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Literature Review

Symptomatic Outcome in Patient having Multi-Vessels Coronary Artery Disease with Partial Revascularization.

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Abstract

Background; *Recent estimates suggest that 80 per cent of CVD deaths occur in developing countries like Pakistan. This high burden of heart diseases is largely attributed to the industrial and technological progress which is associated with economic and social transformations which have led to life style modification and sedentary life style. This study was planned to ascertain symptomatic outcomes of multi-vessel coronary artery disease.*

Objective*; To determine the frequency of post partial revascularization outcomes in patients having multi-vessel coronary artery disease.*

Study design; Descriptive case series.

Setting; Department of Cardiology, Chaudhry Pervez Elahi Institute of Cardiology, Multan.

Duration; Six months after the approval of synopsis.

Data collection procedure; All the patients (n = 79) with multivessel coronary artery disease with partial revascularization were followed weekly for one month to diagnose Unstable angina and myocardial infarction.

Results*; Of these 79 study cases, 55 (69.6%) were male patients while 24 (30.4 %) were female patients. Mean age of our study cases was 59.04 ± 6.56 years. Diabetes was presente in 34 (43 %) and hypertension in 51 (64.6 %) of our study cases. Mean BMI was 25.06 ± 2.37 kg/m2 and obesity was present in 24 (30.4 %) and mean disease duration was 12.28 ± 5.53 months. Of these 79 study cases, 26 (32.9 %) were smokers and 25 (31.8 %) were having hyperlipidemia. Family history of CAD was present in 28 (35.4%). Unstable angina was noted in 52 (65.8%) of our study cases and myocardial infarction was noted in 21 (26.6%).*

Conclusion; *Frequencies of adverse in-hospital outcomes were high in our study among patients with multi-vessel coronary artery disease. Myocardial Infarction (MI) was significantly associated with socioeconomic status, obesity, smoking, hyperlipidemia and family history of coronary artery disease. Unstable Angina was significantly associated with age, residential status, diabetes, smoking, hyperlipidemia and family history.*

Keywords; *Coronary artery disease, unstable angina, Frequency.*

INTRODUCTION

Ischemic heart disease (IHD) is the leading cause of morbidity and mortality world wide 1,2,3. The prevalence of Myocardial infarction (MI) is more in the middle income world; and it is well known that males are more commonly affected than females 4. Atherosclerotic coronary artery disease (CAD) causing myocardial ischemia may manifest itself either as acute myocardial infarction (AMI), unstable angina or effort angina. Among these the most life threatening is AMI and is one of the most common life threatening diseases in emergency hospital admissions. With the increasing incidence of coronary artery disease (CAD), coronary angiography, as the gold standard for CAD diagnosis, has obtained growing popularity. An increasing number of hospitals have acquired the ability and qualifications to perform coronary angiography. Through clinical studies, it has been identified that multivessel lesions are common in stable angina and acute coronary syndrome, and are an independent predictor of CAD that affects the prognosis of patients. 5, 6 Controversy remains with regard to the treatment strategies for patients with multivessel coronary artery disease (MCAD), particularly in recent years. Since the one-step implantation of multi- stents has been charged and limited, it remains inconclusive whether patients with MCAD should undergo single complete revascularization (CR), fractionated revascularization (FR) or partial revascularization (PR) 7, 8.

The incidence of CAD has gradually increased and the age of onset has become increasingly younger 9. MCAD is one of the most serious types of CAD that commonly leads to complications, including heart enlargement, heart failure, malignant arrhythmias and cardiac sudden death, which seriously impacts the quality of life and life expectancy of a patient. The treatment principles of CAD include drug therapy, reperfusion therapy and heart transplantation. Patients with MCAD constitute the high-risk population for serious cardiovascular events and target vessel revascularization. Myocardial blood supply should be actively improved, preventing left ventricular remodeling, protecting the function of the heart, reducing major cardiac events, including arrhythmia, heart failure and sudden mortality, and CR should be achieved to the greatest extent possible. Controversy remains with regard to achieving CR in patients with MCAD 10. Sun et al 11 from China has reported 67.9 % unstable angina and 28.9 % myocardial infarction with partial revascularization of multivessel coronary artery disease.

