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RESEARCH ARTICLE

Development of Depressive Symptoms after Myocardial Infarction-Impact of Risk Factors

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Abstract

Aim: We designed this study to compare the presence of depressive symptoms pre and 6 months post-MI and to identify the association of various biological and non-biological risk factors with the development of depressive symptoms post-MI. Objective: Coronary artery disease and depressive illness are the largest contributors to global mortality and disability. These disorders frequently occur together and have major health implications. We conducted this study to determine the frequency of increased depressive symptoms following Myocardial Infarction (MI) and analyze associated baseline risk factors. Study Design: Descriptive case series. Place and duration of study: Tertiary care cardiology hospital from Sept 2019 to Jan 2021. Patients and Methods: Patients presenting with a recent episode of myocardial infarction at the out-patient department of cardiology were recruited for this study. Demographic variables and baseline health status were recorded. Hospital Anxiety and Depression Scale (HADS) was applied in two instances, at first contact for depressive symptoms pre-MI and at the second instance 6 months post-MI. An increase in HADS score of 4 or more points after 6 months of MI was considered significant. Association of age, gender, smoking status, employment status, previous MI episode, depression and history of stressful life event with an increase in depression was analyzed. Results: The sample consisted of 140 patients, 88 males and 52 females. The mean age was 51.22 years (SD= ± 12.35). 60.7% (n=85) of patients had an increase in depressive symptoms scores as measured by HADS. Younger age (30 to 50 years), being a smoker and having a previous history of myocardial infarction were associated with a significant increase in depressive symptoms. Conclusion: 60.7% of patients have increased depressive symptoms after myocardial infarction. Patients should be

regularly screened for emerging depressive symptoms and special attention should be paid to younger patients, smokers and those who have a previous history of coronary artery disease. ***ASEAN Journal of Psychiatry, Vol. 23(9): September 2022:1-11.***

Keywords: Depression, Anxiety, Myocardial Infarction, Association, Stress, Smoking

Introduction

Cardiovascular disease is the leading contributor to the global burden of Non-Communicable Diseases (NCDs) in terms of early mortality [1]. This burden is highest in low and middle-income countries like Pakistan [2]. The global mortality from cardiovascular disease has significantly decreased in the past 2 decades, however in South-Asia cardiovascular disease still accounts for 27% of all deaths [3], which is higher than any other NCD.

At the same time, major depressive disorder is among the top five NCDs that cause the most "disability", reported having caused 34.1 million YLDs (Years of Life Lost due to Disability) according to Global Burden of Disease 2016 estimates [4]. Major depressive disorder affects patients from all strata of life and understandably inflicts greater damage on high-risk people, who are inflicted with more severe physical illness or suffer harder socioeconomic circumstances [5].

The high prevalence of CVD and major depressive disorder, and their co-existence and interaction can result in increased disability and mortality. The relation between mental and physical health is bidirectional. The association of depression with myocardial infarction has been studied in many global [6] and regional studies [7]. These studies have found that more than a quarter of patients suffering from myocardial infarction also suffer from depression. The incidence of depression in MI patients is alarmingly higher (>25%) when compared to the overall prevalence of depression which is estimated to be 4% globally [8].

A depressive disorder can also have downstream effects on medical costs and the management of CVD. Having a depressive disorder after myocardial infarction increases short-term cardiac complications and may prolong hospital stay [9]. Not only does depression influence treatment outcomes but also increases the utilization of medical services which will, in turn, lead to increased expenditure on medical services. The long-term follow-up for patients who develop depression after myocardial infarction reveals that they are more likely to have recurrent MI and adverse cardiac outcomes [10]. On the other hand, if depression is treated with medication in MI patients, it leads to better disease outcomes and reduced mortality in the long-term [11].

It is therefore important to promptly identify patients who are at higher risk of developing depressive symptoms after myocardial infarction (Post MI), to engage them in early treatment and intensive rehabilitation. These predisposing factors have not been analyzed in any study in Pakistan, and in only a few small-scale studies in South-Asia [7]. Thus there is a need to understand the extent of increased depressive symptoms after MI and which risk factors are associated with it.

Materials and Methods

A descriptive case series study was conducted to measure depressive symptoms before and 6 months post-MI. An Urdu language version of the Hospital Anxiety and Depression Scale-Depression component (HADS-D) was used. Ethical approval for the study was taken from the hospital ethical review board. The sample was recruited from the outpatient department of Rawalpindi Institute of Cardiology, Pakistan, between Sept 2019 to Jan 2021. The sample size was calculated by using the WHO Sample size calculator, where, the

confidence interval was kept at 95%, p=64.5% [12], and absolute precision=0.08. The sample size was calculated to be 140.

All patients presenting with a recent (within 2 weeks) episode of myocardial infarction, and were below the age of 80 years were included by consecutive non-probability sampling. Patients who were too unwell or already on treatment with psychotropics were excluded. Written informed consent was obtained from each participant before enrolling them in the study.

