

Statistical study of the risk factors of myocardial infarction in the patients of district Muzaffarabad capital of Azad Jammu and Kashmir

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Abstract: Coronary artery disease (CAD) is a leading cause of mortality in the developing countries. The aim of the study was to check the association of Myocardial infarction (MI) with several factors such as smoking & smoking exposure, blood pressure, sugar & cholesterol level, stress, anxiety & lifestyle. A cross sectional community based survey was conducted involving 469 patients having one or more risk factors or having complains regarding MI & already diagnosed MI, was taken using Multistage sampling technique from Sheikh Zaid Hospital & Abbas Institute of Medical Sciences. The Chi-square test was used to check the association of different risk factors with myocardial infarction. The multivariate Logistic regression model was also applied to find out the most significant risk factors of MI. The results revealed that MI was strongly associated with following risk factors family size ($p=0.04$), profession of respondent ($p=0.026$), smoking ($p=0.028$) & smoking exposure ($p=0.043$). The finding also showed significant association of MI in study population with diastolic blood pressure ($p=0.03$), cholesterol ($p=0.047$), blood sugar ($p=0.008$), stress ($p=0.036$), anxiety ($p=0.044$) and lifestyle ($p=0.015$). The study revealed that family size, family history, smoking & its smoking exposure, cholesterol, blood sugar, diastolic blood pressure, stress and anxiety are the major contributing risk factors of MI in the community, whereas age and gender elucidated minor contributions in the development of MI.

Keywords: Risk factors, odds ratio, logistic regression, Chi-square, Azad Kashmir, Muzaffarabad.

INTRODUCTION

Myocardial infarction (MI) or death of cardiac muscles is the major public health problem across the globe affecting 1.5 million people annually in America only (Antman and Braunwald, 1974). MI is defined in pathology as myocardial cell death due to prolonged ischemia. After the onset of myocardial ischemia, histological cell death is not immediate, but takes a finite period of time to develop as little as 20 min, or less in some animal models (Jenning and Ganote, 1974)

Acute MI is characterized by typical rise or gradual fall (troponin) or more rapid rise & fall of biochemical markers of myocardial necrosis with at least one of the following ischemic symptoms, development of Q waves in ECG, ST segment elevation or depression, coronary artery intervention, & pathological findings of acute MI. established MI is characterize by development of new pathological Q waves on ECG & pathological findings of healed or healing MI (Elliot *et al.*, 2002).

Study revealed that most prevalent risk factors of MI in south Asia are smoking (OR 3.82), use of hydrogenated vegetable oil (OR 3.91), raised fasting blood sugar (OR 3.32), raised serum cholesterol (OR 1.67), low income

(OR 5.05), paternal history of cardiovascular disease (OR 4.84) (Ismail *et al.*, 2004). Modifiable risk factors associated with MI were hypertension, diabetes, less physical activity, smoking, abdominal obesity, psychosocial stress and high risk diet (Arnand *et al.*, 2008). Women at menopausal age showed 1.78 times higher tendency to develop myocardial infarction. Psychosocial factors such as low job control as well as marital stress contributes in development of first MI (Villija and Abdonas, 2010). Low socioeconomic status is associated with female sex, older age, increases acute MI severity & inferior treatment (Kotonas and Drory, 2010). Diabetes is risk factor of acute myocardial infarction but along with this in hospitals level of glucose is also strong predictor of death so blood glucose level is more dangerous risk factor (Goyal, 2009). Explored risk factors associated with MI are male sex (92%), smoking 46%, Type A personality (46%), family history (32%), diabetes mellitus (28%), sedentary lifestyle (26%), hypertension (22%), obesity (17%), alcohol (3%), and OCPs (0%) Most of the patients that is 94% had 3 or more risk factors (Faisal *et al.*, 2011).

The incidence of CAD has been halved in the west in past 3 years; however, it has been doubled in the subcontinent. Moreover people in our part of the world suffer from CAD at relatively younger age, i.e. about half of MI

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occurs under the age of fifty years (Enas and Kumar, 2002). In Pakistan nutritional deficiency of three vitamins folate, B12 and pyridoxal phosphate (PLP) along with cardiovascular risk factors aggravate risk of CAD (Iqbal *et al.*, 2005). Prevalence of coronary artery disease in man is 26.9% and in women 30%. Risks did not differ substantially by age group. Common risk factors associated with coronary artery disease are tobacco use, systolic blood pressure, proteinuria, hypertension diabetes, smoking, hyperlipidemia that need to be prevented (Tazneen *et al.*, 2005). In Asians low-density lipoprotein cholesterol (LDL-C) levels were about 10 mg/dl lower than non Asians. Risks of acute myocardial infarction are associated with increase low density lipoprotein cholesterol (LDC-C) (Paiis *et al.*, 1996).