Owing to scarcity of data on international level on this topic and fact that there is no such published study available on this topic from Pakistan, owing to the genetic diversity, life style modification we

need to conduct such study in our general population. So I have planned to document current magnitude of the problem in our general population as there is no such study done here in last 5 years. The results of this study will add useful information to existing database and generate database of our local population which will improve our level of confidence in the treatment of these patients and will decrease patient burden on health authorities.

OBJECTIVE

To determine the frequency of post partial revascularization outcomes in patients having multi-vessel coronary artery disease.

OPERATIONAL DEFINITIONS;

1.**Multi – vessel coronary artery disease;** Coronary artery disease diagnosis was based on the results of the coronary angiography with ≥50% stenosis (showing peak systolic velocity greater than 125 cm/s) of at least one major coronary artery. Multi – Vessel coronary artery disease was defined as at least two main branches of the epicardial coronary artery with ≥50% stenotic lesions (showing peak systolic velocity greater than 125 cm/s).

POST PARTIAL REVASCULARIZATION OUTCOMES;

These included MI and unstable angina.

2.Myocardial infarction; It was ST-segment elevation-induced and non-ST-segment elevation-induced myocardial infarction and was defined as an increase in the levels of cardiac biomarkers by >99% of the upper reference limit of 0.09 ng/ml (on Laboratory report by pathologist having more than 5years experience), plus electrocardiography (ECG)- prompted new ischemic changes like ST segment elevation/depression and T wave inversion.

3.Unstable angina: presence of ischemic chest pain for more than 30 minutes during rest condition (assessed clinically on visual analogue scale) occurring at state of rest was deemed as positive.

4.Diabetes; Known patients of diabetes which are on either oral hypoglycemic drugs or on Insulin for more than 2 years with only controlled diabetes (HbA1C less than 9% was taken).

5.Hypertension; Known cases already taking any antihypertensive medication for more than 2 years having controlled blood pressure (BP< 140/90 mmHg) was registered.

6.Smoking; It was deemed as positive when a patient has history of smoking at least 5 cigarettes daily for more than 2 years.

7.Hyperlipidemia; Known case diagnosed with Serum Cholesterol > 200mg/dl and Serum TG > 150mg/dl (presence of both) for more than 2 years.

8.Partial revascularization; More than 50 % residual stenosis of any coronary artery and its braches (showing peak systolic velocity greater than 125 cm/s).

9.Obesity; It was calculated by using following formula;

BMI = Weight (In Kg) / Height (in meters)2 and BMI more than 27.5 kg/m2 was deemed as obesity 12.

MATERIAL AND METHODS

Study design; Descriptive case series.

Setting; Department of Cardiology, Chaudhry Pervez Elahi Institute of Cardiology, Multan.

Duration; Six months after the approval of synopsis.

Sample Size; Sample size is determined by the formula;

$n= z^2 p q / d^2$

Where z=1.96, p= 28.9 %8, (hypothesized frequency of MI which is least proportion), q = 100-p and d= 10%.

Thus sample size n = 79 patients.

Sampling technique; Non-probability consecutive sampling.

Inclusion Criteria;

Both genders.

Age groups (50 – 70 years).

Patients of multi-vessel coronary artery disease having partial revascularization (as defined in operational definition).

Disease duration more than 6 months.

Exclusion Criteria;

Patients with acute ST segment elevation induced myocardial infarction (on ECG).

Patients having chronic renal failure and liver cirrhosis (on lab report and ultrasound).

Patients with valvular heart disease accompanied with heart failure (assessed clinically).

Patients who don't give consent of participation.

