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ORIGINAL ARTICLE

Assessing the Severity and Persistence of Depressive Symptoms in Patients with Acute Coronary Syndrome

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Abstract

Background: Depressive symptoms are common among patients with Acute Coronary Syndrome (ACS) and can adversely affect recovery and long-term outcomes. This study aimed to assess the severity and persistence of depressive symptoms in ACS patients in Dhaka, Bangladesh.

Methods: This observational study was conducted at the Department of Cardiology, Dhaka Medical College Hospital from May 2017 to April 2018. A total of 210 newly diagnosed ACS patients were assessed for depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9) at three time points: two weeks before admission, post-admission, and two months after admission. Data on sociodemographic characteristics, clinical profiles, and risk factors were collected and analyzed using SPSS version 22.

Results: The mean age of participants was 54.32 ± 8.37 years, with 72.38% being male. STEMI was the most common type of ACS (76.67%), followed by NSTEMI (17.62%) and unstable angina (6.19%). Before admission, 37.14% had minimal depressive symptoms, 32.38% had mild symptoms, 22.86% had moderate symptoms, 6.67% had moderately severe symptoms, and 0.95% had severe symptoms. Post-admission, minimal depression decreased to 33.33%, while moderately severe depression increased to 9.52%. During follow-up, minimal depression further decreased to 15.29%, and severe depression increased to 7.65%. The mean PHQ-9 score increased significantly from 6.63 ± 4.67 before admission to 9.95 ± 5.77 during follow-up ($p < 0.001$).

Conclusion: Depressive symptoms are prevalent and persistent in ACS patients, particularly among older adults and females. Routine mental health screening and targeted interventions in ACS care are essential to improve patient outcomes.

Keywords: Acute Coronary Syndrome, Depressive Symptoms, Patient Health Questionnaire-9 (PHQ-9)

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Introduction

Acute Coronary Syndrome (ACS), which includes conditions such as myocardial infarction and unstable angina, represents a significant cause of morbidity and mortality worldwide. Despite advances in medical treatment, ACS continues to pose a considerable public health challenge, with substantial impacts on both physical and psychological well-being. Among the

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psychological impacts, depressive symptoms are notably prevalent in ACS patients and have been linked to adverse health outcomes, including higher rates of rehospitalization and mortality[1-3]. Depression is common in ACS patients, with studies indicating that approximately 20-30% of these patients experience major depressive episodes, while an even larger percentage suffer from subclinical depressive symptoms[4,5]. The onset of depressive symptoms often coincides with hospitalization for the acute cardiac event and can persist long-term, significantly affecting recovery and quality of life[6]. This high prevalence underscores the need for effective screening and management strategies to address depressive symptoms in ACS patients. Persistent depressive symptoms post-ACS have been associated with numerous negative outcomes. Patients with ongoing depressive symptoms tend to exhibit poorer adherence to prescribed medications and secondary prevention behaviors, such as quitting smoking, maintaining a healthy diet, and participating in physical activity. For instance, Rieckmann et al. (2006) found that persistently depressed ACS patients had significantly lower adherence to aspirin therapy, which is critical for preventing recurrent cardiac events[7]. Similarly, Kronish et al. (2006) reported that persistently depressed patients were less likely to adhere to behaviors that reduce the risk of recurrent ACS, including medication adherence, exercise, and attendance at cardiac rehabilitation programs[8]. The persistence of depressive symptoms also has biological implications. Depressive symptoms are associated with higher levels of inflammatory markers, such as C-reactive protein, which are indicative of an ongoing inflammatory response that can exacerbate cardiovascular conditions. Miller et al. (2005) demonstrated that patients with more severe depressive symptoms exhibited higher levels of C-reactive protein and higher pathogen burden, suggesting a link between depression and heightened inflammatory responses in ACS patients[9]. Additionally, Steptoe et al. (2012) found that anaemia, which is common in ACS patients, predicted higher depressive symptom scores and was associated with future cardiac morbidity[10]. Long-term persistence of depressive symptoms can lead to reduced quality of life and increased cardiovascular morbidity and mortality. Whang et al. (2010) highlighted that depressive symptoms in patients with unstable angina were associated with a higher risk of all-cause mortality[11]. Similarly, persistent depressive symptoms have been linked to compromised white matter integrity in the brain, further illustrating the extensive impact of depression on overall health and cognitive function[12]. These findings underscore the critical need for ongoing monitoring and intervention to manage depressive symptoms in ACS patients effectively. The impact of depressive symptoms extends beyond individual health behaviors and biological markers. Social factors also play a significant role. Depressed patients often experience reduced social support, which can exacerbate feelings of isolation and further hinder recovery. Horsten et al. (2000) found that women with coronary heart disease who had low social integration and depressive symptoms faced a higher risk of recurrent cardiac events compared to those with higher social integration[13]. This interplay between social support and depressive symptoms highlights the importance of a holistic approach to patient care that includes psychological and social dimensions. Despite the extensive research on depressive symptoms in ACS patients, there is limited data specific to the population in Dhaka, Bangladesh. Cultural, social, and economic factors unique to this region may influence the prevalence, severity, and persistence of depressive symptoms. Understanding these factors is crucial for developing targeted interventions to improve mental health and cardiac outcomes in this population. This study aims to assess the severity and persistence of depressive symptoms in patients with ACS in Dhaka, Bangladesh, and identify demographic and clinical factors associated with these symptoms. By providing comprehensive data on depressive symptoms in ACS patients in Dhaka, this study hopes to contribute to the global understanding of the interplay between depression and cardiovascular disease, and inform healthcare providers and policymakers about the need for integrated care approaches that address both the physical and psychological aspects of ACS.