Patient demographic data were collected on a performa that included both demographic questions and the HADS-D scale. The performa included details on demographics, contact information, and risk factor inquiries such as smoking status, previous history of MI, stroke, depression, hypertension, diabetes mellitus, family history of coronary artery disease, and recent stressful life events.

HADS is a 14-item scale for assessing the presence of depression and anxiety, including 7 items each for anxiety and depression. It is a simple self-rating scale and can be completed in 5 to 10 minutes. For this study, only the 7-item depression component was used (HADS-D). The sample population was Urdu speaking so the Urdu version of HADS was used. The Urdu version of the HADS depression subscale has a sensitivity of 95% and a specificity of 93% according to Karim et al. [13]. The choice of HADS in our study was guided by its prescribed utility, that is, it was made to assess symptoms of depression and anxiety in clinical populations thus it avoids the use of physical symptoms to gauge depression and hence is a useful instrument to be used in patients with physical disease. In patients with myocardial infarction, it was reported to be of satisfactory validity [14]. Patients were asked to fill the HADS-D scale based on recall of their mental state before MI. The same patients were then contacted six months later and the depression scale was re-assessed over the phone. Patients who were found to be clinically depressed were referred to mental health services for further evaluation and management.

Data were entered and analyzed with the Statistical Program for Social Sciences (SPSS) version 22. Descriptive statistics were used to calculate frequencies of baseline variables like age, gender, history of diabetes, hypertension, MI, depression, stroke, recent stressful life event, family history of coronary artery disease, and 'significant increase in depression' which was taken as the increase of 4 or more points of HADS score. Means and standard deviation were calculated for age, change in depressive symptoms score, HADS score before MI, and HADS score 6 months after MI. Relation of increased depression to gender, employment status, history of MI, diabetes, hypertension, and recent stressful life events was also calculated and a test of association(One-way ANOVA) was applied. A P-value of <0.05 was considered significant. The strength of association was measured by applying the Eta statistic.

Results

The sample consisted of 140 patients with recent myocardial infarction. The patient population had a mean age of 51.22 ± 12.35 years. The distribution of baseline variables in the sample population is given in Table 1.

Table 1: Distribution of baseline variables

Variable	Frequency	Percentage
Gender		
Male	88	62.9
Female	52	37.1

Age		
30-40 years	29	20.7
41-50 years	30	21.4
51-60 years	44	31.4
60-70 years	27	19.3
71 years or older	10	7.1
Employed	90	64.3
Unemployed	50	35.7
Smoker	68	48.6
Non-smoker	72	51.4
History of previous MI		
Present	23	16.4
Absent	117	83.6
Family history of coronary artery disease		
Present	66	47.1
Absent	74	52.9
Diabetes mellitus		
Present	65	46.4
Absent	75	53.6
Hypertension		
Present	74	52.9
Absent	66	47.9
History of cerebrovascular disease		
Present	29	20.7
Absent	111	79.3
History of depression		
Present	15	10.7
Absent	125	89.3
History of recent stressful Life-event		
Present	97	69.2
Absent	43	30.8

Most patients had no previous history of MI, depression, or cerebrovascular event. Nearly half (48.6%) of the patients were smokers and all of them were males. Another noteworthy finding was that 69.2% of patients had a preceding stressful life event.

The mean HADS score for depressive symptoms of the sample population was 5.49 (SD=1.427) before suffering from MI and 9.51 (SD=4.004) after the event. The mean change in depression score was found to be 4.03 (SD=3.616) over the six-month evaluation period. A significant increase in depression score (an increase of 4 or more points on HADS), was found in 85 patients (60.7%) in our study group in Table 2.

Table 2: Association of Risk factors with change in depressive symptoms

Variable	Mean change in depressive score	Standard Deviation	ANOVA P-value	Eta	Eta Squared
Gender			0.275	0.093	0.009
Male	3.78	4.039			
Female	4.47	2.708			
Age			0.000*	0.599**	0.358
30-40 years	6.7	0.75			
41-50 years	5.37	1.098			
51-60 years	1.16	5.061			
60-70 years	3.56	1.188			
71years or older	5.6	0.516			
Employed	3.78	4.298	0.275	0.093	0.009
Unemployed	4.47	1.88			
Smoker	5.81	1.949	0.000*	0.480**	0.231
Non-smoker	2.35	4.015			
History of previous MI			0.003*	0.248**	0.061
Present	6.04	2.266			
Absent	3.63	3.706			
Family history of coronary artery disease			0.084	0.146	0.021
Present	3.48	4.759			
Absent	4.53	1.987			
Diabetes mellitus			0.000*	0.616**	0.38
Present	1.61	3.836			
Absent	6.07	1.636			
Hypertension			0.606	0.044	0.002
Present	3.88	1.87			
Absent	4.19	4.866			
History of cerebrovascular disease			0.521	0.055	0.003
Present	4.41	1.427			
Absent	3.93	3.995			
History of depression					
Present	-4.13	1.784			
Absent	5.08	2.151			
History of recent stressful life-event			0.00*	0.347**	0.12
Present	3.2	3.815			
Absent	5.91	2.191			

*:P-value of <0.05 was significant; **:Eta Measure of Association denotes the degree of association as follows Eta 0.2-0.39 weak association, 0.4-0.69 moderate association, >0.7 is strong.

