Pattern of Coronary Artery Disease in Patients with ST-elevation Myocardial Infarction undergoing Primary Percutaneous Coronary Intervention

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ABSTRACT

Objective: To determine the pattern of coronary artery disease in patients having ST-Elevation myocardial infarction undergoing primary percutaneous coronary intervention and to find out the risk factors of coronary artery disease in local population.
Study Design: A Cross-sectional Observational study
Place and Duration: From 1st January 2019 to 30th June, 2019 at Chaudhary Pervaiz Elahi Institute of Cardiology, Multan
Methodology: Patients with ST-Elevation Myocardial Infarction diagnosed on electrocardiogram who underwent primary percutaneous coronary intervention were included. Different types of ST-elevation myocardial infarction were noted. Pattern of coronary artery disease and the vessels involvement were observed. Conventional risk factors for coronary artery disease age, gender, diabetes, hypertension, hyperlipidemia, smoking, obesity and family history were also studied.
Results: A total of 170 patients with mean age of 42.7 ± 6.7 years predominantly male (65.29%}. Majority70%) were smokers, 17.06% patients had positive family history, 28.82% hypertensive, 46.67% diabetics and 8.82% patients were dyslipidemics. In cornory artery involvement, 61.76% had single vessel, 12.94% double vessel, 16.47% triple vessel disease and only 8.82% had left main stem involvement. Left anterior descending artery (58.82%) is the most common artery involved.
Conclusion: Single vessel disease is most common among patients with acute ST-elevation myocardial infarction. Left anterior descending artery is the most commonly affected vessel. Smoking is the most prevalent risk factor in our population.
Keywords: Coronary artery disease, Prevalence, ST-elevation, Myocardial infarction, Coronary artery involvement, Risk factors, Smoking, Hypertension,

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INTRODUCTION

Ischemic heart disease is one of the main causes of morbidity and mortality, both in under developed as well as in developed world[1]. Acute ST-Elevation myocardial infarction (STEMI) is considered as the most dangerous presentation of ischemic heart disease with death rates ranging from 15 to 20%[2]. Reperfusion therapy via primary percutaneous coronary intervention (PCI) is the best method of management for STEMI[3]. Primary PCI results in better outcome as compared to thrombolysis[4]. It not only reduces mortality but also causes reduction in re-infarction and stroke rates[5]. Despite of these facts, this treatment has not been adopted worldwide yet as a first line treatment in developing countries like ours[6]. This is mainly due to financial causes as the people are poor and state funding for health sector is very minimal so patients have to bear most of the expenses. Therefore, the data is scarcely available from the developing nations including indo-Pak subcontinent[6].

The population of Indo-Pak subcontinent is a different race as compared to the developed world[7]. The South Punjab region of Pakistan is an underdeveloped area with high illiteracy rate and poverty. This leads to different lifestyle of our local population as compared to develop world. Our institution has reorganized its structure to provide facility of Primary PCI to the people of this area. We conducted this study to find out the pattern of coronary artery disease (CAD) in patients who presented with acute STEMI undergoing primary PCI in a tertiary care hospital of South Punjab. We observed for the severity of disease on number of coronary vessels involved. We also looked for the common risk factors of CAD prevalent in our local population and compare them with the internationally and nationally available data to find out whether our population differs from

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the world in any aspect of coronary artery disease. So this study was conducted with an objective to determine the pattern of coronary artery disease in patients having ST-elevation myocardial infarction undergoing primary percutaneous coronary intervention and to find out the risk factors of coronary artery disease in local population.

METHODOLOGY

The Cross-sectional, Observational study was conducted at the Department of Cardiology, Chaudhary Pervaiz Elahi Institute of Cardiology, Multan for six months from 1st January 2019 to 30th June, 2019 after taking permission from Ethical Review Committee of the hospital. All the patients coming to emergency department with the complaint of typical central severe chest pain of less than 12 hours and ECG features of ST elevation in ≥ 2 contiguous leads of ≥ 2.5 mm in leads V2-3 in men under 40 years, or ≥ 2.0 mm in leads V2-3 in men over 40 years, ≥ 1.5 mm ST elevation in V2-3 in women, ≥ 1 mm ST elevation in all other leads were labeled as STEMI and were considered for Primary PCI. Patients of any age group either male or female were part of the study. Patients with previous history of ischemic heart disease or stable angina, previous revascularization either by coronary artery bypass graft or angioplasty, nephropathies and co-morbidities like history of stroke were excluded in the study. Informed consent was taken by the patients or the family to include their data in the study without revealing their identity.

