Pak Heart J

PATTERN OF ANGIOGRAPHIC FINDINGS IN YOUNG PATIENTS PRESENTING WITH ACUTE ST SEGMENT ELEVATION MYOCARDIAL INFARCTION

Burhan Akhtar[1], Nauman Ali[2], Rana Kashif[3]

[1-3] Department Of Cardiology, Chauhdary Pervaiz Elahi, Institute of Cardiology Multan, Pakistan

Address for Correspondence:

Dr. Burhan Akhtar,

Department Of Cardiology, Chauhdary Pervaiz Elahi, Institute of Cardiology Multan, Pakistan

E-Mail: drnaumanali@yahoo.com

Contribution
All the authors contributed significantly to the research that resulted in the submitted manuscript.

All authors declare no conflict of interest.

ABSTRACT

Objective: To investigate angiographic patterns in young patients presenting with acute ST segment elevation MI and various factors which may probably affect this problem.

Methodology: This observational cross sectional study was conducted at Chaudary Pervaiz Elahi institute of cardiology Multan from January 2013 to August 2013. Patients with acute ST segment elevation myocardial infarction were included. Detailed history was taken about risk factors. Proper investigations (fasting blood glucose and total cholesterol) were carried out, where needed, to check for the risk factors. Angiographic patterns were noted and listed in appropriate proforma. We divided the patients into two groups according to their age and gender and analyzed angiographic patterns according to different risk factors.

Results: A total of 101 total patients of either genders were included. Of them 15.8% were diabetic, 56.4% were smoker, 27.7% had family history of premature ischaemic heart disease, 13.9% were hypertensive while 7.9% had hyperlipidemia. 79.2% patients had LAD involved, 42.5% patients had RCA involved, 26.7% patients had LCX involved while 4.9% patients had Ramus intermedius involvement. About 63.4% patients had single vessel disease, 23.8% patients had double vessel disease while 12.9% had triple vessel disease.

Conclusion: In young patients with acute ST segment elevation myocardial infarction most common risk factor was smoking, most common vessel involved was left anterior descending artery while most patients had single vessel disease and mild left ventricular systolic dysfunction.

Key Words: ST Segment Elevation Myocardial Infarction, Angiographic Patterns, Young Patients

INTRODUCTION

Cardiovascular diseases are major causes of morbidity and mortality causing more than 25% of deaths in the Indian subcontinent.[1,2] Atherosclerotic disease is expected to become the leading cause of global morbidity and mortality by 2020.[1] According to an estimate, nearly one hundred thousand individuals suffered an acute myocardial infarction in Pakistan in the calendar year 2002.[3]

The incidence of coronary artery disease (CAD) in the young has been reported to be 12% to 16% in Indians and about 25% of acute myocardial infarction (MI) in India occurs under the age of 40 years.[4] However in another study CAD in younger population aged less than 40 years was found to represent only 3% of all patients with CAD.[5] This higher incidence of CAD and excess mortality rates in young cannot be fully explained on the basis of conventional risk factors.[6]

There is a clear correlation between the incidence of coronary artery disease and existing cardiovascular risk factors. In one local study, the proportion of major risk factors for CAD was sedentary life style 72%, family history 42%, dyslipidemia 31%, obesity 24%, hypertension 19% and Diabetes Mellitus 15%. Proportions of the three major risk factors (smoking, hypertension and dyslipidemia) occurring singly, doubly and all three together in the study population were found to be 39%, 11% and 1% respectively.[7] However Patwary et al in a study in Bangladesh has shown that smoking was present as the commonest risk factor (73.33 %) in young patients. Diabetes and hyperlipidemia are also frequently present in young CAD patients. Patwary et al has shown that young patient in their study 53.33 % were dyslipidemic and 41.67 % were hypertensive.

Angiographic pattern is identified in higher incidence of one-vessel disease in (56.89%), followed by two-vessel disease (20.68%), three-vessel disease (13.79%), and normal coronary arteries (8.62%), were observed in one of the study while in another study one-vessel disease is observed in (45%), two-vessel disease in (30%), three-vessel disease (22.5%), with LMS (9.5%), LAD (73.5%), RCA (39%), and ramus intermedius (RI) 7% in another study.[8,9]

As the number of young patients presenting with acute myocardial infarction is increasing, so we will be able to identify coronary artery diseases pattern in young Pakistani patients and correlate their disease with the risk factor profile. This will help us to risk stratify young patients according to risk factor profile

