Acute Myocardial Infarction among Urban and Rural Population of Pakistan

Nauman Ali[1], Syeda Mahrukh Shakir[2], Shoaib Abid[2], Azhar Shehzad[2]

Abstract

Background: Acute myocardial infarction (AMI) is an acute myocardial necrosis that results from the acute obstruction of the coronary artery. Its symptoms mainly include chest pain or discomfort, with or without dyspnea, nausea, and diaphoresis. Diagnosis is made by findings on ECG and by raised cardiac biomarkers in blood. AMI is one of the leading causes of death worldwide.

Objective: To determine the frequency of acute myocardial infarction among urban and rural populations and determine risk factor distribution among them.

Methodology: This cross-sectional study was carried out in the Cardiac Complex Emergency department, BVH Bahawalpur to determine the frequency and risk factors of acute myocardial infarction among urban and rural populations. A sample of 350 patients visiting the cardiac complex emergency department, was taken using non-probability convenient sampling. The sample includes patients from the urban and rural population age group i.e. 20 years-80 years, both males and females, visiting the cardiac complex emergency department, with acute chest pain and positive ECG findings for AMI. Information was collected through a structured questionnaire.

Results: A total of 350 patients were interviewed, 217 (62%) were from rural areas, and 133 (38%) were from urban areas. 260 (74.3%) were males, 90 (25.7%) were females. 153 (43.7%) were smokers, 197 (56.3%) were non-smoker. 220 (62.9%) belonged to low socioeconomic class, 130 (37.1%) belonged to middle socioeconomic class.

Conclusion: Most of the AMI patients were old males, poor rural inhabitants, with uncontrolled hypertension, and smokers. Health education regarding knowledge of the risk factors of AMI is suggested at the population level specifically in rural areas.

Keywords: Acute myocardial infarction, Risk factors, Urban, Rural

Introduction

Acute myocardial infarction (AMI) or heart attack is one of the major causes of death in Pakistan and worldwide. Pakistan is an agricultural country with more population in rural areas.[1] There are social, cultural, dietary, and educational differences between rural and urban people. These differences have effects on disease patterns as well. Rural–urban differences in presentation, treatment, and outcomes of acute myocardial infarction remain a very important public health concern.[1] Previous studies have found a significant difference in care of acute myocardial infarction between hospitals in rural and urban areas.[2,3] Rural area patients usually present first to a local rural area hospital and from there if recognized early are almost always referred to tertiary care hospital. This first encounter is very important for early referral.[3] Traditionally, the general public perception is that heart diseases are more prevalent in urban areas due to many factors like unhealthy fast food eating dietary patterns, more pollution due to vehicle smoke and industries, lack of time for physical activities, less intake of fresh fruits and vegetables and a perception of stressful life in cities.[4,5] Historically, ischemic heart disease is also thought to be more prevalent in the developed world. This all is contrary to current data. So this makes the rationale to conduct a study to find differences responsible for this.[6]

In addition, most rural residents face a large number of barriers to getting an optimal level of care after an acute myocardial infarction.[4] Quality cardiology care services and facilities are available only in Bahawal Victoria Hospital and Cardiac Center Bahawalpur. Bahawalpur division (study population) comprises both urban and rural areas, predominantly rural areas, and compared to urban residents, those in rural areas tend to be less

1. Cardiac Centre, Bahawalpur, Pakistan.
2. Department of Cardiology, CPEIC, Multan, Pakistan.

Correspondence: Dr. Nauman Ali, Cardiac Centre, Bahawalpur, Pakistan.
Email:drnaumanali@yahoo.com   **Received:** 26-08-2019   **Published:** 00-12-2022

educated and belong to a lower socioeconomic status, have a higher burden of chronic diseases, and poorer access to preventive health care services such as cholesterol screening and cardiac rehabilitation. Due to high early mortality many of the AMI patients may not have adequate time to travel to these hospitals. Although a patient of AMI from rural will ultimately receive necessary care at an urban cardiac care hospital, Emergency Medical Care, prolonged travel time, and medical treatment during the transport may not be optimal.[5,7] In Pakistan, no study has directly observed rural and urban distribution of acute myocardial infarction, which could have important effects on outcome as noted above. Variations in medical treatment, along with poor access to health services, and associated comorbidities can result in differences in mortality outcomes. Therefore, this study provides a baseline data set of rural-urban AMI distribution, to determine the frequency of acute myocardial infarction among urban and rural populations and determine risk factor distribution among them.

Methodology

This cross-sectional descriptive study was carried out between 1st May 2019 to 20 July 2020. After approval from the ethical committee of the hospital, informed consent was taken from every study subject. Overall 350 patients presented in the emergency of Cardiac Center Bahawalpur, of both genders between 30 to 70 years were included in the study by nonprobability consecutive sampling. Data was collected by taking interviews from each study subject and noted on a questionnaire. It contains information related to the demographic profile of the participants like age, gender, residence (rural/urban), and regarding risk factors such as smoking, diabetes, hypertension, and socioeconomic status. Data were analyzed through SPSS version 20. Quantitative variable like age was measured by Mean standard deviation. Qualitative variables like diabetes, hypertension, socioeconomic class, and smoking have been presented as frequency and percentages. Confounding variables were controlled by stratification.