Methods

This observational study, comprising both prospective and retrospective components, was conducted at the Department of Cardiology, Dhaka Medical College Hospital (DMCH), Dhaka, from May 2017 to April 2018, with a total of 210 participants. Inclusion criteria were patients with newly diagnosed ACS, aged 18 years or older, and with preserved cognitive capacity. Exclusion criteria included unwillingness to give consent, history of illicit substance use, previous coronary artery disease or interventions, impaired cognitive capacity, prior diagnosis of depression or use of antidepressants, and other significant comorbid conditions like severe hepatic or renal impairment or malignancy. Data collection involved initial assessment by the attending doctor, followed by evaluation by the principal investigator. Upon admission, patients underwent a 12-lead ECG and cardiac biomarker (Troponin-I) tests. Patients who

met the inclusion criteria and were clinically stable, usually 3 to 5 days post-hospitalization, were approached for consent and enrolled in the study. ACS was diagnosed based on predefined criteria for acute myocardial infarction or unstable angina, including ECG changes, Troponin-I levels, and clinical presentation. Participants were interviewed during their index hospitalization to gather sociodemographic data (age, sex, occupation) and health status information, including coronary artery disease risk factors (diabetes, hypertension, dyslipidemia, smoking, and family history of premature coronary artery disease). The presence and severity of depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9). Three separate screenings were conducted: one for depressive symptoms two weeks before hospital admission, another for post-hospitalization, and given the transient nature of depressive symptoms following a heart attack, a follow-up interview was conducted two months later, either in person or by phone, using the same PHQ-9 tool. At the follow up 2 months after hospital admission, few patients had dropped out or expired, leading to a sample size of 170 at follow-up. All data were meticulously recorded in preformed data collection sheets. Data were subsequently edited, coded, and entered into a computer for analysis using the Statistical Package for Social Sciences (SPSS) version 22. Results were presented in tables, graphs, and charts. Confidence intervals were set at 95%. Qualitative variables were expressed as frequency and percentage, and quantitative variables as mean ± standard deviation. Chi-square tests assessed associations between variables, and Pearson correlation coefficients measured the correlation between depression severity and time. A p-value of <0.05 was considered statistically significant.

Results:

Table-I

Distribution of baseline characteristics (N=210)

Variables	Frequency	Percentage
Age		
<40	13	6.19%
≥40-49	67	31.90%
≥50-59	81	38.57%
≥60	49	23.33%
Mean ±SD	54.32±8.37	
Gender		
Male	152	72.38%
Female	58	27.62%
Type of ACS		
ASTEMI	161	76.67%
NSTEMI	37	17.62%
Unstable Angina	13	6.19%

The study included a total of 210 participants. The age distribution showed that 6.19% were under 40 years, 31.90% were between 40-49 years, 38.57% were between 50-59 years, and 23.33% were 60 years or older, with a mean age of 54.32 ± 8.37 years. Regarding gender, 72.38% of the participants were male, and 27.62% were female. In terms of the type of Acute Coronary Syndrome (ACS), 76.67% of the patients were diagnosed with STEMI, 17.62% with NSTEMI, and 6.19% with unstable angina.