METHODOLOGY

This observational cross sectional study was conducted at Chaudary Pervaiz Elahi institute of cardiology Multan from January 2013 to August 2013, after approval from local ethical committee. Informed consent from the patients with acute myocardial infarction age ≤ 40 years were included by non probability purposive sampling. Patients with pre-existing heart failure, valvular heart diseases and pericardial diseases were excluded in the study. The demographic information like age, gender and risk factors like diabetes mellitus (Fasting blood glucose >126mg/dl), hypertension (≥ 140/90), smoking, hyperlipidemia (total cholesterol >200mg/dl), family history of premature ischaemic heart disease (ischaemic heart disease in male<55years or female <65years of age) were noted for stratification. All patients underwent coronary angiography and angiographic pattern was noted by the researcher at the time of coronary angiography. Angiographic pattern is determined according to following parameter

1. Involvement of named vessels like left main coronary artery (LMS), left anterior descending artery (LAD), Right coronary artery (RCA), left circumflex artery (LCA), Ramus intermedius artery (RI).

2. Number of vessels involved (Single/double/triple).

3. Severity of disease was defined as narrowing of luminal diameter and divided into mild<50% narrowing, moderate =50-70% narrowing and severe ≥70% narrowing.

4. Segment of vessel involved like proximal, middle and distal segments.

All information was noted on specially designed proforma. The collected information was entered and analyzed through SPSS Version 16. Descriptive statistics were used to calculate mean and standard deviation for age and number of vessels involved. Frequencies and percentages were calculated for gender and angiographic patterns (vessels involved, severity of lesion, involved segments and left ventricular function) in acute myocardial infarction. Stratification was undertaken on age, gender and risk factors (diabetes mellitus, hypertension, smoking, hyperlipidemia and family history of premature ischemic heart disease) to control the confounding effects of extraneous variables on the study.

RESULTS

We had total 101 patients. Out of 101 patients 95 (94.1%) were males while 6 (5.9%) were females. These patients were in the age range of 21 (minimum) to 40 (maximum) years with mean age of 34.31 ± 4.75.

Regarding angiographic patterns, left main stem artery was not involved in any patient. Left anterior descending artery was the most commonly involved vessel (79.2%) with proximal segment being the most commonly involved segment. Left anterior descending artery involvement was followed by right coronary artery (42.5%) which was followed by left circumflex artery (26.7%). Majority of the

Table 1: Left Anterior Descending Artery

		No Disease	Mild Disease	Moderate Disease	Severe Disease
Proximal Segment	**Frequency**	41	7	5	48
	Percent	40.6	6.9	5.0	47.5
	Valid %	40.6	6.9	5.0	47.5
	Cumulative %	40.6	47.5	52.5	100.0
Mid Segment	**Frequency**	72	5	2	22
	Percent	71.3	5.0	2.0	21.8
	Valid %	71.3	5.0	2.0	21.8
	Cumulative %	71.3	76.2	78.2	100.0
Distal Segment	**Frequency**	101.0	0	0	0
	Percent	100.0	0	0	0
	Valid %	100.0	0	0	0
	Cumulative %	100.0	0	0	0

patients (63.4%) were found to have single vessel disease. Detailed angiographic pattern is shown in the tables 1, 2, 3, 4.

Smoking was the most common risk factor. It was found in 56.4% of the study group. About 27.7% patients had a positive family history of premature ischemic heart disease, 15.8% patients had history of diabetes mellitus, 13.9% patients were hypertensive and only 7.9% patients had hyperlipidemia.

Table 2: Right Coronary Artery

		No Disease	Mild Disease	Moderate Disease	Severe Disease
Proximal Segment	**Frequency**	84	4	2	11
	Percent	83.2	4.0	2.0	10.9
	Valid %	83.2	4.0	2.0	10.9
	Cumulative %	83.2	87.1	89.1	100.0
Mid Segment	**Frequency**	83	3	5	10
	Percent	82.2	3.0	5.0	9.9
	Valid %	82.2	3.0	5.0	9.9
	Cumulative %	82.2	85.1	90.1	100.0
Distal Segment	**Frequency**	88	2	2	9
	Percent	87.1	2.0	2.0	8.9
	Valid %	87.1	2.0	2.0	8.9
	Cumulative %	87.1	89.1	91.1	100.0

Table 3: Left Circumflex Artery

		No Disease	Mild Disease	Moderate Disease	Severe Disease
Proximal Segment	**Frequency**	92	1	3	5
	Percent	91.1	1.0	3.0	5.0
	Valid %	91.1	1.0	3.0	5.0
	Cumulative %	91.1	92.1	95.0	100.0
Mid Segment	**Frequency**	86	3	4	8
	Percent	85.1	3.0	4.0	7.9
	Valid %	85.1	3.0	4.0	7.9
	Cumulative %	85.1	88.1	92.1	100.0
Distal Segment	**Frequency**	94	2	1	4
	Percent	93.1	2.0	1.0	4.0
	Valid %	93.1	2.0	1.0	4.0
	Cumulative %	93.1	95.0	96.0	100.0

We did Stratification of angiographic patterns according to the risk factors, age and gender and found that Left main stem artery was not involved in any of the 101 patients. LAD proximal segment was involved with most severity in smokers, patients of male gender and in age group of 31-40 years. In LAD middle segment male gender and age group of 31-40 years were the most important culprits for disease. In LAD distal segment there was no disease. Male gender and age group of 31-40 years were the most commonly involved risk factors in all segments of RCA disease.

