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Frequency of Anxiety & Depression after Primary Percutaneous Coronary Intervention among Patients with Acute Myocardial Infarction Using Hamilton Rating Scale

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ABSTRACT

Objective: to determine frequency of depression and anxiety after primary percutaneous coronary intervention among patients with acute mayocardial infarction using Hamilton rating scale. **Methods:** This cross-sectional study was performed in outpatients' clinics of interventional cardiology in National Institute of Cardiovascular Diseases, Karachi, Pakistan from 1st January 2024 to 30th July 2024. The study enrolled patients underwent primary percutaneous coronary intervention within our hospital premises. Anxiety and depression were evaluated based on Rating Scale for Anxiety will be used to evaluate depression (HAMA-14) and Hamilton Rating Scale for Depression (HAMD-17) respectively. Data was analyzed using SPSS version 27. **Results:** A total of 300 patients were studied with with mean age of 56.4 ± 11.4 years. age range of patients was 28-90 years. About two-third patients were males (64%). About half were belonging to urban area (51%). majority of them had comorbidity of hypertension (88.7%) and diabetes (53.7%). Depression was seen in approximately one-third patients (33.7%) whereas anxiety was found in nearly one-fifth of patients (20.7%). **Conclusion:** The present study found that burden of depression and anxiety was higher substantial after PCI in MI patients. Integration of mental health assessment and treatment among patients with CAD as soon as after PCI is recommended for optimal and effective treatment.

INTRODUCTION

For patients, a heart attack is a life-changing, unanticipated experience that might raise many questions. As a result, recovering after an acute myocardial infarction (AMI) might be challenging. Not only does the MI cause physical reactions like excruciating pain, but it also causes psychological reactions like depression (1,2). Following MI, 20–40% of patients report having anxiety or depression symptoms, which is associated with an increased risk burden and adverse event (3,4).

Patients may differ significantly in the intensity of their depression or anxiety (5,6). For instance, one patient may experience brief and mild symptoms along with their MI, whereas another may have more serious anxiety or sadness that required psychiatric treatment before their MI. Because the severity of MI varies, so too might the need for post-MI monitoring and care.

Cardiovascular disease and depression have a complicated and reciprocal interaction. The stress variable may have a role in the connection between depression and CAD since it shares certain psycho-physiological pathways with depression (7). Significant stress levels can trigger acute cardiovascular events, as demonstrated by naturalistic studies on natural disasters (stressful life events). However, studies have also linked chronic stress to coronary artery disease (CAD) (8).

A growing body of research has consistently demonstrated that depression is among the most prevalent psychological responses following MI, and that it may not only worsen the patients' long-term quality of life but also raise their death rate (9,10). In a meta-analysis investigating the impact of post-MI depression on cardiovascular outcomes, Meijer et al. (11) discovered that patients with MI who experience

post-MI depression may be 2.25 times more likely to die from all causes, 2.71 times more likely to die from heart attacks, and 1.59 times more likely to experience cardiac events within a 24-month period.

As managing a mental health illness such as depression or anxiety disorder can be difficult in and of itself, managing the fallout from an AMI adds another layer of difficulty. Furthermore, despite being common, post-MI melancholy is sometimes disregarded as a normal emotional response to a medical condition. Compared to patients who do not struggle with depression or anxiety, it may make patients more susceptible to poorer than ideal results after AMI. Moreover, new data indicates that depression raises the risk of MI (12). There are studies that have looked into depression in individuals who have had a MI in Pakistan, but they are not the most recent (13, 14). It is crucial to ascertain the incidence of depression in the modern era because social media has greatly increased public knowledge of diseases and fundamentally altered people's lifestyles. Thus we planned the current study to determine frequency of depression and anxiety after primary percutaneous coronary intervention among patients with acute mayocardial infarction using Hamilton rating scale.

METHODS

This cross-sectional study was performed in outpatients' clinics of interventional cardiology in National Institute of Cardiovascular Diseases, Karachi, Pakistan from 1st January 2024 to 30th July 2024. The study protocol was first approved from institutional review board with letter Ref# IRB-14/2024, Dated February 28, 2024. Patients were enrolled into the study with their written informed consent. Patients of any gender of age at least 18 years who underwent primary percutaneous coronary intervention within our hospital premises were studied. While patients with past history of MI and underwent coronary intervention/ surgical procedure, diagnosed with mental illness and having cognitive disabilities and Patients with chronic illness such as kidney diseases, arthritis, liver diseases and malignancies were excluded.

Previously conducted similar study reported that frequency depression and anxiety was 11.8% and 24.8% patients (14). Sample size estimation was separately performed for both of the frequencies at 95% confidence interval and 5% margin of error which yielded a sample size of 160 to estimate depression frequency and 287 for estimation of anxiety prevalence. Thus, a higher sample size of 287 was considered for this study. Sample size calculation was performed on online available calculator Open-Epi. After PCI and hospital discharge, patients were given a appointment for follow-up visit in outpatient clinic after 7 days of their discharge or PCI. The assigned data collector interviewed the patient before their consultation.