Data collection procedure;

A specialized proforma has been developed to record the findings of this study. All the patients (n = 79) who meet inclusion criteria of this study were registered from (indoor patients) Department of cardiology, Chaudhry Pervez Elahi Institute of Cardiology, Multan. The study was conducted after approval of synopsis from CPSP. Informed consent was taken from the patients of these patients describing them objectives of this study, ensuring them confidentiality of the information provided and fact that there was no risk involved to the patient while taking part in this study. Patients with multivessel coronary artery disease (as defined in operational definitions) with partial revascularization were followed weekly for one month to diagnose Unstable angina and myocardial infarction (as defined in operational definitions). All this data was recorded on a predesigned proforma (Annexure-I).

Data Analysis procedure;

All the data was entered and analyzed using SPSS-18. Descriptive statistics was applied to calculate mean and standard deviation for the age of the patients and disease duration. Frequencies and percentages were tabulated for the categorical variables like age groups, gender, diabetes, hypertension, family history of CAD, obesity, residential status, monthly family income, smoking, hyperlipidemia, myocardial infarction and unstable angina. Effect modifiers like age, diabetes, obesity, residential status, monthly family income, hyperlipidemia, smoking, family history of CAD, disease duration, Hypertension and gender were controlled by making stratified tables. Post stratification chi-square test was applied to see its effect on outcome. P value equal or less than 0.05 was considered as significant.

RESULTS

Our study comprised of a total of 79 patients meeting inclusion criteria of our study. Of these 79 study cases, 55 (69.6%) were male patients while 24 (30.4 %) were female patients. (Table No. 1).

Mean age of our study cases was 59.04 ± 6.56 years (with minimum age of our study cases was 50 years while maximum age was 70 years). Mean age of the male patients was noted to be 60.69 ± 5.82 years while that female patients was 55.25 ± 6.71 years (p=0.000). Our study results have indicated that majority of our study cases i.e. 46 (58.2%) were aged less than 60 years. (Table No. 2).

Of these 79 study cases, 33 (41.8 %) belonged to rural areas, 46 (58.2 %) belonged to urban areas while 36 (45.6%) had monthly family income up to Rs. 25000 while 43 (54.4%) had more than 25000 rupees monthly family income. Diabetes was presented in 34 (43 %) of our study cases. Hypertension was present in 51 (64.6 %) of our study cases. (Table No. 3 – 6).

Mean body mass index of our study cases was 25.06 ± 2.37 kg/m2 and obesity was present in 24 (30.4 %) of our study cases. (Table No. 7).

Mean disease duration was 12.28 ± 5.53 months and 40 (50.6 %) had duration of illness more than 1 year. (Table No. 8). Of these 79 study cases, 26 (32.9 %) were smokers and 25 (31.8 %) were having hyperlipidemia. Family history of CAD was present in 28 (35.4%) of our study cases. (Table No. 9-11).

Unstable angina was noted in 52 (65.8%) of our study cases and myocardial infarction was noted in 21 (26.6%). Outcome was stratified with regards to gender, age, residential status, monthly family income, diabetes, hypertension, obesity, disease duration, smoking, dyslipidemia and family history. (Table No. 12 – 24)

Table No. 1 Gender Distribution. (n = 79)

Gender	**Frequency**	**Percentage**
Male	55	69.6030.4
Female	24	
Total	**79**	**100**

Table No. 2 Age wise distribution of study cases. (n = 79)

Age groups	**Frequency**	**Percentage**
50 – 60 Years	46	58.2
61 – 70 Years	33	41.8
Total	**79**	**100**

Table No. 3 Distribution of residential status among study cases. (n = 79)

Residential status	**Frequency**	**Percentage**
Rural	33	41.8
Urban	46	58.2
Total	**79**	**100**

Table No. 4 Distribution of monthly family income among study cases. (n = 79)

Family Income	Frequency	Percentage
Up to Rs. 25000	36	45.6
More than Rs. 25000	43	54.4
Total	**79**	**100**

