes along with one of the following: ischaemic symptoms, electrocardiographic (ECG) changes with ST elevations or ST depressions, pathological Q waves, left bundle branch block (LBBB) and imaging evidence of myocardial injury not seen on previous reports.[1,2]

Despite development of advanced measures to treat MI, it is among the leading causes of morbidity and mortality worldwide. About 17.1 million deaths occur due to ACS all over the world and it has been estimated to rise to 25 million by 2030.[3] Prevalence of myocardial infarction is noted to be greater in the Asian populations. Pakistan has a population of 187 million and almost 30% of people above the age of 45 are affected with coronary artery disease.[4, 5]

Although new strategies are constantly researched and adopted for the treatment of MI, prevention and controlling risk factors should also be a major focus. Risk factors are broadly categorised into modifiable (smoking, diet, sedentary lifestyle) and non-modifiable (age, gender and family history) causes.[3] One major risk factor for atherosclerosis and MI is smoking,[1] a factor that is especially common in patients who suffer from MI.[6] Deleterious effects of smoking are widespread and systemic; however, the coronary vasculature is particularly vulnerable. In this study, the clinical profile of smokers and non-smokers was compared to assess the differences in their history, clinical features and

treatment outcomes. This comparison allows more calculated clinical predictions of prognosis in patients with MI.

MATERIALS AND METHODS

A cross-sectional study was conducted at a leading tertiary care hospital for cardiac disease in Karachi in September 2013. A total of 100 patients, between the ages of 18-65 years of age who presented with MI were allowed to participate in this study and divided into two groups, smokers and non-smokers. Subjects included in the smokers group were those who had been smoking for 10 or more years. Informed consent was taken from each patient before their participation. Each subject's history was taken directly from the patient and their medical file was reviewed for other relevant information. Data was collected via a survey form that was filled by the subject and anonymity was maintained throughout this process. Patients with major co-morbidities such as chronic obstructive pulmonary disease, diabetes or chronic kidney disease were excluded from the study, as well as smokers who had quit more than 5 years ago.

This study was reviewed and consequently approved by the Ethics Committee of the concerned department. All the data collected and entered into SPSS v.20. Mean ± standard deviation was calculated for quantitative variables like age, while frequencies and percentages were calculated for qualitative variables. Chi-square test was used to analyse association and a p-value of <0.05 was considered significant.

RESULTS

A total of 100 patients were included in this study and divided into two groups: smokers and non-smokers. Each group contained 50 patients who were compared on the basis of clinical presentation (chest pain, vomiting and sweating), complications (arrhythmias, heart failure and cardiac tamponade) and outcome in terms of mortality due to MI (Figure 1).
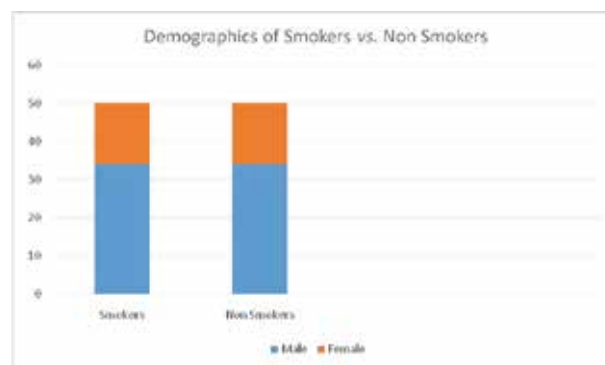

Figure 1. Demographics of Smokers vs. Non-Smokers.

Table 1: Symptoms and complications of myocardial infarction in smokers and non-smokers.

	Smokers	Non-Smokers	p-value*
Symptoms			
Chest Pain	4(8%)	23(46%)	0.001
Sweating	7(14%)	27(54%)	<0.001
Vomiting	11(22%)	11(22%)	0.5
Complication			
Arrhythmia	10(20%)	2(4%)	0.001
Acute Heart Failure	12(24%)	2(4%)	0.004
Cardiac Tamponade	5(10%)	0(0%)	0.003
Death			
Fatalities	16(32%)	3(3%)	0.001

In the smokers group, 32% (n=16) deaths due to complications of MI were seen as opposed to only 6% (n=3) from the non-smokers group. The p-value calculated showed a significant difference of 0.001 in mortality between both groups (Table 1).

DISCUSSION

The prevalence of coronary artery disease varies across the world. It is often misconceived as a disease of the western world, where mortality due to coronary artery disease (CAD) makes up about 40% of the total deaths, mostly in ages above 60 years.[6,8] However, the developing world, including nations like Pakistan, are also plagued by CAD, the severity and high burden of which is still largely unknown due to lack of studies and documentation.

