

A Cross-Sectional Study on Lifestyle, Dietary, and Socioeconomic Determinants of Myocardial Infarction in Adults

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Abstract

Cardiovascular diseases are the leading cause of mortality in the world and myocardial infarction (MI) is one of the serious manifestations of ischemic heart disease. The low middle-income countries such as Pakistan are increasing the myocardial infarctions due to urbanization and western lifestyle. This study investigates the demographic, lifestyle, dietary, socioeconomic and clinical determinants of myocardial infarction in hospitalized patients in Faisalabad, Punjab. Data were collected using the standardized questionnaire and the medical records. The results indicate that individuals who had myocardial infarction (MI) were older and had higher body mass index (BMI) in comparison with those who did not have MI. Patients with a heart attack were more likely to stay in rural areas, do inadequate physical exercises, smoke, often eat fast food, and had undergone bypass surgeries. In adjusted models, age, rural

resident, non-exercise, higher BMI, frequent fast food intake and undergoing bypass surgery were individually related to myocardial infarction. These findings reveal the significance of the changeable risk factors and underscore the necessity of prevention measures that would consider behavioral risks and disparities in the health service access.

Introduction

Ischemic heart disease encompassing myocardial infarction (MI) contributes a significant percentage of mortality and morbidity of cardiovascular diseases (Roth et al., 2020; World Health Organization [WHO], 2023). Heart disease is the major cause of death in all parts of the globe. Rupture of the atherosclerotic plaque with subsequent thrombus formation is the major cause of myocardial infarction (MI). When this thrombus blocks the coronary artery, myocardial necrosis takes place (Libby, 2030). According to a study by Roth et al. in 2020, the overall burden of myocardial infarction (MI) is high even with the development of acute care and high survival rates after heart

attacks. It is often difficult to avoid the problems and track the risk factors on a regular basis with time, especially in low- or middle-income countries.

The global threat of initial myocardial infarction is heavily influenced by a few changeable variables. The case-control study carried out in 52 countries demonstrated that smoking, poor physical exercise, poor dietary habits and obesity were significantly correlated to myocardial infarction (Yusuf et al., 2004). The differences between the cardiovascular events and risk profiles of various countries are due to various factors, including socioeconomic status, effectiveness of a healthcare system, and access to preventive services (Yusuf et al., 2014). The international cohort studies have shown recent evidence to support this claim. Myocardial infarction is one of the major causes of untimely mortality in South Asia, and it is common among people below 40 years of age. The economical as well as demographic environment in Pakistan is undergoing severe changes. Among these changes is the fact that people are eating more calorie-rich foods and having a low amount of physical activity. Two of the major risk factors of cardiometabolic disease are changes in eating habits and more of ultra-processed and fast foods. Patients who excessively consume sodium and caloric levels develop insulin resistance (Mozaffarian, 2016). Risk factors related to myocardial infarction can also be determined by the deficiencies of the societal and healthcare system. To give an example, people living in rural areas have more difficulties regarding the possibility to access examinations and treatment options than the urban residents. According to Teo et al. (2006), PURE paradigm was created to investigate the impact of different social variables, lifestyle, and healthcare accessibility on the outcome of chronic illness at a regional level.

According to Nishtar et al. (2013), systemic problems in Pakistan can be a challenge to the prevention and management of noncommunicable diseases in their early development stages. Other problems among them are the inadequate availability of primary care and other vital services. Risk factors of myocardial infarction (MI) include smoking, lack of physical exercise, unhealthy eating habits, and excessive obesity of the body. To develop effective preventive measures, it is extremely important to conduct local research, including these variables with socioeconomic status and medical history. This study, therefore, employed a cross-sectional design in order to study the demographic, lifestyle, dietary, socioeconomic, and clinical risk factors associated with myocardial infarction in Pakistani adults.

Ischemic heart disease with its main manifestation, myocardial infarction (MI) imposes a high rate of morbidity and mortality associated with cardiovascular disease (Roth et al., 2020; World Health Organization [WHO], 2023). The major cause of death all over the world is heart disease. The rupture of an atherosclerotic plaque is the primary cause of myocardial infarction (MI) causing the development of thrombus. This thrombus blocks the coronary artery, leading to the myocardial necrosis (Libby, 2030). The research by Roth et al. (2020) has shown that, even with the enhanced acute care and higher survival rates, the cumulative effect of the myocardial infarction (MI) is not negligible. It especially concerns the low- and middle-income nations, in which it may be difficult to avoid the problems and retain control over the risk factors in the long run. Extensive studies in various countries have shown that there are a few modifiable factors that significantly influence the global risk of first myocardial infarction. A case-control study, which was conducted in 52 countries, found statistical relationships between myocardial infarction and several factors with a number of them being smoking, physical inactivity, poor eating habits, and obesity (Yusuf et al., 2004). According to Yusuf et al. (2014), recent international cohort studies have produced additional evidence of the existence of country-specific cardiovascular events and risk profiles about the differences caused by various factors, including socioeconomic factors, effectiveness of healthcare systems, and the availability of preventive services.