Table No. 5 Distribution of diabetes among study cases. (n = 79)

Diabetes	Frequency	Percentage
Yes	34	43.0
No	45	57.0
Total	**79**	**100**

Table No. 6 Distribution of hypertension among study cases. (n = 79)

Hypertension	Frequency	Percentage
Yes	51	64.6
No	28	35.4
Total	**79**	**100**

Table No. 7 Distribution of obesity among study cases. (n = 79)

Obesity	Frequency	Percentage
Yes	24	30.4
No	55	69.6
Total	**79**	**100**

Table No. 8 Distribution of disease duration among study cases. (n = 79)

Disease duration	Frequency	Percentage
Up to 1 Year	39	49.4
More than 1 Year	40	50.6
Total	**79**	**100**

Table No. 9 Distribution of smoking among study cases. (n = 79)

Smoking	Frequency	Percentage
Yes	26	32.9
No	53	67.1
Total	**79**	**100**

Table No. 10 Distribution of dyslipidemia among study cases. (n = 79)

Dyslipidemia	Frequency	Percentage
Yes	25	31.6
No	54	68.4
Total	**79**	**100**

Table No. 11 Distribution of family history of CAD among study cases. (n = 79)

Family History ofCAD	Frequency	Percentage
Yes	28	35.4
No	51	64.6
Total	**79**	**100**

Table No. 12 Distribution of use of unstable angina among study cases. (n = 79)

Unstable angina	Frequency	Percentage
Yes	52	65.8
No	27	34.2
Total	**79**	**100**

Table No. 13 Distribution of Myocardial Infarction among study cases. (n = 79)

Myocardial Infarction	Frequency	Percentage
Yes	21	26.6
No	58	73.4
Total	**79**	**100**

Table No. 14 Stratification of outcome with regards to gender. (n = 79)

Outcome		Gender		P – value
		Male (n=55)	Female (n=24)	
Unstable angina	Yes (n=52)	34	18	**0.309**
	No (n=27)	21	06	
Myocardial Infarction	Yes (n=21)	15	06	**1.000**
	No (n=58)	40	18	

Table No. 15 Stratification of outcome with regards to age. (n = 79)

Outcome		**Age** (In Years)		**P – value**
		Up to 60 (n=46)	**More than60** (n=33)	
Unstable angina	Yes (n=52)	25	27	**0.016**
	No (n=27)	21	06	
Myocardial Infarction	Yes (n=21)	12	09	**1.000**
	No (n=58)	34	24	

Table No. 16 Stratification of outcome with regards to residential status. (n = 79)

Outcome		**Residential status**		**P – value**
		Rural (n=33)	**Urban** (n=46)	
Unstable angina	Yes (n=52)	27	25	**0.016**
	No (n=27)	06	21	
Myocardial Infarction	Yes (n=21)	06	15	**0.200**
	No (n=58)	27	31	

Table No. 17 Stratification of outcome with regards to monthly family income. (n = 79)

Outcome		**Monthly income**		**P – value**
		Up to Rs. 25000 (n=36)	**More thanRs. 25000**(n=43)	
Unstable angina	Yes (n=52)	26	26	**0.343**
	No (n=27)	10	17	
Myocardial Infarction	Yes (n=21)	18	03	**0.000**
	No (n=58)	18	40	

Table No. 18 Stratification of outcome with regards to diabetes. (n = 79)

Outcome		**Diabetes**		**P – value**
		Yes (n=34)	**No** (n=45)	
Unstable angina	Yes (n=52)	31	21	**0.000**
	No (n=27)	03	24	
Myocardial Infarction	Yes (n=21)	09	12	**1.000**
	No (n=58)	25	33	

Table No. 19 Stratification of outcome with regards to hypertension. (n = 79)

Outcome		**Hypertension**		**P – value**
		Yes (n=51)	**No** (n=28)	
Unstable angina	Yes (n=52)	36	16	**0.321**
	No (n=27)	15	12	
Myocardial Infarction	Yes (n=21)	12	09	**0.435**
	No (n=58)	39	19	