In this study we have shown that smokers presented differently in cases of MI as compared to non-smokers, as well as having higher rates of complications and mortality. Abstinence from smoking has been shown to decline the risk of MI by 65%.[9] In a study conducted in Punjab, smoking was present among 46% of STEMI patients and their mortality was observed to be two to three times higher than non-smokers.[7]

Incidence of chest pain was seen in 46% of non-smokers and only 16% of smokers, with a significant difference with p-value of 0.001. This is an alarming fact as absence of chest pain in a patient can lead to missed or delayed diagnosis. It is a significant symptom of heart attack that allows patients to recognise their condition and call for help as soon as possible. Similarly, diaphoresis was seen in 54% of non-smokers and only 14% of smokers with a significant difference with p-value of <0.001. The presence of sweating has previously been identified to have a positive predictive value (PPV) of 76.09 for STEMI.[10] In our study, an atypical presentation in smokers can be deduced which consequently decreases chances of accurate and timely prediction of the disease. Since vomiting, present equally in both groups, is a very non-specific sign that can occur in a variety of diseases along with MI, it does not affect the diagnosis or outcome of the disease.

Three potentially life-threatening complications were analysed in this study. Arrhythmias, including supraventricular and ventricular, were seen to be more common in smokers (20%) than the non-smoker group (4%). This is consistent with a study done in India that showed 52.9% of patients with MI who developed arrhythmias in the first 48 hours of admission were smokers.[11] Heart failure and cardiac tamponade were also seen mostly in the smoking population as compared to non-smokers. Previous studies attribute increased risk of cardiac tamponade with advanced age, female gender, uncontrolled hypertension, first episode of MI and a trans-

muralinfarction.[12,13] This study shows that smoking can also be included in the risk factors of cardiac tamponade as the difference in incidence between smokers and non-smokers yielded a significant p-value of 0.003.

The outcome and mortality of smokers in hospitals (32%) comparative to non-smokers (6%) does not align with previous studies that have shown smokers to have a relatively improved short-term prognosis as compared to non-smokers,[14] a phenomena known as 'smoker's paradox'.[15] This phenomena, however, is a misleading concept as tobacco adversely affects blood flow in the coronary arteries, increasing oxygen demand of the myocardium consequently accelerating atherosclerosis.[16] This finding is in accordance with the results of this study. The effects of smoking are reversible to an extent. Up to a 13% decrease in mortality has previously been observed in patients who quit smoking for 5 years or more and after 20 years of quitting, their risk becomes equal to those of non-smokers.[14,16] A study conducted in Sudan, among male and female smokers, also observed that increase in smoking duration increases the incidence of myocardial infarctions.[17] It has also been previously observed that after the first acute MI attack, patients who had never smoked were at about half the risk of dying than smokers. These persistent smokers are at higher risk of dying even compared to patients who quit smoking before or after MI. Reducing the number of cigarettes smoked daily among persistent smokers was also shown to be better for survival (reduction of 5 cigarettes/day after MI was associated with an 18% decline in mortality risk).[18] Persistent smoking is therefore considered the most accurate independent long-term predictor for repeated major adverse coronary events,[19] showing an almost eight-fold increased risk of acute STEMI in young smokers when compared to ex and non-smokers.[20]

The duration of smoking as a habit in the included participants is a major limitation in this study. All the participants of the smoking group had been smoking for 10 or more years so the same conclusions cannot be applied to smokers who had quit smoking more than 5 years ago or those who have been smoking for less than 10 years. Future research is required on this topic, with smokers of different durations in a greater sample size. Common cardiac interventions done on patients in emergency situations can also be recorded in order to compare the difference in responses between smokers and non-smokers.[21]

Smoking is a highly prevalent habit in Pakistani adolescents and healthcare professionals.[22] The largest amount of tobacco consumption in South Asia can be attributed to Pakistan where about 45% of the male population smokes, a number that reduces to 18% when subjects are categorized

according to higher education.[23] Considering the prevalence of tobacco smoking and its association with the development of ACS and CAD,[20] it is necessary to work towards programs for incentives from workplaces for smokers to quit. The need for anti-smoking education and awareness programs and local public policies regarding restrictions on smoking need to be implemented post-haste. Smoking is a hazard with far-reaching effects that requires immediate attention from medical professionals of every field.[24]

Some of the limitations of this study are necessary to note. First, the data was collected in 2013 which presents a delay in the reporting of the results. Secondly, the sample size was small. Third, certain confounding variables such as age and gender were not taken into account in this study. Larger studies with more diverse variable divisions are recommended by the authors.

CONCLUSION

Smoking is a major modifiable risk factor for MI, with smokers presenting mostly with atypical features that can lead to delayed diagnosis, high rate of post-MI complications and increased mortality rate as compared to non-smokers. This study impacts the perception of MI symptoms in patients with a long standing history of smoking along with the prognosis and immediate need of treatment options.

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