In LCX proximal segment, disease pattern was influenced by smoking, family history and age group of 31-40 years equally. In LCX middle segment smoking and age group of 31-40 were the most important factors affecting the disease severity. In LCX distal segment smoking male sex and age group of 31-40 affected the disease process mostly. In Ramus intermedius proximal segment smoking and age group of 31-40 seemed to affect the changes. No disease was found in Ramus intermedius middle and distal segments. Left ventricular dysfunction was seen with increasing severity in smokers, males and in patients of 31-40 years of age. Regarding number of vessels involved, smoking, positive family history of premature ischemic heart disease, male gender and age group 31-40 years were responsible for more severe disease involvement. Stratification of no. of vessels invoived for risk factors, age and gender is shown in tables 5.

DISCUSSION

ST segment elevation myocardial infarction in the young population is a dilemma which is increasingly seen in our

Table 4: Number Of Vessels Involved

Number Of Vessels	Frequency	Percent	Valid Percent	Cumulative Percent
Single vessel	64	63.4	63.4	63.4
Double vessel	24	23.8	23.8	87.1
Triple vessel	13	12.9	12.9	100.0
Total	101	100.0	100.0	

Table 5: Stratification of Vessels Involved

		Single Vessel	Double Vessel	Triple Vessel
Diabetes	Non Diabetic	56	18	11
	Diabetic	8	6	2
Hypertension	Non Hypertensive	59	18	10
	Hypertensive	5	6	3
Smoking	Non Smoker	24	15	5
	Smoker	40	9	8
Hyperlipidemia	Non Hyperlipidemic	60	21	12
	Hyperlipidemic	4	3	1
Family history	Negative	45	20	8
	Positive	19	4	5
Gender	Male	61	23	11
	Female	3	1	2
AGE(YEARS)	21-30	21	4	3
	31-40	43	20	10

hospitals now a days.

There is a lot of evidence to show that risk factors play a major role in ischaemic heart disease. The Framingham heart study has clearly demonstrated the multifactorial nature of coronary artery disease. About 85% of excess risk of premature coronary artery disease can be explained by major risk factors. The increased incidence of coronary artery disease in Pakistan has created interest to study for risk factors in Pakistan. Coronary angiographic studies done in Pakistan so far have confirmed that coronary artery disease is more diffuse and affects relatively much younger age group.[10] Furthermore there is a wide variability in prevalence of risk factors and angiographic patterns in different regions. Therefore it is vital to know the exact nature of the prevalent risk factors of every region to modify our treatment modalities and patient awareness programmes.[10]

In our study mean age was $34.31 + 4.753$ with minimum age 21 years. About 94.1% patients were males. It corresponds with study conducted by Hosseini et al in Tehran, where the males were 92.6%. Another study conducted by Haneef A Khan at CMH Kharian shows similar results of 92.7% males while study conducted by Sagheer at NICVD shows it to be 84%.[10-12]

In our study 56.4% patients were smoker, indicating it a potent risk factor for acute coronary syndrome in addition to male sex. Study conducted by Haneef khan showing similar results of smoking as 64.2% as a risk factor.[12] However in Tehran, Hosseini et al concluded smoking as a risk factor in 39.8%. In a study conducted at Singapore, smoking was found in 74% patients while in study conducted at NICVD showed smoking to be present in 62% individuals.[11,13] One reason for this variability in smoking may be due to cultural differences in different parts of the world.

In our study 28 (27.7%) patients had positive family history of ischemic heart disease. The data given by Haneef Khan in Pakistan and Hosseini et al in Iran has shown 30.7% and 34.6% respectively. Similarly in study by Tahir Sagheer it was found to be 30%.[10] This shows family history is another leading risk factor apart from male sex and smoking.

Our study shows 15.8% patients to be suffering from Diabetes Mellitus. This risk is less in a study conducted in a similar age group at CMH Kharian where it is 5.1%.[12] Hosseni et al results were 10.3% while it is similar to Sagheer and Chun Pong Wong which shows it to be 14% and 16.5% respectively.[10,11,13] This small variability in diabetes as a risk factor may correspond to eating habits, exercise and different living styles.