Results

A total of 350 study subjects were included in this study. The mean age was 54±3.2 years. The study showed 265 (75.7%) were males and 85 (24.3%) were females, 217 (62%) belonged to rural areas and 133 (38%) belonged to urban areas. Regarding age 170 (48.6%) were from the age group 40-59 years, and 160 (45.7%) were from the age group 60-80 years. Among the study subjects, 153 (43.71%) were smokers and non-smokers were 197 (56.28%). Similarly, diabetes and hypertension distribution with respect to rural/urban residence is shown in Table I. Table I also shows the distribution of patients by socioeconomic status. The occupational status of patients was, among females all were housewives i.e. 94 (26.8%). Among male patients, 114 (32.57%) were laborers, 56 (16%) were shopkeepers, 25 (7.14%) were landlords, 35 (10%) were drivers and 30 (8.6%) were retired persons.
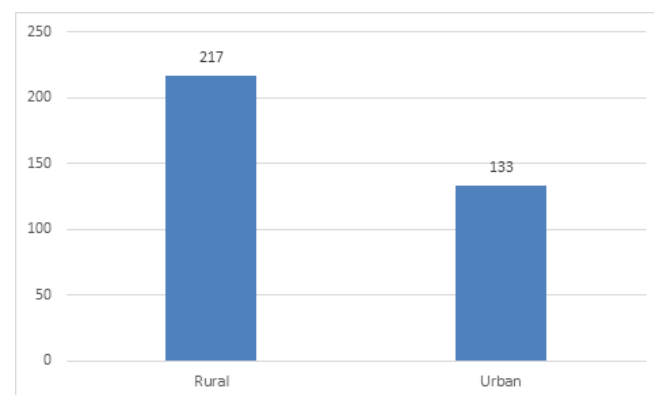

Table-I: Risk factors versus rural/urban residence distribution in our study population

Variable	Rural	Urban	P Value
Smoking Status			
Smoker	80 (36.8%)	73 (54.8%)	
Nonsmoker	137 (63.1%)	60 (45.1%)	0.000
Total	217 (100%)	133 (100%)	
Diabetes Status			
Diabetes	73 (33.61%)	47 (35%)	
Non Diabetes	144 (66.35%)	86 (64.66%)	0.74
Total	217 (100%)	133 (100%)	
Hypertension status			
Hypertension	102 (47%)	73 (54.8%)	
Non hypertensive	115 (53%)	50 (44.12%)	
Total	217 (100%)	133 (100%)	0.000
Socioeconomic status- Income/month (PKR)			
Low =20,000/-	70 (32%)	78 (58%)	
Middle (20k-100k)	120 (55%)	27 (20%)	
High (=100k	27 (12.44%)	28 (21%)	
Total	217 (100%)	133 (100%)	0.000

Discussion

A study regarding the frequency of acute myocardial infarction among urban and rural populations was conducted at the Cardiac Complex Emergency Department Bahawalpur. In our study, the main reason for the increased frequency of AMI reporting among the rural population might be more proportion of the rural population in the study area and the lack of knowledge regarding the risk factors of the disease. Smoking, hypertension, and poor socioeconomic status based on monthly income were significantly more prevalent among rural AMI patients. (p=<0.05) Age, male gender, and cigarette smoking were found important risk factors in the study. Poor health facilities in rural areas also contribute to the increased frequency of disease among the rural population and this also contributes to their late presentation and complications.

A study found rural–urban disparities in AMI distribution and mortality differences in Nebraska. They found that the patients with AMI in urban areas have comparatively lower odds of in-hospital reported mortality than the patients belonging to rural areas. The myocardial infarction patients belonging to urban areas had also shown a better overall survival chance than the patients in rural areas.[6]

Limited resources in rural hospitals lead to fewer cardiologists available options for treating acute myocardial infarction patients. If patients cannot obtain timely medical care from a cardiac specialist, they obviously will get care from a general doctor, who mostly might not go for necessary tests and timely cardiology referrals.[7] Thus finally, the necessary medical care received in the time of pre-hospital travel or settings in rural areas might not be optimal, because most long-distance rural emergency transport and most of the ambulance systems which are available in rural areas are usually staffed by poorly trained medical personnel who might not be trained enough to provide advanced cardiac life support interventions.[8]