Myocardial infarction in South Asia is usually found at an earlier age and is a significant cause of premature death. The economy and the population of Pakistan are changing drastically. Among such changes is that people are also increasingly becoming inactive and eating high-calorie foods. An alteration in the dietary habit characterized by increased consumption of ultra-processed and fast foods has been identified as resulting in an elevated risk of cardiometabolic disease. Patients eat too much caloric and sodium and their lipid profiles worsen, and they become insulin-resistant (Mozaffarian, 2016). The problems of the society and healthcare system can also add to the risk of myocardial infarction increase as well. People living in rural areas have more difficulties in receiving screening and treatment services than those, who live in cities. According to Teo et al. (2006), Prospective Urban-Rural Epidemiology (PURE) framework was designed to evaluate the effects of societal determinants, lifestyle factors and accessibility to healthcare on the outcomes of chronic diseases in various environment. According to Nishtar et al. (2013), Pakistan faces systemic barriers that can be an impediment in prevention and early detection of noncommunicable diseases. One of such challenges is the lack of access to primary care and the further complication of the access to needed services. It is widely accepted that smoking, sedentary lifestyle, unhealthy food habits and obesity contribute greatly to the risk of myocardial infarction (MI). However, localized studies of these factors along with the socioeconomic status and medical history must be performed to develop effective prevention strategies. This study, therefore, employed a cross-sectional design to examine the demographic, lifestyle, dietary, socioeconomic, and clinical parameters that were associated with myocardial infarction in Pakistani adults.

Methodology

The present research is a cross-sectional one that was conducted in the cardiology department of a tertiary-care hospital in Pakistan. All the subjects provided their informed consent which was written and the right institutional review board approved the study to be conducted in an ethical manner. The participants of the study were individuals aged between 30 and 70 years of age that were hospitalized due to a cardiovascular examination. To prevent any form of confusion, only patients with congestive heart disease, cancer, or kidney disease during the end stage were not included. The data were collected with the help of a structured questionnaire and the analysis of medical records. The information collected comprised of the sociodemographic (such as age and where the individual stayed), lifestyle (such as smoking and the amount of physical activities they engaged in), dietary (such as frequency of consumption of fast foods), anthropometric (such as height, weight, and body mass index) and medical history (such as having undergone bypass surgery previously). Mean and standard deviation were used to summarize the continuous variables and percentages and frequencies were used to summarize the categorical data. Multivariable logistic regression analysis was applied to identify independent predictors of MI. We also provided odds ratios and confidence intervals of a 95% confidence level. The level of statistical significance was set at a level of $p = 0.05$.

Study Design and Setting

Against this background of high rate of myocardial infarction, the current cross-sectional study is conducted in hospitals to determine the relationship between lifestyle, that is, fast food intakes, smoking, and physical activities. The data about patients was collected in the cardiology department of [Name of Hospital], a tertiary care center in [City, Pakistan], between the period of the research project, which in this case was between [Start Date] and [End Date]. The participants were sufficiently informed and

given a chance to give their consent before they became involved. The project is approved by the Institutional Review Board (IRB) of [Institution Name].

Population and Sampling of the study

His target group was people between 30 and 70 years old who were in hospital with an exclusive purpose to evaluate cardiovascular disease. To minimize the possible number of confounding factors among the participants, patients with history of congestive cardiac disease, which can be classified as congenital or age related comorbidities, such as malignancy and end-stage renal disease, were excluded in the study. An appropriate subset was selected among the [n] patients in the sample. A rough calculation of the prevalence of myocardial infarction among the population was taken to determine the size of the sample that would have to be taken. The level of confidence was established at 95 and margin of error at 5 in this cross sectional study that was carried out in the hospitals to investigate the relationship between the lifestyle factors especially fast food consumption, smoking and physical activity in the face of the high prevalence of myocardial infarction. The research study that was conducted between [Start Date] and [End Date] involved the utilization of patient data of individuals who were admitted to the cardiology department of [Name of Hospital], which is a tertiary care facility in [City, Pakistan]. Participants were well informed before being enrolled with an opportunity to give their consent. The official approval is provided by the Institutional Review Board (IRB) of [Name of Institution].

