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RESEARCH

Impact of post myocardial infarction depression on drug adherence of cardiological medicines

Hemanta Dutta, Soumitra Ghosh, DJ Dutta

Abstract

Background: Depressive symptoms are very usual in patients experiencing a history of myocardial infarction (MI). An individual who has developed depression after an episode of MI becomes non compliant with the treatment of cardiology.

Aim: To test the impact of post MI depression on drug adherence of cardiological medicines.

Settings and design: The study was conducted on patients of acute MI (n=50) attending cardiology outpatient department (OPD) of Assam Medical College and Hospital, Dibrugarh at eight weeks after the index event.

Methods: Screening was performed by the Primary Care Evaluation of Mental Disorders (PRIME-MD) and diagnoses of major depressive disorder were established according to the text revision of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) criteria. The eight-item Morisky Medication Adherence Questionnaire was applied to the patients to assess drug adherence after eight weeks from the MI episode.

Results: Statistically significant strong association and correlation were found between post MI depression and drug adherence of cardiological medicines (Wald 9.84, Odd's ratio 2.054, p=0.002, rho=0.714).

Conclusion: The result of analysis has revealed that post MI depression has an unfavourable impact on drug adherence, ultimately contributing to increased risk of cardiological morbidity and death rate. Therefore, routine screening of depressive symptoms should be mandatory in cardiology.

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Correspondence: rubulpd1984@rediffmail.com

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Ischemic heart disease (IHD) or coronary artery disease (CAD) is the generic appellation for a group of closely related syndromes resulting from myocardial ischaemia. The cardinal feature of CAD is chest pain, typically on exertion, and often times, there are no symptoms until an acute coronary event occurs.[1] In developing countries, rates are predicted to increase by 120% in women and 137% in men from 1990 to 2020.[2] Coronary heart disease (CHD) prevalence appears to be worsening in India as well.[2] Granting to the 2010 Global Burden of Disease Study, major depression is a significant risk factor for CHD.[3] Incidence of depression symptoms following myocardial infarction (MI) is a very common psychological problem among patients with MI. This psychological problem has negative impact on the prognosis of cardiac disease.[4]Patients suffering from depression are three times as likely to be noncompliant with medical treatment regimes compared to nondepressed patients.[5] Study reports have demonstrated a significant association between depression and drug nonadherence.[6,7] Accurate diagnosis of comorbid depressive and anxiety disorders in patients with chronic medical illness is essential in understanding the cause and in optimising the management of somatic symptom burden.[8] Patients with post MI show poor adherence to the medications and behaviours which are prescribed from the cardiology.[9,10] Subject areas in relation to treatment noncompliance after development of post MI depression are scarce. Study with this object has not been conducted in India, especially in our North East India region**.** Hence, here we have attempted to analyse the connection between depression and compliance with the treatment prescribed from cardiology.

Materials and method

The aim of the study: To examine the impact of post MI depression on drug adherence of cardiological medicines.

Study area: The study was conducted in the departments of psychiatry and cardiology, Assam Medical College and Hospital, which is a tertiary care centre situated in Dibrugarh.

The design of the study: The study subjects were 50 diagnosed cases of MI from the cardiology outpatient department (OPD) who were selected by employing the simple random sampling technique. The period of the study was one year (June 2012-May 2013). Socio-demographic information was collected as per the prepared standard questionnaire. Ethical approval and consent of the patients were obtained in the initial portion of the study. Patients were evaluated for screening of depression by using the Primary Care Evaluation of Mental Disorders (PRIME-MD) Patient Health Questionnaire (PHQ)[11] after eight weeks from an attack of MI, as by that time the normal psychological reaction to MI is supposed to have settled.

During screening, patients who were discovered to be experiencing depression and fulfilling the criteria according to the text revision of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)[12] were selected for the survey. Later on, the Beck Depression Inventory (BDI) scale[13] was applied to assess the severity of depression. The eight-item Morisky Medication Adherence Questionnaire (MMAS-8)[14,15] was applied to the patients to assess drug adherence after eight weeks from the episode of MI. People who did not come to cardiology OPD for follow-up at the specified time, i.e. after eight weeks, were assessed by telephonic communication.

Inclusion criteria: a) Both male and female patients, b) Age between 21-70 years, c) Diagnosed cases of MI as per redefined acute MI criteria.[16]

Exclusion criteria: a) Patients aged more than 70 years were chucked out as there will be a greater hazard of other comorbid physical illness as well as psychological issues associated with old age, b) Patients with other comorbid medical illness and history of other psychiatric disorders.