Angiography was reported by a senior fellow counter checked by the consultant. The coronary artery was labeled diseased if there was luminal stenosis of 50% or more. Single vessel disease (SVD) labeled if only one of the left anterior descending, left circumflex or right coronary artery was diseased, double vessel (2VD) if ant two of these vessels were involved and triple vessel (TVD) if all three vessels were having disease. Left main stem (LMS) disease was separately noted. Data regarding age, gender, type of STEMI, pattern of coronary artery involvement and risk factors like diabetes, hypertension, dyslipidemia, smoking, obesity and family history of coronary artery disease was calculated on a preformed Performa. Data was calculated from all 170 patients presenting with acute STEMI undergoing primary PCI for the period of six months fulfilling the inclusion and exclusion criteria stated above.

Data Analysis: Computer software SPSS version 20.0 was used for data entry and analysis. Mean and standard deviation was calculated for age. Frequency and percentages were calculated for different types of ST-elevation myocardial infarction, gender, diabetes, hypertension, smoking, obesity, dyslipidemia, positive family history and pattern of coronary artery disease. Frequencies were calculated for different vessel and their involved segments. Frequencies for risk factors in SVD, 2VD, TVD and LMS disease were calculated separately. Chi square test was applied on frequencies of risk factors in SVD 2VD, TVD and LMS and p value of less than 0.05 was considered significant.

RESULTS

A total 170 were studied among them 111 (65.29%) were males and 59 (34.71%) were females with a mean age of 42.7± 6.7 years. Among them, 60 (35.29%) patients were having anterior wall myocardial infarction (MI), 39 (22.94%) were with inferior wall MI, 28 (16.47%) were having infero-posterior wall MI, 16 (9.41%) were having anterolateral wall MI, 16 (9.41%) were having high lateral wall MI and 11(6.47%) were having inferior wall MI with Right ventricle infarction (Table-I)

Table-I: Pattern of coronary artery disease (N=170)

Vessel involved	Frequency
Single vessel disease	105 (61.76%)
Double vessel disease	22 (12.94%)
Triple vessel disease	28 (16.47%)
Left main stem disease	15 (8.82%)
Left anterior Descending (LAD)	
Proximal LAD	42
Mid LAD	51
Distal LAD	7
Left circumflex artery	24
Right coronary artery (RCA) Disease	
Proximal RCA	32
Mid RCA	42
Distal RCA	22

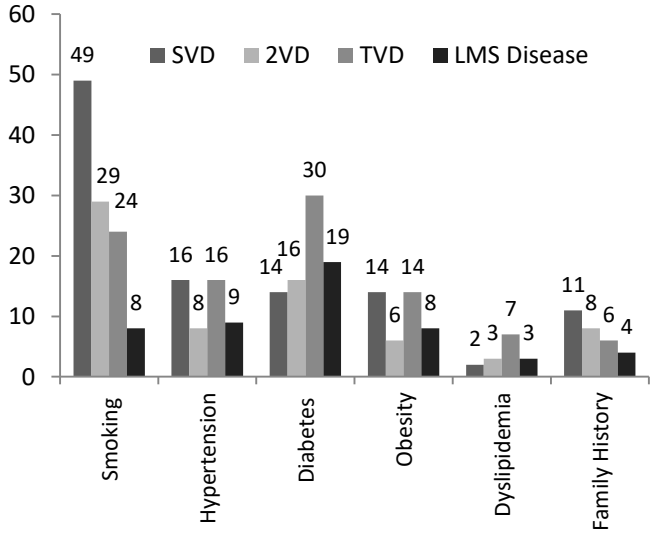

Figure-1: Frequencies of risk factors in different patterns of coronary artery disease involvement (N=170)

P-Value 0.007 (significant)

Out of these 170 patients, 110 (64.70%) were smokers, 49 (28.82%) were hypertensive, 79 (46.67%) were diabetics, 42 (24.70%) were obese, 15(8.82%) were having dyslipidemia and 29 (17.06%) were having strong family history. Figure-1 shows the frequency of risk factors in SVD, 2VD, TVD and LMS disease.