The above table shows that certain variables like age (p=0.00), being a smoker (p=0.00) and a previous history of MI (p=0.003) were associated with having an increase in depressive symptoms following an MI. Diabetes (p=0.00) and having had a recent stressful life event (p=0.00) were also associated but patients with these conditions did not have a significant increase in depressive symptoms, this will be further discussed in the following section.

Discussion

This study was primarily looking at the change in patients' depressive symptom scores before and after they had suffered an acute myocardial infarction. There have been numerous studies that reported increased prevalence of depression in patients with coronary artery disease [6], giving rates of depression ranging between 9.17% to 65.88% in post-MI patient populations worldwide, higher rates were reported in Asia as compared to Europe and USA. These findings conform to our study population where 60.7% of patients had increased depression after an episode of MI.

Depression may be underreported if diagnosable depressive disorder measures are used [15]. However self-reported scales like HADS have a lower threshold and may be able to detect symptoms early on. This is particularly important because post-MI depression is linked to adverse cardiac events [16], including longer hospital stays [9] and increased mortality [17]. Therefore, our results showing an increased rate of depressive symptoms calls for more vigilant patient monitoring to improve outcomes in cardiac disease. Another key finding of our study is the unequal trend of increase in depressive symptoms with respect to age. Most studies report a mean patient age of 65 years when depression co-presents with coronary artery disease, however, our results found that patients aged between 30 to 50 years and those aged more than 70 years had a greater increase in depressive symptoms. This association of age with depressive symptoms is shown to be of moderate strength as shown in Table 2.

While the elderly are typically considered vulnerable to depression, our study additionally indicates that the 30-50 years age range can also be at risk of developing depression after cardiac episodes. g. The 30-50 years period carries the greatest burden of social and financial responsibilities, and these socioeconomic burdens are risk factors for both depression and coronary artery disease. There are also differences in the mean age of patients presenting with coronary artery disease and depression (52 to 67 years) worldwide compared to the South Asian region. The South Asian region has a higher burden of coronary artery disease in a significantly younger age group [18,19]. Therefore most of the patients recruited in our study group are about a decade younger than the global mean. This can also explain why a more significant change was observed in the younger population as that was the highest represented group in this study.

Two of the important risk factors associated with increased depressive scores in our patient population were being a smoker and having a history of previous MI. Both of these variables are independent risk factors for myocardial infarction, our study denotes that they are also significantly associated with an increase in depressive symptoms. This was also found to be true in a recent meta-analysis looking at the prevalence of depression in myocardial infarction. This in turn indicates that a patient who is a smoker, has a history of myocardial infarction and then develops a new MI, carries the trifecta of risk factors which will predict a strong likelihood of developing depressive symptoms and eventually poor cardiac prognosis. These patients would benefit from an

early referral to mental health services and regular screening for depressive symptoms [20].

History of the recent stressful event was found in a major proportion of our study population with nearly 69% of patients reporting that they had gone through an adverse life event before the episode of myocardial infarction, this is in accordance with findings of recent literature [21]. This was however not found to be associated with a significant increase in depressive symptoms; this particular aspect is not well studied except in a small study that reports opposite findings [22]. An explanation for this effect in our study could be that a stressful life event coupled with Myocardial Infarction draws significantly on social support; these patients might have received enough psychological and physical support to offset the effect of MI and associated emotional symptoms.

Among other risk factors, diabetes was shown to be associated with negligible change in depressive symptoms in this study. Recent literature regarding this aspect is conflicting; a meta-analysis of depression in myocardial infarction patients shows diabetes to be associated with developing depression in these patients. However, another large case-control study reported findings similar to our observations and did not find diabetes to be strongly associated with increased depressive symptoms [23]. Thus the association of diabetes as a risk factor for depression needs to be explored further.

The main limitations of this study are a small sample size, a study setting in one hospital, and limited follow-up. We were also not able to follow up on cardiac parameters like LVEF. The data relies on recall of depressive symptoms before myocardial infarction which is prone to recall bias but there are no other means to assess the pre-MI depression state without conducting a community-level cohort study, which was beyond the current scope. Nonetheless, the study gives us a significant understanding of the Pakistani population concerning depressive symptoms and coronary artery disease. It will be worthwhile to conduct future research with a longer-term follow-up and a control arm added to the cohort [24-26].

Conclusion

A major proportion of patients suffering from myocardial Infarction develop increased depressive symptoms within the first 6 months of the cardiac event. In contrast to other regions, a younger age group of patients is affected by this comorbidity of depression and MI in Pakistan. Smoking and previous history of MI are associated with the risk of increased depressive symptoms and hence should be indicators of special attention for the cardiac rehabilitation team. Future studies need to look at long-term prognosis with and without these risk factors and gauge treatment response to depression.

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