Tools which are used in the study are: a) Proforma for socioeconomic data, b) PRIME-MD PHQ, c) BDI, d) DSM-IV-TR, and e)MMAS-8.

PRIME-MD PHQ: PRIME-MD, a diagnostic tool containing modules on five different mental health disorders, was developed in the mid-1990s. The PHQ-9, a tool specific to depression, simply scores each of the nine DSM-IV criteria based on the mood module from the original PRIME-MD.[11]

BDI: BDI, created by Aaron T Beck, is a 21-question multiple-choice self-report inventory; one of the most widely used instruments for measuring the severity of depression.[13] Internal consistency is satisfactorily high (alpha>or=0.84), and retest reliability exceeds r>or=0.75.[17] BDI is a clinician rated scale. The Assamese translation of BDI was used in this work, which was practiced earlier in another study and is a well accepted one.[18]

MMAS-8: MMAS was first published in 1986 by DrMorisky and his colleagues. In 2008, a modified eight-item MMAS-8, developed from the original four-item scale, was published. The sensitivity and specificity of this instrument are 93% and 53%, respectively, and Cronbach's alpha value is 0.83 which is above the acceptance threshold. Adherence has been graded as low, medium, and high based on the scorings.[14,15] Scores on the MMAS-8 are as follows:

Scores: *>2=low adherence*
1 or 2=medium adherence
0=high adherence

Translated Assamese version of MMAS-8 was used in our study. A pilot study was conducted to validate the Assamese version of the scale. Internal consistency (Cronbach's alpha 0.89) was found to be a good and an acceptable one.

Statistical analysis of data: The information has been analysed using statistical software packages SPSS and XLSTAT. Logistic regression, Spearman coefficient, and Student t tests were executed for analysis. Analysis of the extent of the effect of depression on treatment compliance has been examined by the logistic regression method. Along with the issue of socio-demographic variables, the coronary risk factor variables have also been evaluated through the same logistic regression method, as there is a probable chance that these variables may affect drug adherence. The student t test was used to examine the variation of age factor in between the two groups, as age is a continuous variable here.

Results

The bulk of the survey subjects were male (74%), married (80%), and Hindu (84%). Fifty two per cent, 72%, and 48% of the study population belonged to rural areas, nuclear family, and lower middle economic class. Thirty two per cent of them had previous history of MI, 54% of them had their anterior wall involvement, and inferior wall involvement was seen in 46% of patients. Fifty four per cent had a history of smoking, 30% had a history of hypertension, and 52% had a family history of heart disease. Thirty two per cent of the study group (total number of depressed patients, i.e. n=16) were set up to be depressed at just around eight weeks after the index event. The results have been depicted through tables 1 and 2.

During statistical analysis, the depressed group is split between two groups, i.e. drug adherent and nonadherent. Hundred per cent compliance was observed among the nondepressed group. But similar trend was not observed in

Table 1. Distribution of the study population based on socio-demographic, coronary heart disease risk factors, and clinical variables

Variables		Sex		
		Male (%)	Female (%)	Total (%)
Age groups	21-30	1 (2)	2 (4)	3 (6)
	31-40	2 (4)	2 (4)	4 (8)
	41-50	6 (12)	2 (4)	8 (16)
	51-60	17 (34)	6 (12)	23 (46)
	61-70	11 (22)	1 (2)	12 (24)
Religion	Hindu	31 (62)	11 (22)	42 (84)
	Muslim	4 (8)	2 (4)	6 (12)
	Christian	2 (4)	0 (0)	2 (4)
Marital status	Unmarried	8 (16)	2 (4)	10 (20)
	Married	29 (58)	11 (22)	40 (80)
Locality	Rural	18 (36)	8 (16)	26 (52)
	Semi-urban	14 (28)	3 (6)	17 (34)
	Urban	5 (10)	2 (4)	7 (14)
Type of family	Nuclear	25 (50)	11 (22)	36 (72)
	Extended	5 (10)	1 (2)	6 (12)
	Joint	7 (14)	1 (2)	8 (16)
Education	Illiterate	1 (2)	1 (2)	2 (4)
	Primary school certificate	6 (12)	3 (6)	9 (18)
	Middle school certificate	11 (22)	1 (2)	12 (24)
	High school certificate	5 (10)	7 (14)	12 (24)
	Graduate or post graduate	14 (28)	1 (2)	15 (30)
Socioeconomic status	Upper middle (II)	20 (40)	3 (6)	23 (46)
	Lower middle (III)	15 (30)	9 (18)	24 (48)
	Upper Lower (IV)	2 (4)	1 (2)	3 (6)
History of smoking	No	15 (30)	8 (16)	23 (46)
	Yes	22 (44)	5 (10)	27 (54)
History of hypertension	No	25 (50)	10 (20)	35 (70)
	Yes	12 (24)	3 (6)	15 (30)
Family history of heart disease	No	19 (38)	5 (10)	24 (48)
	Yes	18 (36)	8 (16)	26 (52)
Site of myocardial infarction	Anterior wall	18 (36)	9 (18)	27 (54)
	Inferior wall	19 (38)	4 (8)	23 (46)