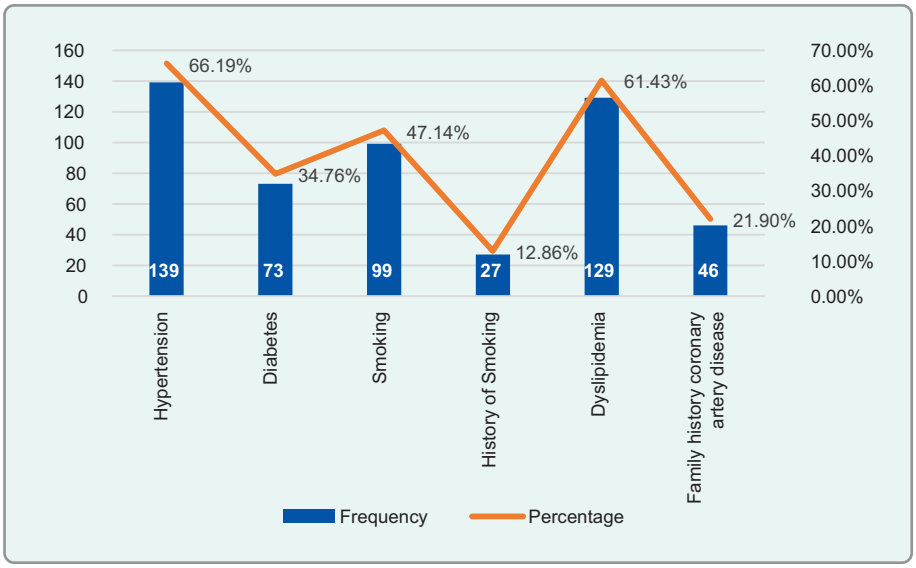


Figure 1: *Distribution of participants by presenting risk factors (N=210)*

Among the 210 participants, various risk factors were identified. Hypertension was the most prevalent, affecting 66.19% of the patients. Diabetes was present in 34.76% of the participants, while 47.14% had a history of smoking. Dyslipidemia was noted in 12.86% of the patients. Additionally, 21.90% of the participants had a family history of coronary artery disease, and 61.43% had dyslipidemia.

The depressive scores of participants, assessed using the PHQ-9 at different observational follow-ups, revealed significant changes over time. Before admission, 37.14% of the participants had minimal depression (scores 1-4), 32.38% had mild depression (scores 5-9), 22.86% had moderate depression (scores 10-14), 6.67% had moderately severe depression (scores 15-19), and 0.95% had severe depression (scores 20-27). After admission, the distribution shifted slightly, with 33.33% of the participants experiencing minimal depression, 32.86% mild depression, 23.33% moderate depression, 9.52% moderately severe depression, and 0.95% severe depression. During the follow-up period, the depressive scores showed further changes among the remaining 170 participants. The percentage of participants with minimal depression decreased to 15.29%, while those with mild depression slightly increased to 27.65%. The proportion of participants with moderate depression rose to 34.71%, moderately severe depression to 14.71%, and severe depression to 7.65%.

The association of age groups with the severity of depressive symptoms, as measured by the PHQ-9 questionnaire, was examined at three different time points: before admission, after admission, and during follow-up. Before admission, participants under 40 years mostly had PHQ-9 scores <10, with 5.2% in this category and only 1.0% having scores ≥10. In the 40-49 years age group, 22.4% had PHQ-9 scores <10, while 9.5% had scores ≥10. The 50-59 years age group had 30.5% with PHQ-9 scores <10 and 8.1% with scores ≥10. Among those aged 60 and above, 11.4% had PHQ-9 scores <10, while 11.9% had scores ≥10. The association was statistically significant with a p-value of 0.002. After admission, the distribution showed slight changes. For the under 40 age group, 5.2% had PHQ-9 scores <10, and 1.0% had scores ≥10. In the 40-49 years age group, 21.0% had scores <10, and 11.0% had scores ≥10. For the 50-59 years age group, 29.5% had scores <10, and 9.0% had scores ≥10. Among those aged 60 and above, 10.5% had scores <10, while 12.9% had scores ≥10. The association remained statistically significant with a p-value of 0.001. During follow-up, there were further changes in the depressive symptom severity distribution. In the under 40 age group, 3.5% had PHQ-9 scores <10, and 2.4% had scores ≥10. In the 40-49 years age group, 13.5% had scores <10, and 18.2% had scores ≥10. For the 50-59 years age group, 21.8% had scores <10, and 18.2% had scores e”10. In those aged 60 and above, 4.1% had scores <10, while 18.2% had scores ≥10. The association was statistically significant with a p-value of 0.003.

