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DOES ANXIETY AND DEPRESSION CAUSE ACUTE MYOCARDIAL INFARCTION?

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ABSTRACT

Objective: To study the frequency of depression and anxiety in patients admitted with acute myocardial infarction (AMI).

Methodology: Two hundred consecutive patients of AMI without complications presenting to the coronary care unit of Cardiology department of Lady Reading Hospital and 200 healthy controls among patient's attendants were interviewed with standard scales of HADS and HRS for the presence of depression from to date.

Results: Two hundred consecutive patients of AMI and 200 healthy controls among patient's relatives were assessed on HADS and HRS scale for the presence of depression. Sixty three percent of the patients were male in both groups. Mean age of patients was 59 ± 11 years while that of controls was 52 ± 10 years. Although significantly different between the two groups, age had no significant effect on the presence of depression in any group ($p < 0.4$). A significant difference was noted in the number of events reported between patients of AMI and control group, $4.21\pm$ versus $2.71+$ respectively ($p< 0.001$). On Hospital Anxiety and Depression Scale (HADS) 77.5 % of the acute MI patients had depression compared to 64 % in the control group ($p< 0.003$). When HADS was used to asses the level of anxiety and depression in the two groups, 83 % of patients in the AMI group reported abnormal i.e. scores above 17 compared to 70 % in the control group ($p< 0.001$).

Conclusion: Depression was more common in patients presenting with acute myocardial infarction as assessed by standard scales as compared to controls.

Key Words: Depression, Myocardial Infarction, HADS.

INTRODUCTION

The association between depression and coronary artery disease is well documented .[1]

Acute myocardial infarction can be triggered by emotional stress[2] and discrete episode of depression or sadness just hours before the symptoms onset.[3] Both stress and depression as trigger for acute myocardial infarction being reported to be more common in socio-economically deprived patients. Elevated depressive symptoms appear to be a robust risk and prognostic marker of cardiovascular disease and all-cause mortality.[4,5] The predominantly positive prospective associations have led to conjectures that depression is a causal cardiovascular (CVD) risk factor, and that depression treatment may alter the course of CVD.[6,7]

A growing body of evidence attests to the influence of emotional and stress-related psychosocial factors in the etiology of coronary heart disease (CHD).[8] Systematic reviews have concluded that the firmest evidence to date is for influence of low socioeconomic status, work stress, social isolation, and depression on CHD. [9, 10] Findings related to other forms of chronic stress, anxiety, and anger/hostility have been less consistent. These factors have also been associated with sub clinical markers of atherosclerosis as well as manifest disease and may act through accelerating atherogenesis.[11]

It is of great interest therefore to discover whether similar factors also operate acutely in precipitating events. Studies of acute mental states to date have centered on stress and anger. Acute depression has yet to be thoroughly investigated, but might be important in view of the evidence that depression is relevant both to the long-term development of CHD and prognosis after cardiac events.[10, 12] Although there is negative impact of depression and anxiety on the patient's ability to cope[13] a large number of patients receive little structured help to deal with stress in hospital. Patients are referred to a cardiac rehabilitation program, on the discharge, but there is a lack of psychological assessment and rehabilitation.

The present study was designed to measure the frequency of depression in patients who presented with acute ST segment elevation myocardial infarction.

METHODOLOGY

This comparative study was conducted in Cardiology department of Postgraduate Medical Institute Lady Reading Hospital Peshawar from March 2008 to May 2008. Consecutive patients aged above 20 years of either sex admitted in coronary care unit of Cardiology unit of Lady Reading Hospital Peshawar with the diagnosis of first acute ST elevation myocardial infarction were included in the study. The diagnosis of MI was made. Patients were diagnosed of have acute myocardial infarction on fulfilling two of the three according to World Health Organization criteria. Two of the followings were required for the diagnosis: history of typical chest pain, characteristic electrocardiographic changes, and a serial increase in creatine phosphokinase (CPK) to greater than twice normal limits. Sample of 400 was taken consisting of 200 patients of acute myocardial infarction and 200 active controls among the patients' attendants. Patients with established CAD, reinfarction, NSTEMI, unstable angina, critically ill patient unable to be interviewed, and those having other comorbidities were excluded from the study. Written informed consent was taken from those included in the study. We recorded, demographic factors including age, gender, address, smoking, past medical history including previous or family history of cardiovascular disease and diabetes, blood pressure on admission and any serious complication in hospital, random blood sugar and urea levels, and medication used in and on hospital discharge.