DISCUSSION

This is probably the first study from the South Punjab region of Pakistan which shows the pattern of coronary artery disease in patients undergoing primary angioplasty for STEMI. Our institution has reorganized our structure for primary PCI and it is now offer to the maximum number of patients in its capacity. This study has shown few results which are astonishing and differentiating from the developed parts of the world.

The mean age of the patients in our study was more than a decade less than the mean age presented in western literature as reported by Steg et al and Gibson[8,9]. The mean age of our patients is comparable to the mean age reported by Chaudhary et al and Dubey et al[10,11]. This shows that our population of South Punjab region of Pakistan is more prone to develop CAD at a younger as compared to the developed world. This emphasizes that we should start risk stratification at an early age and modification of risk factors to prevent our patients from CAD.

Among risk factors smoking was the most prevalent in our community and this is also comparable to results found by Dubey et al[11]. The prevalence of smoking is far more than reported by the western developed countries[12]. Dyslipidemia was another risk factor which showed contradicting results from developed world and comparable results to local and South Asian studies [10, 11, 13]. We found that dyslipidemia is far less common in our population as compared to the developed world. This could be due to extensive use of fast food items as daily staple food in western world which are not very common in our society.

Our study showed that SVD is found in 61.76% of patients which is comparable to the results reports by Farman et al[6]. Mid LAD is the most commonly involved portion as observed in our study which is similar to what was observed by Chaudhary et al in his study[10]. Dubey et al also reported LAD as the most commonly involved vessel (56.6%)[11]. In this aspect our results are comparable to national and international studies. We have observed that a significant number of patients who presented with acute STEMI have multi-vessel involvement showing 2VD, TVD and LMS disease. When we compare our results to a similar study of Dubey et al we found they reported 24.2% with 2VD, 26.07% with TVD and 2.43% with LMS disease[11]. The frequency of 2VD and TVD is slightly lower as compared to Dubey et al and prevalence of LMS diseases is slightly higher.

We have also observed that diabetics have usually aggressive disease as compared to other risk factors as most of the patients with double vessel, triple vessel and LMS disease were diabetics. This shows that diabetes cause aggressive damage to coronaries. These results are also comparable to international studies. Studies have reported that diabetics have a higher risk for CAD, more severe CAD and twice the short- and long-term mortality after STEMI than non-diabetic patients[14]. The main reason of severe aggressive disease in diabetics in our population was poor control. Aamir et al showed that Pakistan has higher prevalence of DM as compared to previously estimated prevalence rate [15.] Due to poverty, lack of education and fear of insulin and medicines for diabetes our people have usually uncontrolled diabetes. Many patients don't even know about their diabetic status and were diagnosed during hospital stay. Due to these reasons our diabetic population has aggressive coronary disease.

Our study also has limitations. It was just an observational descriptive single centre study with a small sample size and not a randomized trial for documentation of pattern of CAD involvement in STEMI having primary PCI. Larger multi-centre studies, randomized trials with proper follow-up must be conducted to assess the pattern of CAD in acute STEMI, risk factor profiles and develop an association between the risk factors and the pattern of CAD.

CONCLUSION

Single vessel disease is most common among patients with acute ST-elevation myocardial infarction. LAD is the most commonly affected vessel. Smoking is the most prevalent risk factor and this issue must be addressed. Similarly diabetes is observed to be causing aggressive disease in our patients which also needs our attention.

AUTHOR'S CONTRIBUTION

Khan TM: Conceived idea, Designed study, Statistical analysis, Data interpretation, Manuscript writing

Shahzad A: Designed research methodology, Data collection, Literature search, Data interpretation

Zarif HMA: Literature search, Literature review, Statistical analysis, Final reading and approval

Akhtar A: Data collection, Data interpretation, Statistical analysis, Manuscript writing

Zubair M: Literature search, Data collection and compilation, Final reading and approval

Rasheed M: Data interpretation, Statistical analysis, Literature review

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