Using the Hamilton Rating Scale for Depression (HAMD-17), depression was assessed. There are 17 items on the scale; the majority are scored using the 5-level scoring system, which ranges from 0 to 4 points, while a small number use the 3-level scoring method, which ranges from 0 to 2 points. The ranges of scores are: 0–7 indicate no depression, while score above 7 indicates presence of depression (15). The Hamilton Rating Scale for Anxiety was used to evaluate anxitey (HAMA-14). Each of the 14 items on the scale has a value between 0 (not present) and 4 (very severe).Sum score >14 designates the anxiety group, and ≤14 designates non-anxiety (16).

Data was analyzed using SPSS version 27. Frequencies and percentages were computed for categorical variables. numerical variables were summarized as mean ± standard deviation. Likelihood of depression was compared among sub-groups of patients' features using binary logistic regression. Odds ratio with their 95% confidence interval were computed. P-value ≤0.05 was considered as statistically significant.

RESULTS

Total 300 patients were studies with mean age of 56.4 ± 11.4 years. age range of patients was 28-90 years. About two-third patients were males (64%). About half were belonging to urban area (51%). One-third patients were current smokers (31%), majority of them had comorbidity of hypertension (88.7%) and diabetes (53.7%). Table 1 displays summary of demographic features of study participants.

Table 1

Summary of sociodemographics and clinical features

Variables	Groups	Frequency	Percentage
Gender	male	192	64.0
	female	108	36.0
Education	illiterate	76	25.3
	primary	85	28.3
	secondary	45	15.0
	intermediate	44	14.7
	graduate and above	50	16.7
Residence	Urban	153	51.0
	Rural	147	49.0
Employment status	unemployed	107	35.7
	employed/self-employed	193	64.3
Marital status	Single/divorced	21	7.0
	Married	279	93.0
Family monthly income	Less than 30k PKR	32	10.7
	31-50k PKR	121	40.3
	50k-100k PKR	137	45.7
	100k PKR	10	3.3
Family system	joint	282	94.0
	nuclear	18	6.0
Physical activity after PCI	yes	172	57.3
	no	128	42.7
Smoking status	Current	93	31.0
	Former	16	5.3

	Never	191	63.7
Hypertension	yes	266	88.7
	no	34	11.3
Diabetes	yes	161	53.7
	no	139	46.3
Vessel involved	1	151	50.3
	2	89	29.7
	3	60	20.0

Mean depression score was 8.1 ± 5.9 whereas depression presence was seen in one third patients (33.7%). Table 2 displays factors associated with depression. Likelihood of depression was significantly higher among males, less educated patients, those who were not doing physical activity after PCI. Odds of depression were also significantly lower among those having 1 vessel or 2 vessel disease as compared to those who had 3 level disease. Depression odds were significantly lower among those belonging urban area and who had less family income.

Table 2
Association of patients' features with depression

Variables	Groups	Depression		OR (95% CI)	p-value
		Yes n(%)	No n(%)		
Age (in years)#	-	58.1 ± 12.1	55.6 ± 11.0	1.02(1-1.04)	0.589
Gender	male	70(36.46)	122(63.54)	1.43(0.86-2.37)	0.173
	female	31(28.7)	77(71.3)	Reference category	
Education	illiterate	27(35.53)	49(64.47)	6.34(2.06-19.51)	0.001
	primary	46(54.12)	39(45.88)	13.56(4.48-41.04)	<0.001
	secondary	15(33.33)	30(66.67)	5.75(1.74-19)	0.004
	intermediate	9(20.45)	35(79.55)	2.96(0.84-10.4)	0.091
	graduate and above	4(8)	46(92)	Reference category	
Residence	Urban	34(22.22)	119(77.78)	0.34(0.21-0.56)	<0.001
	Rural	67(45.58)	80(54.42)	Ref	
Employment status	unemployed	34(31.78)	73(68.22)	0.88(0.53-1.45)	0.606
	employed/self-employed	67(34.72)	126(65.28)	Reference category	
Marital status	single/divorced	4(19.05)	17(80.95)	0.44(0.14-1.35)	0.151
	married	97(34.77)	182(65.23)	Reference category	
Family monthly income	Less than 30k PKR	6(18.75)	26(81.25)	0.1(0.02-0.5)	0.005
	31-50k PKR	46(38.02)	75(61.98)	0.26(0.06-1.07)	0.062
	50k-100k PKR	42(30.66)	95(69.34)	0.19(0.05-0.77)	0.020
	100k PKR	7(70)	3(30)	Reference category	
Family system	joint	96(34.04)	186(65.96)	1.34(0.46-3.87)	0.587
	nuclear	5(27.78)	13(72.22)	Reference category	
Physical activity after PCI	No	69(53.91)	59(46.09)	5.12(3.05-8.59)	<0.001
	Yes	32(18.6)	140(81.4)	Reference category	
Smoking status	Current	27(29.03)	66(70.97)	0.77(0.45-1.33)	0.353
	Former	8(50)	8(50)	1.89(0.68-5.28)	0.222
	Never	66(34.55)	125(65.45)	Reference category	
Hypertension	no	12(35.29)	22(64.71)	1.08(0.51-2.29)	0.831
	Yes	89(33.46)	177(66.54)	Reference category	
Diabetes	no	31(22.3)	108(77.7)	0.37(0.22-0.62)	0.256
	yes	70(43.48)	91(56.52)	Reference category	
Number of diseased vessels	1.00	71(47.02)	80(52.98)	3.9(1.9-8.2)	<0.001
	2.00	19(21.35)	70(78.65)	1.2(0.5-2.7)	0.653
	3.00	11(18.33)	49(81.67)	Reference category	