Table No. 20 Stratification of outcome with regards to obesity. (n = 79)

Outcome		**Obesity**		**P – value**
		Yes (n=24)	**No** (n=55)	
Unstable angina	Yes (n=52)	18	34	**0.309**
	No (n=27)	06	21	
Myocardial Infarction	Yes (n=21)	00	21	**0.000**
	No (n=58)	24	34	

Table No. 21 Stratification of outcome with regards to disease duration. (n = 79)

Outcome		**Disease duration**		**P – value**
		Up to 1 Year (n=39)	**More than1 Year** (n=40)	
Unstable angina	Yes (n=52)	24	28	**0.482**
	No (n=27)	15	12	
Myocardial Infarction	Yes (n=21)	09	12	**0.612**
	No (n=58)	30	28	

Table No. 22 Stratification of outcome with regards to smoking. (n = 79)

Outcome		**Smoking**		**P – value**
		Yes (n=26)	**No** (n=53)	
Unstable angina	Yes (n=52)	13	39	**0.046**
	No (n=27)	13	14	
Myocardial Infarction	Yes (n=21)	03	18	**0.017**
	No (n=58)	23	35	

Table No. 23 Stratification of outcome with regards to hyperlipidemia. (n = 79)

Outcome		**Hyperlipidemia**		**P – value**
		Yes (n=25)	**No** (n=54)	
Unstable angina	Yes (n=52)	25	27	**0.000**
	No (n=27)	00	27	
Myocardial Infarction	Yes (n=21)	03	18	**0.057**
	No (n=58)	22	36	

Table No. 24 Stratification of outcome with regards to family history of CAD. (n = 79)

Outcome		**Family History**		**P – value**
		Yes (n=28)	**No** (n=51)	
Unstable angina	Yes (n=52)	28	24	**0.000**
	No (n=27)	00	27	
Myocardial Infarction	Yes (n=21)	03	18	**0.019**
	No (n=58)	25	33	

DISCUSSION

Coronary artery disease (CAD) is one of the most common causes of mortality and morbidity in both developed and developing countries. It is one of the leading causes of death in Pakistan with its contribution to mortality in young patients is rising. Of particular concern to our population, is not only the high burden of cardiovascular diseases (CVDs), but also the effects of these diseases on the productive workforce. Projections show that CVD has reached epidemic proportions in many developing countries. Heart diseases are rising in Asian countries 5–10 years earlier than in other populations around the world. Coronary artery disease (CAD) that manifests at a younger age can have devastating consequences for an individual, the family, and society. Prevention of these deaths in young people is a nation's moral responsibility. A strategy involving prevention of CVDs long before their onset will be more cost- effective than providing interventions at a stage when the disease is well established. CVDs are no longer confined by geographical area or by age, sex, or socioeconomic boundaries. Heart disease has already reached epidemic proportions in poorer countries. Of the 45.0 million adult deaths reported worldwide in 2002, three-quarters (32 million) were due to noncommunicable diseases. Except in Africa, noncommunicable diseases outnumbered communicable diseases in all WHO regions worldwide. In Southeast Asia alone, 7 423 000 deaths were due to noncommunicable diseases as compared with 5 730 000 deaths related to communicable diseases in the year 2002. Globally, ischemic heart disease (IHD) was the leading killer in the age group ≥60 years, and, with 1 332 000 deaths in adults aged 15–59 years, IHD was ranked behind HIV/AIDS only 102. Considering the size of this public health issue, the interventions can only be addressed through policy measures by means of legislation and regulatory approaches on agriculture and food, tobacco or physical activity (a conducive transport policy which favours urban cycle lanes, walking paths with curbs on private vehicular transport, facilities for leisure time exercise in community playgrounds and emphasising the importance of physical activity in school curriculum and at worksites) that have large impact on the mean level CHD risk factors at the population level 103.