Methodology

Study design & sample

A Cross sectional survey was conducted in district Muzaffarabad. A sample of 469 patients having one or more risk factors of MI was selected using multistage sampling technique from Sheikh Zaid Combined Military Hospital & Abbas Institute of Medical Sciences over the patients who were getting treatment there or who visited the hospitals for treatment. A close-ended structured questionnaire was used to collect the information from the respondents. Questionnaires were distributed randomly to well trained staff nurses who collected the formation from the patients who visited the hospitals for the treatment of any of risk factor of MI, or who are suffering from it or filled questionnaire using the record of MI patients who visited before. This data collection took the time of 2-3 months. This study was approved by the authorities of the ministry of public education Azad Jammu & Kashmir.

Patients having no history of heart disease & risk factors excluded from study as primary concern of research were to find out risk factors of MI.

Measures

Independent variables which were chosen as risk factors were smoking and smoking exposure, blood pressure, sugar & cholesterol level, worry, stress, anxiety and lifestyle. Univariate descriptive and inferential statistics bivariate or multivariate (Chi square and logistic regression model) were performed to find out most significant risk factors of MI.

STATISTICAL ANALYSIS

Data was entered in spreadsheet & analyzed using SPSS version 17.

RESULTS

Table 1 shows that 28.8% patients were of age group above 60 years 61.8% were male and 21.1 were illiterate. 84.1% were single. People residing in rural areas were

53.3%. Patients who had family size 4-6 members were 39.2%.

Table 2 describes that 53% people were spending stressful life. Smokers were 53.1%. non-smokers were 51.8%, those who had diastolic BP 80-120mmHg were 52.9 whereas patients who had blood sugar level below 6.3mmol/L were 44.1%.

Table 3 shows the results of Chi-square test for association and it is clear that all the variables in the above table were significantly associated with myocardial infarction because each variables have p value less than the level of significance (0.05) so it can be observed that all the variables were strongly related with myocardial infarction.

Table 4 represents the results of odds ratios from multivariate logistic regression model about the likelihood of getting myocardial infarction in presence of some risk factors.

The results displayed that the patients having exposure to its risk factors in age of (41-50 years and (51-60 years are 1.026 times and 1.404 times respectively more likely to have MI then in patients exposed to risk factors in age (20-30 years and have less chances in age group of (31-40 years and above 60 years.

Also the family size of 4-6 and 7-9 of the above patients is 4.161 and 6.812 times respectively more likely to have MI then those patients having that of 1-3.

Among the patients those who smoked have 2.42 times more chances of facing MI then non-smokers and the smokers having 1-6, 7-12cigarettes per day and chain smokers are 2.013, 1.371 and 1.505 times respectively more likely to have the disease under study then non-smokers.

The MI is 1.015 times more prevalent in patients having family history. The diastolic BP of 90-120mm Hg increases the risk of getting MI in patients 1.597 times then having that of less and above 120mmHg. Likelihood of getting MI in patients having 5.0-7.2mmol/L and above is 1.113 and 1.569 times respectively more than having lower cholesterol levels.

Diabetic patients having sugar level of up to 10mmol/L and above enhance the occurrence of getting MI 2.129 and 3.428 times then patients having below this range. Worry can cause chances of occurrence of MI 1.279 times in those worry moderately and 2.378 times those who have severe worries then those who have no or mild worries. Mild anxiety have 1.230 times more chances of getting MI then the patient who is free of it whereas patients having moderate & severe anxiety don't effect it by much.

Table 1: Socio-Demographic characteristics of the study population

Characteristics		Frequency	Percentage (%)
Age	21-30	48	10.2
	31-40	59	12.6
	41-50	116	24.7
	51-60	113	24.1
	Above 60 years	133	28.4
Gender	Male	290	61.8
	Female	179	38.2
Education	Illiterate*	99	21.1
	Primary	82	17.5
	Middle	44	9.4
	Metric	96	20.5
	Intermediate	72	15.4
	Graduate	50	10.7
	Masters	26	5.5
Marital status	Single	397	84.6
	Married	53	11.1
	Divorced	19	4.1
Residence	Urban	219	46.7
	Rural	250	53.3
Family size	1-3	137	29.2
	4-6	184	39.2
	7-9	116	24.7
	Above 10	17	3.6
	None	15	3.2

Table 2: Feed back of the patients in the presence of different risk factors of MI

Variable	Characteristics	Frequency	%
Life style	Sedentary	74	15.8
	Stressful	253	53.9
	Relaxed	142	30.3
Smoking	Yes	204	43.5
	No	249	53.1
	Occasionally	16	3.4
Smoking exposure	1-6	56	11.9
	7-12	92	19.6
	Chain smoker	78	16.6
	Non smoker	243	51.8
Diastolic BP	80mmHg	158	33.7
	80-120mmHg	248	52.9
	Above 120mmHg	63	13.4
Blood suger level	Below 6.3mmol/L	207	44.1
	Up to 10mmol/L	163	34.8
	Above 10mmol/L	99	21.1

Sedentary lifestyle of a patient having some other risk factors of MI is 1.981 times more capable to lead them towards MI then those having relaxed lifestyle. Whereas gender, depression, education, obesity and marital status does not affect MI that much.