In our study 13.9% patients were hypertensive. In study of Haneef Khan 7.3% were hypertensive, the reason may be that it was due to better physical fitness in soldiers however our results were identical to Hosseini et al.[11,12]

Hyperlipidemia was found in 7.9% of our patients which is less than that of Haneef Khan which was 14.6%. Study conducted at Singapore showed it to be 20%.[12,13] One reason for this variability may be due to using raised LDL by other researchers while we used total cholesterol in our study as a parameter to access hyperlipidemia. So hyperlipidemia when considered to be a measure of total cholesterol is not a big issue in our area but raised LDL, triglycerides and low HDL are important.

In our study group 63.4% patients had single vessel disease, 23.8% had double vessel disease and 12.9% had triple vessel disease. However a study conducted by MK AKanda et al revealed that 14.6% patients had single vessel disease, 18.68% patients had double vessel disease and 40.68% patients were suffering from triple vessel disease.[14] This difference was most probably due to the fact that patients in this study were older (22-76 years). In a similar study conducted by Fida Muhammad, 45% patients had single

vessel disease 30% had double vessel disease where as 22.5% had triple vessel disease.[9] This study was conducted in acute coronary syndrome patients.

Another study showed that 73.5 % of their patients had LAD involvement 39% had RCA, 51% had LCX and 7% had RI involvement.[9] Our study also matched results with the study conducted at National Institute of cardiovascular diseases Karachi.[10]

From all these studies it is evident that smoking is a major preventable risk factor and that should be dealt seriously at civil society level and strict legal actions should be taken to prevent this curse in our society.

CONCLUSION

We concluded that smoking was the most common risk factor for ST segment elevation myocardial infarction in young patients followed by family history of premature ischaemic heart disease. Left anterior descending artery was the most commonly involved vessel while its proximal segment was the most commonly diseased segment. Most of the patients had single vessel disease and majority of patients had mild left ventricular systolic dysfunction.

REFERENCES

1. Rosamond W, Flegal K, Furie K, Go A, Greenlund K, Haase N, et al. Heart disease and stroke statistics - 2008 Update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation 2008;117:e25-146.

2. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. Heart 2008;94:14-26.

3. Samad A. Coronary artery disease in Pakistan preventive aspects. Pak J Cardiol 2003;14:59-60.

4. Meenakshi S, Nirmal K. Premature coronary artery disease in Indians and its associated risk factors. Vasc Health Risk Manag 2005;1:217-25.

5. Egreb M, Viswanathan G, Davis GK. Myocardial infarction in young adults. Postgrad Med J 2005;81:741-5.

6. Chakraborty B, Zaman F, Sharma AK. Combating coronary artery disease in South Asia- What is special? Bangladesh J Cardiol 2009;1:88-90.

7. Iqbal SP, Dodani S, Qureshi R. Risk factors and behaviours for coronary artery Disease (CAD) among ambulatory Pakistanis. J Pak Med Assoc 2004;54:261-6.

8. Haque AFMS, Siddiqui AR, Rahman SMM, Iqbal SA, Fatema NN, Khan Z. Acute coronary syndrome in the young - risk factors and angiographic pattern. Cardiovasc J 2010;2:175-8.

9. Muhammad F, Abid AR, Ahmad A, Imran S, Mallick NH. Coronary artery disease: pattern of clinical and angiographic findings in young males. Professional Med J 2009;16:192-7.

10. Saghir T, Qamar N, Sial J. Coronary angiographic characteristics of coronary artery disease in young adults under age forty years compared to those over age forty. Pakistan Heart J 2008;41:49-56.

11. Hosseini SK, Soleimani A, Salarifar M, Pourhoseini H, Nematipoor E, Abbasi SH, et al. Demographics and angiographic findings in patients under 35 years of age with acute ST elevation myocardial infarction. J Tehran Univ Heart Centr 2011;6:62-7.

12. Safdar MHK, Fazal I, Ejaz A, Awan ZI. Risk profile in young patients with acute myocardial infarction. Pak Armed Forces Med J 2010;2:Available from: http://www.pafmj.org/showdetails.php?id=342&t=o

13. Wong CP, Loh SY, Loh KK, Ong PJL, Foo D, Ho HH. Acute myocardial infarction: clinical features and outcomes in young adults in Singapore. World J Cardiol 2012;4:206-10.

14. Akanda MAK, Ali SY, Islam AEMM, Rahman MM, Parveen A, Kabir MK, et al. Demographic profile, clinical presentation & angiographic findings in 637 patients with coronary heart disease. Faridpur Med Coll J 2011;6:82-5.