Data Collection

A systematic questionnaire was used to obtain the data, and the review of medical records was performed to supplement the data. The questionnaire also acquired sociodemographic information (age, gender, level of education), lifestyle, and medical history. To retrieve the clinical information, the patient records were analyzed to identify the diagnosis of myocardial infarction, environmental conditions, including hypertension and diabetes mellitus, and relevant laboratory outcomes. Anonymity of the information made the information private and all the documents were secure. Individuals could opt to participate and they could withdraw at any given time without affecting their medical treatment.

Data Analysis

We used [Statistical Software, such SPSS version XX or R] to process all the data and run statistics on it. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to figure out all the variables. Logistic regression was employed to ascertain the relationship between lifestyle variables and the prevalence of myocardial infarction. Odds ratios (ORs) with 95 percent confidence intervals (CIs) were used to figure out how strong the link was. All inferential tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant.

Results

The effect of MI status on continuous variables is represented in Table 1. The average age of persons who experienced a heart attack was more (53.87 ± 13.94 years) as compared to those who did not (46.05 ± 16.94 years). Individuals who were heart attack patients also had above average BMI (25.71 ± 4.71 kg/m²) compared to individuals who were not heart attack patients (24.59 ± 6.43 kg/m²). Table 2 presents various data about demographics and lifestyles of people. The proportion of MI cases was more in rural (71.74) as compared to urban (28.26) areas. Both samples were not so active, though MI cases tended to be inactive more (rate was 82.61). The proportion of smokers with MI (36.96%) was higher as compared to non-MI (32.47%).

Table 3 presents the clinical history indicating that, MI cases were more likely to undergo a bypass surgery previously (19.57%) than the non-MI cases (2.60%). Table 4 demonstrates the multivariate regression model. Age, rural living, lack of exercise, smoking, body mass index, regular intake of fast-food and prior by-pass surgery were independently associated with myocardial infarction in adjusted studies.

Table 1. Comparison of continuous variables by myocardial infarction status

Variable	No MI (Mean $\pm$ SD)	MI (Mean $\pm$ SD)
Age (years)	46.05 $\pm$ 16.94	53.87 $\pm$ 13.94
Height (feet)	5.36 $\pm$ 0.51	5.38 $\pm$ 0.43
Weight (kg)	64.29 $\pm$ 10.30	68.24 $\pm$ 9.32
Body mass index (kg/m ²)	24.59 $\pm$ 6.43	25.71 $\pm$ 4.71

The high age of the MI cases are in line with the global epidemiology showing that MI rates increase with age because of the accretal load of atherosclerotic disease and chronic cardiometabolic risk factors (Libby, 2021; Roth et al., 2020). The increased BMI in MI patients demonstrates the implication of adiposity-related processes, such as insulin resistance, dyslipidemia, hypertension, and chronic inflammation, which have been noted as being associated with coronary risk in most populations (Mozaffarian, 2016; Yusuf et al., 2004). The abdominal obesity was found to be of particular importance whereas BMI remains an effective surrogate measure of excess adiposity in many clinical studies (Yusuf et al., 2004).

Table 2. Distribution of demographic and lifestyle factors by myocardial infarction status

Variable	Category	No MI (%)	MI (%)
Residence	Rural	17.53	71.74
	Urban	82.47	28.26
Physical activity	Regular	22.08	17.39
	Irregular/None	77.92	82.61
Smoking status	Smoker	32.47	36.96
	Non-smoker	67.53	63.04

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Table 3. Clinical history by myocardial infarction status

Variable	No MI (%)	MI (%)
Prior bypass surgery	2.60	19.57
No bypass surgery	97.40	80.43

The possibility of undergoing bypass surgery in the past was very high in case of myocardial infarction. The clinical plausibility of this finding is that it means that coronary artery disease is already established and that the risk of recurring ischemic episodes is increased at a baseline. It is also stated by Libby (2021) that the molecular

and clinical pathophysiology of acute coronary syndromes supports the opinion that existing atherosclerotic disease remains vulnerable to future plaque instability and thrombosis. This perspective shows the necessity of a constant secondary prevention.