CI: Confidence interval, OR: Odds ratio, #Age is expressed as mean ± SD, *Significant at p<0.05

Mean anxiety score was 10.4 ± 7.4 whereas anxiety frequency was found in nearly one-fifth of the total patients (20.7%). Table 2 displays association of patients' features with anxiety. Anxiety risk was significantly higher in lower educated patients, patients belonging to urban areas, patients with less family income, patients who were involved in physical activity after PCI. Anxiety odds were significantly among patients who had 1 vessel or 2 vessel disease as compared to those who had 3 level disease.

Table 3
Association of patients' features with anxiety

Variables	Groups	Anxiety		OR (95% CI)	p-value
		Yes n(%)	No n(%)		
Age (in years)#	-	60.0 ± 11.6	55.5 ± 11.2	1.04(1.01-1.06)	*0.006
Gender	male	45(23.44)	147(76.56)	1.64(0.88-3.03)	0.116
	female	17(15.74)	91(84.26)	Reference category	

Education	illiterate	21(27.63)	55(72.37)	18.71(2.43-144.27)	*0.005
	primary	33(38.82)	52(61.18)	31.1(4.09-236.14)	*0.001
	secondary	5(11.11)	40(88.89)	6.12(0.69-54.58)	0.104
	intermediate	2(4.55)	42(95.45)	2.33(0.2-26.65)	0.495
	graduate and above	1(2)	49(98)	Reference category	
Residence	Urban	15(9.8)	138(90.2)	0.23(0.12-0.44)	*<0.001
	Rural	47(31.97)	100(68.03)	Reference category	
Employment status	unemployed	12(11.21)	95(88.79)	0.36(0.18-0.71)	0.303
	employed/self-employed	50(25.91)	143(74.09)	Reference category	
Marital status	single/divorced	0(0)	21(100)	-	-
	married	62(22.22)	217(77.78)	-	-
Family monthly income	Less than 30k PKR	1(3.13)	31(96.88)	0.03(0-0.34)	*0.004
	31-50k PKR	36(29.75)	85(70.25)	0.42(0.12-1.55)	0.195
	50k-100k PKR	20(14.6)	117(85.4)	0.17(0.05-0.64)	*0.009
	100k PKR	5(50)	5(50)	Reference category	
Family system	joint	61(21.63)	221(78.37)	4.69(0.61-35.96)	0.137
	nuclear	1(5.56)	17(94.44)	Reference category	
Physical activity after PCI	No	44(34.38)	84(65.63)	4.48(2.44-8.24)	*<0.001
	Yes	18(10.47)	154(89.53)	Reference category	
Smoking status	Current	13(13.98)	80(86.02)	0.54(0.28-1.07)	0.077
	Former	5(31.25)	11(68.75)	1.52(0.5-4.61)	0.460
	Never	44(23.04)	147(76.96)	Reference category	
hypertension	no	5(14.71)	29(85.29)	0.63(0.23-1.71)	0.366
	yes	57(21.43)	209(78.57)	Reference category	
diabetes	no	12(8.63)	127(91.37)	0.21(0.11-0.41)	0.256
	yes	50(31.06)	111(68.94)	Reference category	
Number of diseased vessels	1.00	47(31.13)	104(68.87)	26.6(3.5-198.3)	0.001
	2.00	14(15.73)	75(84.27)	11.0(1.4-86.2)	0.022
	3.00	1(1.67)	59(98.33)	Reference category	

CI: Confidence interval, OR: Odds ratio, #Age is expressed as mean ± SD, *Significant at p<0.05

DISCUSSION

Patients with mental health conditions may find it difficult to follow post-PCI treatment plans, prescription drugs, and lifestyle modifications. Furthermore, pathophysiological processes brought on by stress (such as elevated cortisol levels, inflammation, and autonomic dysfunction) may exacerbate cardiac outcomes. Significant psychosocial stress is experienced by many PCI patients, including financial strains, recurrence anxiety, and role shifts in families. For a variety of reasons, including medical, psychological, and social ones, it is imperative to evaluate anxiety and depression in patients who have had percutaneous coronary intervention (PCI) (17,18). Improving coping strategies and promoting improved health outcomes are two benefits of treating anxiety and depression. Therefore, the current investigation assessed the prevalence of anxiety and sadness in acute MI patients who had undergone PCI.