DISCUSSION

Cross sectional descriptive study was conducted over 469 patients who had complain regarding MI or it was already diagnosed who used to visit AIMS & Sheikh Khalifa Bin Zaid Hospital to figure out significant risk factors that

Table 3: Association of Myocardial infarction with different risk factors

Risk factors	Range/Value	MI		Chi square value	P value
		Yes	No		
Family size	1-3	111	26	9.494	0.04
	4-6	135	49		
	7-9	99	17		
	Above 10	15	2		
	Unmarried	14	1		
Nature of work	Mental effort	82	24	9.244	0.026
	Physical effort	105	29		
	Both 1 & 2	118	16		
	Jobless	69	26		
Smoking exposure	1-6 cig/day	46	10	7.296	0.043
	7-12 cig/day	76	16		
	Chain smoker	69	9		
	No smoker	183	60		
Diastolic BP	80mmHg	116	42	5.912	0.03
	90-120mmHg	206	42		
	Above120mmHG	52	11		
Life style	Sedentary	53	21	8.389	0.015
	Stressful	211	35		
	Relaxed	107	39		
Cholesterol level	Below 5.0mmol/L	124	31	5.418	0.047
	5.0-7.2mmol/L	149	49		
	Above 7.2mmol/L	101	15		
Smoking	Yes	173	31	7.153	0.028
	No	187	62		
	Occasionally	14	2		
Anxiety	Mild	147	34	7.345	0.04
	Moderate	72	12		
	Severe	41	7		
	No	114	42		
Blood sugar random	Below 6.3mmol/L	160	47	9.769	0.008
	Up to 10mmol/L	124	39		
	Above 10mmol/L	90	9		

were age, smoking, smoking exposure, health and wealth conditions, family history, worry, stress, anxiety, higher and lower blood pressures, cholesterol and sugar levels.

Present study revealed that incidence of myocardial infarction is positively associated with size of family as those who had 7-9 members at home were 6.821 times more likely to develop myocardial infarction. Smoker are 2.420 times at higher risk of MI. those who had family history of cardiac diseases were 1.015 times at more risk of MI. Smoking exposure, diastolic blood pressure, anxiety, stress or worries are closely associated with incidence of myocardial infarction which is consistent with previous research findings. The most important predictor of acute myocardial infarction was current smoking of cigarettes or tobacco, history of hypertension and diabetes mellitus were also independent risk factors, fasting blood glucose was a strong predictor of risk. Abdominal obesity was also a strong independent

predictor across the entire range of measures with multiple risk factors had greatly increased risk of acute myocardial infarction (Pais *et al.*, 1996).

CONCLUSION

A cross sectional survey was conducted in district Muzaffarabad to investigate risk factors of MI in the patients. A sample of 469 patients having one or more risk factors of MI was selected using multistage sampling technique from Sheikh Zaid Combined Military Hospital & Abbas Institute of Medical Sciences over the patients who were getting treatment there or who visited. The finding indicated that the major contributing factors of MI in the study population are family size, family history, smoking & smoking exposure, cholesterol and blood sugar level, diastolic blood pressure, stress, worry and anxiety, whereas age and gender elucidated minor contributions in the development of MI.

Table 4: Prevalence of Myocardial infarction in the presence of different risk factors