Pakistan is an agricultural country with 65% of the population residing in rural areas. Although basic health units and rural health centers are located in every area, the standard of cardiac care is not much strengthened there. Usually general physician or a medical officer sees patients initially. Due lack of a coronary care unit, intensive care unit, cardiac catheterization facility, shortage of cardiac medications, and availability of a dedicated cardiac team 24 hours a day lead to referral of cardiac patients to urban centers after initial management.[9,10,11] Our study highlights that, as acute myocardial infarction is more prevalent in rural as compared to urban areas, the new cardiac care facilities should be constituted in rural areas. There can be many possible causes of rural dominance of acute myocardial infarction. As a study done in Nabraska[6] has shown, our study shows that conventional risk factors are more common in urban areas. So there are other factors responsible for AMI in urban areas, like less developed health care facilities resulting in decreased early detection and treatment, less awareness of people about taking healthy lifestyle measures, and probably most importantly nonadherence to medical treatment if diagnosed with cardiac disease. This study contrary to popular belief also showed that, shows that acute myocardial infarction is more prevalent in urban areas. It also highlights many factors responsible for this high prevalence of acute myocardial infarction in rural areas. Similarly, outcomes of acute myocardial infarction are also worse in the rural population. It also highlights the factors responsible for the worse outcomes of acute myocardial infarction patient population in less developed rural areas in this local population. The data from a relatively large community with diversity showed a significantly lower incidence of myocardial infarction after the year 2000 and similarly, there is a dramatic decrease in the overall incidence of the ST-segment elevation MI during the previous decade.[12] There is an overall decrease in adjusted case fatality rate over time, although it was shown that it was not decreased in patients with ST-segment elevation MI. This study showed a decreased overall incidence of acute myocardial infarction. We can deduce that urbanization is parallel with this decrease in the incidence of acute myocardial infarction. Nowadays an increasing emphasis is being put on the preventive measures to control and reduce the multifactorial risk factors at both the individual and the community levels simultaneously, including the public bans enforced on the smoking and setting a lower target maintaining low-density lipoprotein (LDL), triglycerides and the blood pressure, and these efforts have resulted in an improved control of the cardiac disease risk factors over the time. Additionally,

improvements in medical care in remote rural areas is expected to reduce the high frequency of myocardial infarction, at the same time the increasing prevalence of the obesity and diabetes would have found the opposite overall effect in both the rural and urban populations.[12] Behavioral interventions regarding heart disease which includes; a healthy diet, better physical activity, controlling blood pressure and blood sugar, and stopping smoking after an event of AMI are well known to be a cause of much lower reported risk of recurrent myocardial infarction events.[9] Rural people are found to be less physically active, comparatively more obese, and are using much more tobacco or related products than urban people in their region.[10,11] We also found that smoking is more prevalent in urban areas and less prevalent in rural areas. This paradox might be explained by the urbanization of rural people. Perception of cardiac disease risks may play a vital role in the scenario of rural–urban disparity reported for heart disease. Mostly many rural dwellers never perceive themselves as being at risk for myocardial disease and stroke, and usually, their behaviors are shaped by these misperceptions. So it results in high prevalence of heart disease in rural areas and this is what we have found in our study as well.

A cross-sectional study was carried out in a Cardiac institute in Ghana in June 2013.[12] Data was collected by Questionnaires, interviews, and observation. During the interviews with 60 outdoor patients, 20 patients were from the rural population. The observed 40 patients (80%) of patients were from the rural population and were smokers and were suffering from anterior wall MI. and only 20% of patients were from the urban population. A similar type of study showed that the ECG study was also performed and about two-thirds of students were from rural populations and were suffering from stress and episodic chest pain. People's education about the risk factors of coronary artery disease in rural areas is very important. Lack of this basic knowledge leads to uncontrolled risk factors and high prevalence of AMI in rural areas.[13] This high prevalence in areas with less developed infrastructure and decreased literacy rate results in late perception of symptoms of chest pain of acute myocardial infarction. This all results in their late arrival at a nearby health facility which again is deficient in trained health personnel and resources. So timely referral to a center where revascularization could be initiated is delayed. These areas are important to identify so that all steps of referral can be addressed. Some rural patients do not usually perceive themselves as being at risk for an acute myocardial infarction and the stroke, and mainly their health or disease-related behaviors are shaped by all these misperceptions. This prevalent lower overall perceived cardiac disease risk is enhanced by the relatively decreased availability of the screening services in most of the rural areas. The cardiac rehabilitation available at tertiary care cardiac centers is also associated with reduced mortality, a finding that has not been previously noted specifically at the population level. In that study, it was noted that Acute Myocardial Infarction patients did attend a specialized cardiac rehabilitation session during admission, also had reported a significantly lower chance of cardiac mortality than those patients who did not attend cardiac rehabilitation. Our study by knowing the distribution of prevalence of acute myocardial infarction in urban rural areas helps to highlight or focus those areas where health infrastructure needs to be developed.

There are some limitations in the current study. Firstly, this study did not include case severity, the treatment given, and its variation between the rural and the urban patients. Secondly, we also do not include the frequency of utilization of cardiac rehabilitation. Thirdly, the study population is sometimes heterogeneous with regard to the close proximity of rural areas to cities.

Conclusion

Most of the patients with acute myocardial infarction were from rural areas. Most of them were old males, poor rural inhabitants, with uncontrolled hypertension, and smokers. Health education regarding knowledge of the risk factors of AMI is suggested at the population level specifically in rural areas.

Authors Contribution: NA: Conception of work, Acquisition and Analysis of data and Drafting. **SMS:** Acquisition and Analysis of data, Interpretation of data and revising. **SA:** Design of work, Acquisition and Analysis of data and revising. **AS:** Interpretation of data and revising.

All authors critically revised and approve its final version.

Conflict of Interest: No conflict of interest among authors.

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