The association of gender with the severity of depressive symptoms, as measured by the PHQ-9 questionnaire, was analyzed at three different time points: before admission, after admission, and during follow-up. Before admission, among male participants, 56.7% had PHQ-9 scores <10, while 15.7% had scores ≥10. In contrast, among female participants, 12.9% had PHQ-9 scores <10, and 14.8% had scores ≥10. This association was statistically significant with a p-value of <0.001. After

Table-II

Depressive score according to PHQ-9 at different observational follow ups

Depression Score	Before 2 weeks admission (n=210)		After Admission (n=210)		During follow up (n=170)	
	n	%	n	%	n	%
1-4 minimal depression	78	37.14%	70	33.33%	26	15.29%
5-9 mild depression	68	32.38%	69	32.86%	47	27.65%
10-14 moderate depression	48	22.86%	49	23.33%	59	34.71%
15 - 19 moderately severe depression	14	6.67%	20	9.52%	25	14.71%
20 -27 severe depression	2	0.95%	2	0.95%	13	7.65%

admission, the distribution changed slightly. For male participants, 53.3% had PHQ-9 scores <10, and 19.0% had scores ≥10. Among female participants, the proportions remained the same with 12.9% having scores <10 and 14.8% having scores ≥10. The association remained statistically significant with a p-value of <0.001. During follow-up, the depressive symptom severity showed further variations. Among male participants, 37.1% had PHQ-9 scores <10, and 36.5% had scores ≥10. For female participants, 5.9% had PHQ-9 scores <10, while 20.6% had scores ≥10. The association continued to be statistically significant with a p-value of 0.001.

The study also examined the association of risk factors with the severity of depressive symptoms as measured by the PHQ-9 questionnaire at different times of observation. The mean PHQ-9 score before hospital admission was 6.63 with a standard deviation of 4.67. After hospital admission, the mean PHQ-9 score increased to 7.26 with a standard deviation of 4.9, and this change was statistically significant with a p-value of <0.001. Two months after hospital admission, during the follow-up period, the mean PHQ-9 score further increased to 9.95 with a standard deviation of 5.77, which was also statistically significant with a p-value of <0.001.

Table-III

Association of age group with severity of depressive symptoms as measured by PHQ 9 questionnaire at 3 different time (n=210)

Age Group (years)	Before 2 weeks admission (n=210)		After Admission (n=210)		During follow up (n=170)	
	PHQ-9 <10	PHQ-9 ≥10	PHQ-9 <10	PHQ-9 ≥10	PHQ-9 <10	PHQ-9 ≥10
<40	11 (5.2%)	2 (1.0%)	11 (5.2%)	2 (1.0%)	6 (3.5%)	4 (2.4%)
40-49	47 (22.4%)	20 (9.5%)	44 (21.0%)	23 (11.0%)	23 (13.5%)	31 (18.2%)
50-59	64 (30.5%)	17 (8.1%)	62 (29.5%)	19 (9.0%)	37 (21.8%)	31 (18.2%)
≥60	24 (11.4%)	25 (11.9%)	22 (10.5%)	27 (12.9%)	7 (4.1%)	31 (18.2%)
p-value	0.002		0.001		0.003	

Table-IV

Association of gender with severity of depressive symptoms as measured by PHQ 9 questionnaire at 3 different time (n=210)

Gender	Before 2 weeks admission (n=210)		After Admission (n=210)		During follow up (n=170)	
	PHQ-9 <10	PHQ-9 ≥10	PHQ-9 <10	PHQ-9 ≥10	PHQ-9 <10	PHQ-9 ≥10
Male	119 (56.7%)	33 (15.7%)	112 (53.3%)	40 (19.0%)	63 (37.1%)	62 (36.5%)
Female	27 (12.9%)	31 (14.8%)	27 (12.9%)	31 (14.8%)	10 (5.9%)	35 (20.6%)
p-value	<0.001		<0.001		0.001	

Table-V

Association of risk factors with severity of depressive symptoms as measured by PHQ 9 questionnaire at Follow up after 2 months (n=170)

PHQ 9 score at different time of observation	Mean	Standard deviation(SD)	p value
Before 2 weeks of hospital admission (n=210)	6.63	4.67	NA
After hospital admission (n=210)	7.26	4.9	<0.001
2 months after hospital admission (during follow up) (n=170)	9.95	5.77	<0.001

Discussion:

This study aimed to assess the severity and persistence of depressive symptoms in patients with Acute Coronary Syndrome (ACS) at a tertiary care center in Bangladesh over time. The findings highlight significant shifts in depressive symptoms before admission, after admission, and during the follow-up period, emphasizing the critical need for comprehensive mental health management in this patient population. Our study included 210 participants with a mean age of 54.32 ± 8.37 years. The age distribution showed that 6.19% were under 40 years, 31.90% were between 40-49 years, 38.57% were between 50-59 years, and 23.33% were 60 years or older. This demographic profile aligns with findings from Khatri & Simkhada (2016), who reported similar age distributions in ACS patients, underscoring the typical middle-aged to older adult population affected by ACS[14]. The gender distribution in our study was predominantly male, with 72.38% male and 27.62% female participants. This male predominance is consistent with the findings of González-Pacheco et al. (2014), who reported that 81.7% of ACS patients were male, highlighting the higher prevalence of ACS in men[15]. Regarding the type of ACS, 76.67% of our patients were diagnosed with STEMI, 17.62% with NSTEMI, and 6.19% with unstable angina. These proportions are in line with Ali et al. (2015), who observed that STEMI was the most common type of ACS in patients younger than 40 years[16]. Our findings reinforce the predominance of STEMI in ACS cases, which is critical for understanding the clinical management and outcomes of these patients. Risk factors identified in our study included hypertension in 66.19% of patients, diabetes in 34.76%, smoking history in 47.14%, dyslipidemia in 61.43%, and a family history of coronary artery disease in 12.86%. These findings are comparable to those of Reda et al. (2018), who found significant differences in the prevalence of diabetes, hypertension, and smoking between male and female ACS patients[17]. The high prevalence of these risk factors underscores the multifactorial nature of ACS and the importance of addressing these comorbid conditions in patient management. Before hospital admission, depressive symptoms were categorized as follows: 37.14% had minimal depression, 32.38% had mild depression, 22.86% had moderate depression, 6.67% had moderately severe depression, and 0.95% had severe depression. After admission, the distribution shifted: 33.33% had minimal depression, 32.86% had mild depression, 23.33% had moderate depression, 9.52% had moderately severe depression, and 0.95% had severe depression. During the follow-up period, depressive symptoms showed further changes: 15.29% had minimal depression, 27.65% had mild depression, 34.71% had moderate depression, 14.71% had moderately severe depression, and 7.65% had severe depression. These shifts highlight the dynamic nature of depressive symptoms in ACS patients and the need for continuous monitoring and intervention. The mean PHQ-9 scores showed a clear upward trend over time, from 6.63 ± 4.67 before admission to 7.26 ± 4.9 after admission, and further to 9.95 ± 5.77 during the follow-up period, all statistically significant ($p < 0.001$). This progression is consistent with the findings of Steptoe et al. (2012), who reported that depressive symptoms increased over time in ACS patients, particularly in those with comorbid conditions like anemia (10). The association between age and depressive symptom severity was significant across all time points, with older age groups showing higher proportions of severe depressive symptoms at follow-up (p-values: 0.002 before admission, 0.001 after admission, and 0.003 during follow-up). This finding is supported by Naqvi et al. (2007), who observed that older ACS patients had more severe depressive symptoms compared to younger patients (4). The significant association between gender and depressive symptom severity was also evident, with females showing higher proportions of severe depressive symptoms at all time points (p-values: <0.001 before and after admission, and 0.001 during follow-up). This aligns with the observations of Dessotte et al. (2013), who reported higher depressive symptoms in female ACS patients (5). The association of gender with the severity of depressive symptoms was further supported by Tatishvili et al. (2018), who found that women hospitalized with ACS reported more cognitive and somatic depressive symptoms than men[18]. Pelletier et al. (2014) also noted that depressive symptoms were associated with worse cardiovascular outcomes, particularly in younger ACS patients, underscoring the importance of addressing depression to improve overall prognosis[19]. Frazier et al. (2012) identified significant gender differences in depressive symptoms during ACS episodes, with women reporting greater overall depressive symptoms and more somatic depressive symptoms compared to men[20]. Chen et al. (2005) observed that women reported more

varied and intense symptoms, which is consistent with our findings of higher depressive symptom severity in female patients[21]. The progressive increase in mean PHQ-9 scores from admission to follow-up highlights the worsening depressive symptoms over time. This trend is critical, as highlighted by Miller et al. (2005), who found that more severe depressive symptoms were linked to higher levels of inflammatory markers like C-reactive protein, suggesting a biological pathway for the increased risk[9]. These findings emphasize the need for routine screening and targeted interventions for depressive symptoms in ACS patients.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion

This study highlights the significant prevalence and persistence of depressive symptoms in patients with Acute Coronary Syndrome (ACS) in Dhaka, Bangladesh. Our findings demonstrate that depressive symptoms not only persist but often worsen over time, particularly in older patients and females. The associations between age, gender, and depressive symptom severity underscore the necessity for comprehensive mental health screening and interventions as part of standard ACS care. Addressing these depressive symptoms through targeted strategies is crucial for improving patient adherence to treatment, overall quality of life, and long-term cardiac outcomes. Future research should focus on developing and implementing integrated care approaches that address both the psychological and physiological aspects of ACS to optimize recovery and prognosis for these patients. *3*

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