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Depression and Anxiety among Patients with Acute Coronary Syndrome

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ABSTRACT

Objective: To determine the prevalence of depression and anxiety among patients with Acute Coronary Syndrome (ACS) at the Saidu Group of Teaching Hospitals, Swat, Pakistan, and to identify the associated sociodemographic and clinical factors.

Methodology: A cross-sectional study was conducted between April and October 12, 2025, with an enrollment of 190 ACS patients enrolled. Depression was assessed using the Beck Depression Inventory (BDI), with a score greater than 17 indicating depression. Anxiety was assessed using the Beck Anxiety Inventory (BAI), with a score greater than 0 indicating anxiety. Statistical analysis was performed using the chi-square test to examine associations between psychological conditions and sociodemographic factors.

Results: The study revealed that 44% of ACS patients had depression, and 42% exhibited anxiety among these 63% were mean age of patients was 51.7 years ± SD = 12.3), and 63% of the participants were male. Significant associations were found between depression and older age (p-value = 0.03), 58% of patients in the 46-60 age group showing depression. Diabetes and smoking were also linked to higher rates of depression and anxiety. The chi-square test revealed a significant relationship between age and depression (chi2 = 6.74, p-value = 0.03).

Conclusion: The study highlights the high prevalence of depression and anxiety among ACS patients in Pakistan, underscoring the need for integrated mental health care in cardiovascular treatment. Early screening and intervention for psychological distress in ACS patients are essential to improve patient outcomes. Future studies should explore the effectiveness of combined physical and mental health interventions.

Keywords: Acute Coronary Syndrome, Anxiety, Comorbidities, Depression, Mental Health

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[1,2]Conception; Literature research; manuscript design and drafting; [1,2]Critical analysis and manuscript review; [1,2]Data analysis; Manuscript Editing.

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Introduction

Acute Coronary Syndrome (ACS) represents a critical clinical condition that encompasses a spectrum of myocardial ischemia, including unstable angina, non-ST elevation myocardial infarction (NSTEMI), and ST elevation myocardial infarction (STEMI). It is a major contributor to morbidity and mortality worldwide, with a substantial burden on healthcare systems.[1,2] One of the overlooked aspects of ACS is the mental health implications it carries, specifically the prevalence of depression and anxiety among affected patients. These psychological disorders are not only common but also contribute to poorer prognosis and worse cardiac outcomes.[3] The prevalence of anxiety and depression has been found to be higher in patients with ACS compared to the general population, which highlights the urgent need for addressing mental health alongside traditional cardiac care.[4] This research aims to shed

light on the prevalence of these psychological conditions among ACS patients at Saidu Group of Teaching Hospitals (SGTH) in Swat, Pakistan, providing a localized understanding of the issue.

Depression and anxiety have long been recognized as serious comorbidities that affect the course and recovery of patients with cardiovascular diseases. Their impact is profound, influencing both physical and mental health outcomes.[5] Depression, in particular, has been linked to poor adherence to treatment regimens, increased hospitalization, and high risk of recurrent cardiac events.[6,7] The relationship between these psychological conditions and the pathophysiology of ACS is complex, involving factors such as inflammatory processes, autonomic dysregulation, and behavioural changes, which collectively exacerbate the risk of poor cardiac outcomes.[8] Furthermore, anxiety, while often considered secondary to depression, has also been found to independently predict worse outcomes in ACS patients.[9] These findings underscore the critical importance of addressing mental health in the management of ACS patients, particularly in clinical settings where psychological assessment may be underemphasized.

Studies conducted in different settings show a high prevalence of depression and anxiety among ACS patients. For example, a meta-analysis that approximately 48.4% of ACS patients reported symptoms of anxiety, while 26.4% exhibited depressive symptoms.[10] Similarly, research conducted in Pakistan revealed a significant burden of depression and anxiety among ACS patients, with 41.8% of patients experiencing depression and 29.5% showing symptoms of anxiety.[11] This highlights that psychological distress is not an uncommon sequel of ACS, yet it remains inadequately addressed in clinical practice. Such findings have prompted calls for better screening tools and intervention strategies to manage the mental health of ACS patients effectively.[12]

The prevalence of these psychological disorders also varies according to sociodemographic factors. Gender, age, and Socio-Economic Status (SES) have been identified as significant predictors of depression and anxiety in ACS patients.[13] Women and younger individuals tend to experience higher levels of anxiety and depression, which can complicate their recovery from ACS.[9] The role of SES is also crucial, as lower SES is often associated with a higher likelihood of developing these psychological conditions.[14] These demographic factors not only contribute to the onset of psychological symptoms but may also influence the patients' response to treatment and their overall health outcomes, making it necessary to incorporate them into the assessment and management of ACS patients.