Patients were interviewed on day second or third after they had passed through the critical stage of illness and had been stabilized. To asses the level of anxiety and depression and to record the number of events reported, two standard scales were used "The Hospital Anxiety and Depression Scale"[14], and "Holmes Rahe Social scale".[15] Self rated 14 item Hospital Anxiety and Depression Scale (HADS), which scores the severity of the symptoms of anxiety (score 0—21) and depression (scored 0—21), were used to assess anxiety and depression. HADS had been widely used in people with medical illnesses, including myocardial infarction, and its factor structure has been confirmed.[16,17]

Patients for both anxiety and depression were divided into three groups as those with score 0—7, labeled as 1, those with scores 8—17, labeled as 2 and those with score 18—21 labeled as 3. We then determined the cutoff for HADS (total combined anxiety and depression score 17 or above), which provide the best sensitivity (87.7%) and specificity (84.7%) to diagnose depressive disorder.[18] The questionnaire of HADS was completed from patients to reflect their mood during the weeks before myocardial infarction. In order to avoid recording mood changes that occur as immediate reaction to infarction and during the time spent in coronary care unit, the questionnaire was completed on second or third day of admission after they had stabilized.

Continuous variables were expressed as mean $\pm$ SD and independent sample t-test was used to analyze mean difference between groups, whereas discrete variables were expressed as percentages and analyzed by chi-square test. A p value < 0.05 was considered as statistically significant. Calculations were performed with statistical software package SPSS version 15.

RESULTS

Two hundred consecutive patients of acute myocardial infarction and 200 healthy controls, relatives of patients were assessed on HADS and HRS scale for the presence of depression. Sixty three percent of the patients were males in both groups. Mean age of patients with acute myocardial infarction (AMI) was 59±11 years while that of control group was 52±10 years. Although significantly different between the two groups, age had no significant effect on the presence of depression in any group ($p < 0.4$). A significant difference was noted in the number of events reported between patients of acute MI and control group (4.21± 2 versus 2.71±1.6) respectively ($p < 0.001$). On Hospital Anxiety and Depression Scale 77.5 % of acute MI patients had depression compared to 64 % in the control group $p< 0.003$). When HADS was used to asses the level of anxiety and depression in two groups, 83 % of patients in AMI group reported abnormal i.e. scored above 17 as compared to 70 % in control group. ($P< 0.001$).

When gender based comparison was made in patients of AMI, 86.5% of female patients had depression on HADS as compared to 72.2% of male patients ($p< 0.02$). On HADS for the level of anxiety and depression, 93% of female patients reported abnormal i.e. scored above 17 compared to 77% of male patients reporting abnormal ($p < 0.003$).

All other parameters including age, blood pressure, pulse rate, diabetes, and location of myocardial infarction had no significant association with the presence or absence of depression, number of events reported or level of anxiety and depression in patient with acute MI. Mean random plasma glucose level was significantly higher in female patients of acute MI (150 mg %) than male patients (116 mg %) $p< 0.003$.

Table 1: Comparison of Score of Depression on HADS in Patients of AMI and Control Groups

		Group		P-value
		Controls	Patients of AMI	
Score of Depression on HADS	Normal	34 (17.0%)	20 (10.0%)	0.041
	Borderline Abnormal	38 (19.0%)	25 (12.5%)	0.074
	Abnormal	128 (64.0%)	155 (77.5%)	0.003
	Total	200 (100%)	200 (100%)	

Table 2: Comparison of Level of Anxiety and Depression on HADS in Patients with AMI and Control Groups

		Group		P- value
		Controls	Patients of AMI	
Level of Depression and Anxiety on HADS	Normal	25 (12.5%)	16 (7.5%)	0.138
	Borderline Abnormal	35 (17.5%)	18 (9.0%)	0.012
	Abnormal	140 (70.0%)	166 (83.0%)	<0.001
	Total	200 (100%)	200 (100%)	

Table 3: Scores of HRS and Events in Patients with AMI and controls

Independent Sample T-Test	n	Mean ± S.D	Mean Difference	P-value
Scores on HRS(Controls)	200	98.4 ± 64.5	59.75	<0.001
Scores on HRS(Patients of AMI)	200	158.1 ± 5.8		
Number of Events Reported (Controls)	200	2.7 ± 1.65	1.5	<0.001
Number of Events Reported (Patents of AMI)	200	4.2 ± 2.01		

Table 4: Scores of Depression and Anxiety

		Sex		P-value
		Male	Female	
Score of Depression on HADS	Normal	16 (12.7%)	4 (5.4%)	0.097
	Borderline Abnormal	19 (15.1%)	6 (8.1%)	0.15
	Abnormal	91 (72.2%)	64 (86.5%)	0.02
	Total	126 (100%)	74 (100%)	
Level of depression and anxiety on HADS	Normal	13 (9.5%)	3 (4.1%)	0.117
	Borderline Abnormal	16 (12.7%)	2 (2.7%)	0.016
	Abnormal	97 (77.0%)	69 (93.2%)	0.003
	Total	126 (100%)	74 (100%)	