Table 4. Multivariable logistic regression study of myocardial infarction risk factors

Variable	Odds ratio	95% CI	p-value
Age (years)	1.06	1.03–1.09	<0.001
Rural residence	2.31	1.32–4.04	0.003
Physical inactivity	1.74	1.01–2.98	0.046
Smoking	1.89	1.10–3.25	0.021
Body mass index (kg/m²)	1.05	1.01–1.10	0.014
Frequent fast-food intake	2.14	1.26–3.64	0.005
Prior bypass surgery	4.87	2.01–11.78	<0.001

The updated model gives evidence to show that there are independent correlations between myocardial infarction and age, smoking, physical inactivity and risk of obesity based on body mass index. Regarding the quantitative data, it was revealed that every one-year age increase was linked to the increase of the probability of myocardial infarction by 6%. This observation brings forth the synergistic effects of prolonged exposure to cardiovascular risks. The fact that smoking was the risk factor of myocardial infarction which was nearly twice as high as an average risk is a reason to believe that smoking is one of the largest behavioral risk factors of coronary disease that can be modified. Due to the same cause, a sedentary lifestyle was reported to correlate with a 74 percent upsurge in the likelihood of experiencing a myocardial infarction. This observation helps underline the significant role of sedentary behavior in risking cardiovascular disease by using toxic metabolic and inflammatory routes.

Each one-unit rise in the body mass index was associated with a five percent rise in incidence of the risk of myocardial infarction. Adiposity was discovered to exert an independent effect on cardiac risk. Although this augmented danger is not very substantial at a unitary scale, it turns into a substantial one when the environment is a clinical setting and the patient keeps gaining weight. The relationship between the frequency of consumption of fast food and increased chances of having a heart attack was very substantial. The risk of people eating fast food was more than twice as often. This conclusion is also supported by the results of recent studies on cardiovascular nutrition, which indicated that dyslipidemia, insulin resistance, and a high risk of cardiometabolic disease are linked to a low quality of diet and a high consumption of ultra-processed and high-sodium and high-fat foods (Mozaffarian, 2016). It was demonstrated that the risk of having a heart attack was over two times increased in a rural area as compared to normal, alongside lifestyle and metabolic characteristics. This impact is also probably associated with more system-wide problems, including disparities in access to preventative healthcare, late diagnosis, and poor management of cardiovascular risk factors in the long run. Multinational cohorts support this point of view according to which cardiovascular outcomes are not necessarily dependent on the risk exposure of an individual but also on the healthcare infrastructure, resource availability, and system performance in various settings (Teo et al., 2006; Yusuf et al., 2014). Finally, but not the least, the previous bypass surgery was identified as a relatively fivefold higher risk of a heart attack. The findings of this research prove that patients who have already formed and developed coronary artery disease are on a much greater risk, and that secondary prevention is of paramount importance to this type of people.

Discussion

The predictors of myocardial infarction (MI) in this study at the hospital included both immutable (age) and a variety of modifiable exposures (smoking, physical inactivity, high body mass index, and high frequency of fast food intake). Also, a clinical history that was suggestive of pre-existing coronary disease (past bypass surgery) was also identified to play a major role. Overall, these results align with the study carried out in the entire world in the variables contributing to MI especially the focus on smoking, inactivity, and obesity (Yusuf et al., 2004).

The discrepancies could be in the accessibility of health systems, the recognition of risk factors and the persistence of preventive care and the connection with rural living might show the disparities. As Yusuf et al. (2014) state, the results of several studies conducted in different parts of the world underline the fact that cardiovascular outcomes can be symptomatic of the exposure to risk factors and the ability to note and cope with the latter during the period of time. Nishtar et al. (2013) believe that the constraints of the comprehensive health system in Pakistan can lead to the situation when some of the rural regions are lagging behind in seeking medical care and the number of preventative covers experienced is low.

The mechanisms through which smoking causes endothelial dysfunction, oxidative stress, and thrombosis; physical inactivity and unhealthy diet contribute to harmful lipid patterns, insulin resistance, and inflammation; excessive adiposity accelerates the process of atherosclerosis (Libby, 2021; Mozaffarian, 2016). The preventative measures that these pathways support are both the behavior change and easier access to screening of risk factors and long-term care, which interact with each other to facilitate the measures.

Conclusion

This hospital-based study demonstrates that heart attack prevalence among Pakistani adults is significantly associated with advancing age, rural residence, physical inactivity, smoking, higher BMI, frequent fast-food consumption, and a prior history of bypass surgery. These findings underscore the critical role of modifiable lifestyle factors alongside established clinical risks in shaping cardiovascular outcomes. Targeted prevention strategies focusing on smoking cessation, promotion of physical activity, healthier dietary practices, and improved access to cardiovascular care, particularly in rural areas, are essential to reducing the growing burden of heart disease in Pakistan.

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