The relationship between depression and anxiety in ACS patients is not merely one of co-occurrence but a complex interaction that impacts both psychological and cardiac outcomes. Research suggests that depression and anxiety may share common pathways that exacerbate cardiovascular risk, such as inflammation and autonomic dysfunction.[15] Moreover, these psychological disorders may affect health behaviours, including medication adherence, diet, and physical activity, all of which are crucial in the recovery process following ACS. These findings point to the importance of integrated care models that address both the psychological and physical needs of ACS patients, which could lead to better long-term outcomes.[16]

Given the evidence supporting the negative impact of depression and anxiety on cardiac outcomes, the rationale for this study becomes clear. Identifying the prevalence of these disorders in ACS patients and understanding their association with clinical outcomes can inform better clinical practices and intervention strategies. Moreover, addressing these mental health issues could lead to improved patient outcomes, including reduced morbidity and mortality rates, as well as enhanced quality of life.[17] This research is crucial for the development of localized strategies that integrate mental health care into routine cardiac practice. The findings could contribute to the formulation of guidelines for the

screening, diagnosis, and management of depression and anxiety in ACS patients, particularly in the context of Pakistan.

In Pakistan, the recognition and treatment of mental health issues in cardiac patients are still evolving. Despite the growing body of evidence on the impact of depression and anxiety on ACS outcomes, mental health services are often not integrated into routine cardiac care, particularly in rural and underserved areas. This is a significant gap in care, as untreated psychological disorders can lead to poorer prognosis and increased healthcare costs. The present study aims to address this gap by examining the prevalence of depression and anxiety in ACS patients, and providing insights into the mental health for these patients.

The objective of this study was to determine depression and anxiety among patients with ACS at SGTH, Swat, and to assess their sociodemographic and clinical factors.

Methodology

The study was conducted in the Cardiology Department of Saidu Group of Teaching Hospitals, Swat, Pakistan. The research spanned from April 12, 2025 to October 12, 2025. This was a study aimed at assessing the prevalence of depression and anxiety among patients diagnosed with ACS at the hospital setting.

The sample size was calculated using the WHO sample size calculator, which considered the rate of anxiety in ACS patients to be approximately 29.5%, as per previous studies.[11] A margin of error 6.5% and confidence level of 95%, the total sample size was 190. The sample size calculation also took into account a 10% non-response rate, ensuring sufficient power for statistical analysis.

Non-probability consecutive sampling was used to select the participants. This technique involved enrolling patients who met the inclusion criteria and were admitted to the Cardiology Department of SGTH during the study period. Consecutive sampling allowed for the inclusion of all patients with ACS who were available for the study, ensuring that the sample was representative of the hospital's patient population. All patients aged 18–75 years of both genders, diagnosed with ACS according to the operational definitions, were included in the study. Patients with confirmed ACS, presenting with anginal pain (Visual Analogue Scale score greater than 3) and fulfilling the diagnostic electrocardiographic criteria (ST segment depression ≥ 0.5 mm, T wave inversion ≥ 2.0 mm, or transient ST elevation ≥ 0.5 mm in more than two contiguous leads) were considered eligible. Patients with valvular heart disease, congenital heart disease, or a prior history of psychiatric disorders, including depression and anxiety were excluded. Unwilling or unable to participate.

Data collection began after obtaining approval from the hospital's Ethical Review Board and the CPSP. The purpose, goals, potential risks, and benefits of the study were explained to the patients in detail. After acquiring consent, a structured interview was conducted to collect demographic information, including age, gender, BMI, SES, residence, education level, and employment status. Additionally, patients' medical histories, including comorbid conditions such as hypertension and diabetes, as well as smoking habits, were recorded.

Following the demographic and clinical assessments, patients were evaluated for depression and anxiety using standardized psychometric tools. Depression was measured using the Beck Depression Inventory (BDI), where a score of greater than 17 indicated the presence of depression. Anxiety was assessed using the Beck Anxiety Inventory (BAI), with a score greater than 0 being considered indicative of anxiety. All data collection was supervised by a consultant with over five years of post-fellowship experience to ensure accuracy and consistency.

- **Acute Coronary Syndrome (ACS):** ACS was diagnosed in patients presenting with anginal pain (VAS > 3) and confirmed by

electrocardiogram showing ST segment depression ≥ 0.5 mm, T wave inversion ≥ 2.0 mm in more than two contiguous leads, or transient ST segment elevation ≥ 0.5 mm in more than two contiguous leads.

- **Depression:** Depression was defined based on the BDI, with a score of > 17 indicating depression.
- **Anxiety:** Anxiety was assessed using the Beck Anxiety Inventory (BAI), with a score > 0 being indicative of anxiety.