Variables	B	Odds ratio	C-I (95%)	
			Lower	Upper
Age				
(20-30 years		1.00		
(31-40years	-.601	.548	.176	1.706
(41-50years	.025	1.026	.369	2.853
(51-60years	.339	1.404	.611	3.225
Above 60	-.104	.901	.385	2.110
Family size				
1-3r		1.00		
4-6	1.42	4.161	.421	41.091
7-9	1.91	6.812	.679	68.380
Above 10	1.49	4.455	.449	44.167
Unmarried	.489	1.630	.103	25.776
Smoking				
NOr		1.00		
YES	.884	2.420	.346	16.936
Exposure				
Nonsmokerr		1.00		
1-6 cigarette	.699	2.013	.229	17.709
7-12	.315	1.371	.152	12.362
Chain smoker	.409	1.505	.175	12.964
Family history				
Yes	.015	1.015	.511	2.015
Diastolic pressure				
80mmHg r		1.00		
90-120mmHg	-.450	1.597	.347	7.346
Above 120mmHg	.107	.638	.222	1.827
Cholesterol level				
Below 5.0r		1.00		
5.0-7.2mmol/L	.451	1.113	.379	3.267
Above 7.2mmol/L	.756	1.569	.602	4.094
Blood sugar				
Below 6.3mmol/Lr		1.00		
Up to 10mmol/L	1.232	2.129	.722	6.273
Above 10mmol/L		3.428	1.265	9.287
Worry				
NOr		1.00		
Mild	-.285	.752	.295	1.919
Moderate	.246	1.279	.393	4.156
Severe	.866	2.378	.132	42.975
Anxiety				
Nor		1.00		
Mild	.207	1.230	.517	2.926
Moderate	-.246	.782	.204	2.996
Severe	-.467	.627	.138	2.854
Lifestyle				
Relaxedr		1.00		
Sedentary	.684	1.981	.802	4.891
Stressful	-.503	.605	.273	1.340

REFERENCES

- Antman EM and Braunwald E (1997). Acute myocardial infarction. In: Braunwald E (editor). Heart Disease: A Text Book of Cardiovascular Medicine, 5th ed. WB Saunders Company, Philadelphia, PA, pp.1184-289.
- Antman E, Jean-Pierre Bassand, Werner K, Magnus O, Sendon, Lars R, Maarten S and Michal T (2000). MI

- redefined a consensus document of joint European Society of Cardiology American College of Cardiology Committee for redefinition of myocardial infarction. *J. Am. Coll. Cardiol.*, **6**(3): 959-969.
- Enas E and Kumar S (2002). Coronary artery disease. In: Asian Indians: An update and Review. *Int. J. Cardiol.*, **1**(2): 1-34.
- Faisal AW, Ayub M, Waseem T, Khan RS and Hasnain SS (2011). Risk factors in young patients of acute myocardial infarction. *J. Ayub. Med. Coll. Abbottabad*, **23**(3):10-13.
- Goyal A, Mehta SR, Gerstein HC, Díaz R, Afzal R, Xavier D, Zhu J, Pais P, Lisheng L, Kazmi KA, Zubaid M, Piegas LS, Widimsky P, Budaj A, Avezum A and Yusuf S (2009). Glucose levels compared with diabetes history in the risk assessment of acute myocardial infarction patients. *Am. Heart J.*, **157**: 763-770.
- Iqbal M, Ishaq M, Kazmi K, Yousuf FA, Mehboobali N, Ali S and Waqar M (2005). Role of vitamins B6, B12 and folic acid on hyperhomocysteinemia in a Pakistani population of patients with acute myocardial infarction. *Nutrition, Metabolism & Cardiovascular Diseases*, **15**(2): 100-108.
- Ismail J, Jafar TH, Jafary FH, White F, Faruqui AM and Chaturvedi N (2004). Risk factors for non-fatal myocardial infarction in young South Asian adults. *Heart*, **90**(3): 259-263.
- Jennings RB and Ganote CE (1974). Structural changes in myocardium during acute ischemia. *J. AM. Pathol. Circ. Res.*, **35**(Suppl 3): 156-172.
- Karthikeyan G, KK Teo, Islam S, Mathew J, McQueen and Yusuf S (2009). Lipid profile, plasma Apolipoprotein & risk of first myocardial infarction among Asians: An analysis from inter heart study. *J. AM. Coll. Cardiol.*, **53**(3): 244-253.
- Kotona S and Drory Y (2010). Socioeconomic risk factor aggregation and long-term incidence of ischemic stroke in patients after first acute myocardial infarction. *J. Cardiol.*, **157**: 324-329.
- Pais P, Pogue J, Gerstein H, Zachariah E, Savitha D, Jayprakash S and Yusuf S (1996). Risk factors for acute myocardial infarction in Indians: A case-control study. *The Lancet*, **348**(9024): 358-363.
- Anand SS, Islam S, Rosengren A, Franzosi MG, Steyn K and Yusufali AH (2008). Risk factors for myocardial infarction for men & women: Insight from inter heart study. *J. Eur. Heart*, **29**(7): 932-940.
- Tazeen H, Jafar, Fahim H, Jafary Jessani S and Chaturvedi N (2005). Heart disease epidemic in Pakistan: Women and men at equal risk. *J. AM, Heart*, **150**(2): 221-226.
- Vilija M and Abdonas T (2010). Menopause and myocardial infarction risk among employed women in relation to work and family psychosocial factors in Lithuania. *Maturitas*, **66**(1): 94-98.