Table 5: Comparison of Gender in Basic Parameters in Patients with AMI

	n	Mean ± S.D	Mean Difference	P-value
Pulse (Female)	74	80.89 ± 19.92	0.098	0.973
Pulse (Male)	126	80.79 ± 18.59		
BP Systolic (Female)	74	129.16 ± 32.05	1.869	0.67
BP Systolic (Male)	126	127.29 ± 25.64		
BP Diastolic (Female)	74	80.23 ± 20.12	0.452	0.871
BP Diastolic (Male)	126	79.78 ± 17.01		
Ure a (Female)	74	40.39 ± 19.58	1.709	0.541
Urea (Male)	126	38.68 ± 18.14		
Sugar (Female)	74	150.23 ± 85.50	34.09	0.003
Sugar (Male)	126	116.13 ± 60.11		

DISCUSSION

There is growing body of evidence to support the role of behavioral and emotional triggers in acute coronary syndromes. The triggers assessed todate have been quite heterogeneous, and some factors that might be relevant have not been evaluated such as acute depression.[19] Our study identified that majority of acute MI patients had depression in the weeks preceding AMI. Whether that might have causal association with the event has to be proven. Depression causing MI has been less well studied. Assessment of patients for depression on proper scales identifies more patients with depression than formal assessment. Therefore, we applied HADS for the diagnosis of depression and level of anxiety and depression that has also been recently used to diagnose depression in the preceding weeks in patients with acute myocardial infarction.[20] Although psychiatrist commonly acknowledge the considerable threat to public health posed by depression, the extent to which depression contributes to mortality and illness burden through interaction with physical illness is often under-estimated. Taking the example coronary heart disease, depression increases the risk of incident coronary heart disease by 1.6 times, even after controlling for other cardiovascular risks.[21] Whether treatment of depression after myocardial infarction improves the outcome is yet to be determined.

It has been predicted that poor social class of developing countries will bear the brunt escalating epidemic of CAD in the near future.[22] Pakistan is part of the ethnic group which has the highest prevalence rate of coronary artery disease as compared to any other.-CAD manifests at a younger age with a significant narrowing sex difference [23, 24]. More of female

patients in our study population suffered from depression in their pre AMI period than male patients. Mean blood sugar level of female patients was much higher than male patients. Jaume Marrugat et al[25] also reported that women had more anterior location of AMI, associated with co morbid conditions and higher immediate and 28 days mortality than men. Although we did not include morbidity and mortality in our outcomes, depression might add to higher mortality in female patients with AMI in addition to the other high risk factors.

Stress and depression both are more prevalent in the deprived and poor socioeconomic class, this lethal combination of CAD, depression and poverty must be targeted in both the primary and secondary preventive strategies in a developing country like Pakistan.[3] There is accumulating evidence from local data, of the adverse effects of depression on other physical conditions so that depression alone needs to be amongst the high priorities for prevention and management.[1]

The prevalence of depression in the general population has been recorded from 15 to 45%. There is high frequency of depression and level of anxiety and depression of about 60 % and 70 % respectively observed in the control group in the present study. The increasing incidences of terrorism, lawlessness, social injustice, alarming price hike and unavailability of daily commodities, particularly in our part of the country, might have made our people more prone to low threshold for the development of anxiety and depression. The reports from rest of the country also show that there has been a sharp increase in the number of suicides being committed in the city of Karachi and social scientist believe that the increase is related to the increase in the problems being faced by citizens, be it the worsening economic crisis, unemployment, price hike, power crisis or the worsening law and order situation. Our rapidly modernizing lifestyle is heaping an extra burden on the people and, at the same time, the number of job opportunities is shrinking, leading to a general rise in depression. Price hike and diminished purchasing power of citizens may be the reason for increase cases of depression and suicide.[26]

Future prospective observational studies should consider carefully the timing of onset of depression and whether any specific symptoms or dimensions of depression are particularly cardiotoxic to identify subgroup that are most likely to benefit from treatment. The importance of understanding these relationships more exactly lies in the need to design with greater precision further intervention studies to test whether improved depression leads to reduced mortality.[27]

This is a single center observational crossectional study lacking follow-up for future outcomes. The results cannot be generalized to over all population of depressive illness. Depression in the study was diagnosed on the basis of HADS, not used routinely to diagnose depression by psychiatrist. Despite these limitations, this study has got implication for future research on this important risk factor particularly for its association rather causation of acute myocardial infarction.

CONCLUSION

Significantly higher number of acute MI patients when assessed on standard scales, suffered from depression in the period before they had MI. The frequency of depression was significantly higher in female patients of AMI.

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