the sheath of the depressed population. Merely 37.5% among the depressed group were adherent to the drugs prescribed from cardiology depart-ment. 62.5% of the patients from depre-ssssed group were observed to be reluctant regarding the treatment reg-imen. While examining the distribution of the different classes of drug adherence in relation to depressed and nondepressedsubje-cts, 43.75%, 18.75%, and 37.5% among the depressed group have recorded low, medium, and high adherence to the drug prescribed from cardiology. The data have been shown in table 3.

Analysis of the effect of socio-demographic variab-les and clinical risk factors on drug adherence has been examined to analyse the influence of these factors on the drug compliance. The outcome of the analysis has been evinced in the tables 4 and 5. There is no signify-cant difference in terms of sociodemographic variables and coronary risk factor variables between the two groups, i.e. drug adherent and nonadherent ($p > 0.05$). But, it has been shown that depression has signify-cant influence on drug adhrence (Wald 9.84, Odd's ratio 2.054, $p=0.002$).

To test the strength of association between the two categorical variables (severity of depression and drug adherence), we have applied the Spearman correlation test. Categories of drug adherence obtained from MMAS-8 were used as dependent variables against the severity scores of BDI scale. The outcome has been evinced in the table 6. There is a strong negative correlation (rho=-0.714) between the two variables.

Thus, it can be inferred that with the issue of depression in the case of MI patients, there is a probability for noncompliance with the treatment provided from cardiology department and higher level of depression is associated with lower level of adherence.

Table 2: Distribution of the study population based on the depression

Severity of depression	Sex			Total no. depression (%)
	Male (%)	Female (%)	Total (%)	
No	25 (50)	9 (18)	34 (68)	34 (68)
Mild	2 (4)	2 (4)	4 (8)	16 (32)
Moderate	8 (16)	2 (4)	10 (20)	
Severe	2 (4)	0 (0)	2 (4)	

Table 3: Distribution of drug adherence with reference to the severity of depression

Depression severity	Drug adherence			
	Low	Medium	High	Total
No	0	0	0	0
Mild	1	0	5	6
Moderate	3	2	1	6
Severe	3	1	0	4
Total (n1)	7	3	6	16
% against depressed group, (n1/16 × 100)	43.75%	18.75%	37.50%	100%

Discussion

Our work has depicted that depression after an onset of MI is a real usual phenomenon. Prevalence wise it has been seen in around 32%. Lesperance*et al*.,[19] Thombs*et al*.,[20] and Mahapatra*et al*.[21] demonstrated similar findings in this respect.

In the present study, no significant association has been found between socio-demographic variables and treatment compliance. Merely it is revealed that depression has a significant and negative influence on drug compliance (Wald 9.84, Odd's ratio 2.054, p=0.002). Nonadherence is a problem in schizophrenia too, and Hazarika*et al*.[22] studied the demographic and clinical variables affecting medication adherence in schizophrenia; no significant association of adherence was seen to religion, educational level, occupation, family income, type of family, and family history.