According to the current study, depression affected almost one-third of the patients. About 30% of participants experienced moderately to severely sad symptoms, whereas 32% of patients had mild depression, according to a different Pakistani study on depression in MI patients (19). Another study conducted in Pakistan found that patients who received PCI had a decreased prevalence of depression (10.5%) (14). Surprisingly, the finding of our study is not aligned with other Pakistani studies. The possible reasons could be use of other tools for screening of depression. Mujtaba SF (14) performed study in Larkana where majority of people are belonging to rural settings. While our study was performed in Karachi where majority were belonging to urban area. Moreover, Saeed H (19) performed study while patients were being admitted in hospital. On the other hand we performed the study after their discharge in outpatient clinics. We believe that use of different study tools and settings resulted in high disparity among the studies despite of being conducted in same country. In available frequency of depression after PCI varies from 10.5% to 51.9% (14,20).

Surprisingly, this study did not find age differences among patients with and without depression. Although data shows that likelihood of depression was increasing with increasing with increasing age but it did not reach to statistical significance. There could be possibility that higher sample size could detect statistical significance too. Elderly patients are more susceptible to psychological distress than younger people since depression is more evident in them due to other age-related factors such chronic illnesses, social isolation, functional decline, and neurobiological changes. Studies have shown that patients who are older have higher rates of depression (21, 22).

Generally, depression is more commonly diagnosed in females than in males. According to research, women are roughly twice as likely as males to suffer from depression (23, 24). The causes of this discrepancy,

however, are multifaceted and could include a mix of social, psychological, hormonal, and biological elements. However, this study found that depression was significantly higher in males than females. In contrast to this study, females gender was reported was risk factor depression after PCI in other similar studies (25,26). In our society males have financial responsibility so acquiring a life time disease and associated additional financial burden due of unavoidable medications could be the reason of higher likelihood of depression among males.

In agreement to other studies, education was found to be protective factor in this study (27,28). Unlike other studies we also evaluated likelihood of depression among other demographic variables such as monthly income, residence, family system and physical activity. Evaluation of these variables as risk factors are equally important when determining mental health like depression or anxiety. All of these variables were found to significantly associated with depression following PCI in our patients.

Role of medical history and comorbidity are important when determining depression as these variables can a risk factor. Interestingly, smoking status, hypertension and diabetes were not found to be associated with depression while frequency of depression was significantly high in three vessel disease. Likelihood of depression was also found to be not varying with smoking, hypertension and diabetes in a study of Rawashdeh SI et al (25) and Saeed H et al (19). Many researchers did not determine depression frequency based on disease level (14,19,20,25).

The present study also assessed anxiety frequency which was found to be in about one-fifth of patients (20.7%). Frequency of anxiety was 7.5% in a study of Mujtaba SF (14). Oslen et al (29) reported a frequency of 27% anxiety after PCI. Dhital PS reported 27.4% had anxiety among CAD attending cardiac care (28). 29.7% had anxiety in a similar Candadian study (20). Like, depression burden, frequency of anxiety is also heterogeneous among various studies because of the same reasons.

The findings of this study suggested that the likelihood of anxiety was increasing with advanced age which is consistently reported in literature (21). However, anxiety frequency did not differ based on gender in our study which is in agreement with literature (14,20).

Like depression, higher education level was found to be protective factor for anxiety in this study which is again in agreement with existing literature (21). Reason that higher education act as a protective factor for poor mental health is obvious that it gives access to resources, enhancing coping skills, and fostering a sense of control and self-esteem.

Other demographic variable such as residence, employement status, family income, physical activity were also found to be related to anxiety in our survey. None of any patients' features were found to be significantly associated anxiety in a similar Pakistani survey (14). A similar Canadian survey also did not find association of any of the patients' characteristics with anxiety (20). However, a comparable Nepali study found difference in likelihood of anxiety based on gender, living status, employement status and economic status (28). The discrepancy in findings might be due to variation in sample size and sample characteristics.

CONCLUSION

The present study found that burden of depression and anxiety was higher substantial after PCI in MI patients. Integration of mental health assessment and treatment among patients with CAD as soon as after PCI is recommended for optimal and effective treatment.

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