Our study comprised of a total of 79 patients meeting inclusion criteria of our study. Of these 79 study cases, 55 (69.6%) were male patients while 24 (30.4 %) were female patients. Different studies have associated premature coronary artery disease to be more frequent in men than that of women 104. Ahmed et al 104 also reported male gender predominance with 88 % which is similar to that of our findings. Qadri et al 105 reported 70 % male patients which is same as that of our study results. Another

study from Bangladesh by Karim et al 106 reported 68 % male gender predominance which is close to our study results. Dzavik et al 107 has reported 78 % male gender predominance which is in compliance with our study results.

Mean age of our study cases was 59.04 ± 6.56 years (with minimum age of our study cases was 50 years while maximum age was 70 years). Mean age of the male patients was noted to be 60.69 ± 5.82 years while that female patients was 55.25 ± 6.71 years (p=0.000). Our study results have indicated that majority of our study cases i.e. 46 (58.2%) were aged less than 60 years. Dzavik et al 107 has reported 65 years mean age of the patients with multi-vessel coronary artery disease which is close to our study results.

Of these 79 study cases, 33 (41.8 %) belonged to rural areas, 46 (58.2 %) belonged to urban areas while 36 (45.6%) had monthly family income up to Rs. 25000 while 43 (54.4%) had more than 25000 rupees monthly family income. Diabetes was presented in 34 (43 %) of our study cases. Ahmed et al 104 reported 31 % diabetes in patients with CAD which is close to our study results. Qadri et al 105 reported 29.5 % diabetes which is lower than that of our study results. Karim et al 106 reported bit high rate of diabetes to be 46 % which is close to our study results. Dzavik et al 107 has reported 25.8 % diabetes which is quite less than that of our study results.

Hypertension was present in 51 (64.6 %) of our study cases. Qadri et al 105 reported 45 % hypertension in patients with CAD which is close to our study results and a study conducted by Noeman et al 108 also reported 51 % hypertension supporting our findings. Karim et al 106 reported high frequency of hypertension to be 76 % which is also close to our study results. Dzavik et al 107 has reported 55.1 % hypertension in patients with multivessel coronary artery disease which is close to our study results.

Of these 79 study cases, 26 (32.9 %) were smokers and 25 (31.8 %) were having hyperlipidemia. Family history of CAD was present in 28 (35.4%) of our study cases. Ahmed et al 104 reported quite high proportion of smoking to be 79 % which is much higher than our study results. The reason for this difference may be due to small sample size of their study (n=52) as well as very high proportion on male gender (i.e. 87%) because in our study all smokers were male patients. Qadri et al 105 reported 49 % smoking which is again higher proportion of smoking as compared with our study results. Qadri et al 105 reported 32 % positive family history which is close to our findings. Karim et al 106 34 % positive family history which is similar to our study results. Dzavik et al 107 has reported 45 %

hyperlipidemia which is in compliance with our study results. Mean BMI was 25.06 ± 2.37 kg/m2 and obesity was present in 24 (30.4 %) of our study cases. A study conducted by Noeman et al 108 reported 35 % obesity in patients with premature coronary artery disease which is close to our findings. Karim et al 106 reported 44 % obesity which is similar to that of our stud results.

Unstable angina was noted in 52 (65.8%) of our study cases and myocardial infarction was noted in 21 (26.6%). Sun et al 11 from China has reported 67.9 % unstable angina and 28.9 % myocardial infarction with partial revascularization of multivessel coronary artery disease, these findings of Sun et al 11 are similar to that of our study results.

CONCLUSION

Frequencies of adverse in-hospital outcomes were high in our study among patients with multi-vessel coronary artery disease. Myocardial Infarction (MI) was significantly associated with socioeconomic status, obesity, smoking, hyperlipidemia and family history of coronary artery disease. Angina was significantly associated with age, residential status, diabetes, smoking, hyperlipidemia and family history.

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