An individual who has developed depressive symptoms is more probable to get nonadherent to the treatment from the cardiological side, and in the end gets more prone for another MI episode. Grenard*et al*.[23] examined treatment adherence in depressed patients with history of chronic diseases. They also reported poor treatment compliance among depressed patients. DiMatteo*et al*.[5] also demonstrated three times greater risk of noncompliance in the depressed group (95% confidence interval, 1.96-4.89). A study by Ziegelstein*et al*.[24] showed that people who developed depressive symptoms were less likely to cleave to the recommended treatment and advice. In their study, they reported that patients who developed depressive symptoms became less adherent to the recommendations to reduce cardiac risk like low fat diet, regular exercise, and increasing social support etc.[24] Rieckmann*et al*.[9] had also reported similar findings in this regard. In their study, 66% of the depressed population was found to be highly nonadherent to aspirin.[9] Kronish*et al*.[10] compared depressed and nondepressed group after an episode of coronary heart disease, and concluded that depressed group were less likely adherent to the behaviours like quitting smoking, taking medications, exercising and so on, which were advised to reduce the future chances of CHD. Albeit comparable studies with respect to treatment compliance after post MI from India, and particularly from North East India had not been observed which were looked manually and through the web.

Table 5: Analysis showing effect of various independent variables on drug adherence of myocardial infarction

Independent variable	Wald	Odd's ratio	p value	Remark
Sex	0.104	0.778	0.748	NS
Educational status	0.864	0.810	0.352	NS
Socioeconomic status	1.348	2.138	0.246	NS
Locality	0.771	0.659	0.380	NS
Religion	0.504	0.636	0.478	NS
Marital status	2.883	3.778	0.90	NS
Type of family	0.555	0.456	0.456	NS
History of hypertension	4.816	0.194	0.546	NS
Family history of heart disease	3.469	0.205	0.063	NS
Depression	9.84	2.054	0.002	Significant

NS=not significant

While explaining the grounds for noncompliance factors like lack of energy, motivation, social withdrawal, feelings of hopelessness, or alterations in cognition and expectations about the benefits or harms of treatment, which are generally developed after depression play a contributory element in treatment noncompliance. The same authors showed that there was significant variation in quality of life (QOL) between nondepressed and depressed groups.[25] Subsequently, more deterioration in psychological domain was seen. In all domains of QOL, nondepressed MI patients scored higher than the depressed group. As reported by Saini*et al*.,[26] Goldman *et al*.,[27] and Gellad*et al*.,[28] apart from depression, some other components like the price of the drug, belief about medication, social factor, dose complexity, and type of providers may also create barrier in treatment compliance. Nehra*et al*.[29] found that in CHD patients, mindfulness-based stress

Table 4: Analysis showing Effect of age on drug adherence of myocardial infarction

Drug adherence	Mean age ± SD (age in years)	N	t- test	p value	Remark
No	50.50 ± 11.218	10	1.04	0.301	NS
Yes	54.43 ± 10.466	40			
Total	53.64 ± 10.621	50			

NS=Non significant, N=number

Table 6: Analysis showing relationship between depression and drug adherence

Independent variable	Dependent variable	Coefficient of correlation	p value	Remark
Depression	Drug adherence	- 0.714**	**0.003**	Significant

***The correlation is significant at 0.01 level (2-tailed)*

reduction (MBSR) programme was an effective way to cope with perceived stress and health complaints. Educative intervention on drug compliance is helpful in bringing a change towards perception and behaviour related to taking medicine.[30]

Summary and conclusion

The current analysis has revealed that post MI depression has an unfavourable impact on treatment compliance, ultimately contributing to increased risk of cardiological morbidity and death rate. Our study has limitation like a small number of samples. In this study, we had to exclude all comorbid medical illnesses and along with that our study duration was about one year. Hence, on that level there was not enough opportunity to take hold of a large number of samples for the study. Simply our survey will act as an eye opener for future course of research to prevent cardiological morbidity and death rate as this is the first study from North East India which is reporting the problem of drug nonadherence in post MI depressed patients.

Thus, in conclusion, we can recommend routine screening of depressive symptoms by cardiological staff and they should refer those patients for expert opinion, who are found to have developed depressive symptoms. Patients with positive screening results should be assessed by a qualified professional in the diagnosis and management of depression. Management of depression in these groups of patients may improve treatment compliance, lifestyle change, and thereby contributing to a better tone of liveliness. The authors would be concerned to hear similar studies from other clinicians.

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Hemanta Dutta, MD, Senior Resident, Department of Psychiatry, LGBRIMH, Tezpur, **Soumitra Ghosh, MD, FICP,** Associate Professor, Department of Psychiatry, **DJ Dutta, MD, DM (Cardiology),** Associate Professor, Department of Cardiology, Assam Medical College and Hospital, Dibrugarh, Assam, India.