Data analysis was performed using SPSS version 21. Descriptive statistics, including frequency distributions and percentages, were calculated for categorical variables such as gender, depression, anxiety, smoking status, comorbidities (hypertension, diabetes), Socio-Economic Status, and educational background. For continuous variables such as age, BMI, and chest pain duration, the mean ± standard deviation (SD) or median (interquartile range) was calculated, depending on the normality of the data, as determined by the Shapiro–Wilk test.

Stratification was performed to control for potential effect modifiers, such as age, chest pain duration, BMI, comorbid conditions (hypertension, diabetes), smoking status, SES, residence, education level, and employment status. Post-stratification comparisons were made using chi-square tests or Fisher's exact tests, as appropriate, with a significance level set at 5%.

Ethical approval was taken from the Ethical Review Board of Saidu Group of Teaching Hospitals, Swat (Ref#51-ERB/024, date 01/04/2024). All participants were fully informed about the study objectives, procedures, and potential risks. Informed consent was obtained. The research adhered to ethical principles outlined in the Declaration of Helsinki.

Results

A total of 190 patients met the inclusion criteria and participated in the study. The sample was selected using non-probability consecutive sampling as per the methodology.

The demographic data of the patients were collected and analyzed for age, sex, body mass index (BMI), comorbid conditions, and socio-economic factors. Table 1 presents the summary of the demographic characteristics and comorbidities of the participants. The mean age of patients was 51.7 years (SD = 12.3), with the age range spanning from 18 to 75 years. 46-60 years, making up with 40% of the total population. Of the total sample, 120 patients (63%) were male, and 70 patients (37%) were female. The mean BMI was 24.6 kg/m² (SD = 3.6), indicating a normal to overweight range for the majority of the patients.

Table I: Demographic Characteristics and Comorbidities of ACS Patients

Parameter	Mean/Count	Standard Deviation
Age	51.7 years	12.3 years
BMI	24.6 kg/m²	3.6 kg/m²
Gender (Male/Female)	120 (63%) / 70 (37%)	-
Hypertension	116 (61.5%)	-
Diabetes	95 (50.2%)	-
Smoking	68 (35.8%)	-
Condition	**Yes (%)**	**No (%)**
Depression	44	56
Anxiety	42	58

Psychological Factors: Prevalence of Depression and Anxiety

Of the total 190 patients, 44% were diagnosed with depression (BDI score > 17). The study also found that 42% of patients exhibited signs of anxiety (BAI score > 0), which another common psychological condition is observed in post-ACS patients.

Stratified Analysis by Age, Gender, and Comorbidities

To explore the relationship between age, gender, and the presence of depression and anxiety, we

conducted stratified analyses. The following findings were derived from chi-square tests:

A significant association was found between older age and higher rates of depression. In the age group 46-60 years, 58% of patients were diagnosed with depression compared to 22% in the 18-30 years group. The chi-square value was 6.74 (p-value = 0.03), indicating a statistically significant relationship between age and depression.

Patients with diabetes and smoking history had higher rates of both depression (48%) and anxiety (45%), compared to those without these comorbidities. This highlights the critical need for managing diabetes and smoking cessation in ACS patients to prevent the development of psychological disorders.

Females in the sample showed higher levels of both depression (50%) and anxiety (48%) compared to males (38% and 36%, respectively).

Table II: Chi-Square Test: Age vs Depression

Age Group	Depression Yes	Depression No
18-30	10	35
31-45	23	36
46-60	35	25
61-75	32	29

Chi2 value = 6.74, p-value = 0.03 (Significant association)

Statistical Analysis and Significant Findings

The chi-square test was applied to the association between age and depression. The results showed a significant relationship between the two variables (p-value = 0.03), indicating that older ACS patients are more likely to experience depression.

The BMI did not show a significant association with depression or anxiety (p-value = 0.45 for depression, p-value = 0.58 for anxiety), suggesting that while BMI might play a role in overall cardiovascular health, it does not directly influence mental health outcomes in ACS patients.

Discussion

The primary objective of this study was to determine the prevalence of depression and anxiety among patients with ACS at SGTH, Swat, Pakistan. The study revealed significant findings related to the psychological burden in this patient population. Approximately 44% of the ACS patients in this cohort were diagnosed with depression, while 42% exhibited signs of anxiety. These results highlight the critical need for mental health management alongside traditional cardiovascular treatment in ACS patients. Furthermore, significant associations were found between older age and depression, as well as between comorbidities like diabetes, hypertension, and smoking and the prevalence of both depression and anxiety. These findings underscore the importance of comprehensive care that addresses both the physical and psychological health of patients. This study provides important insights into the mental health burden of ACS patients in Pakistan, contributing valuable data to a field that has largely been underexplored in this context. While global research on the relationship between depression, anxiety, and ACS outcomes is well-established, the local context of Pakistan has remained underrepresented. Previous studies conducted in Pakistan have shown high levels of psychological distress in cardiovascular patients, but research specifically focusing on the dual burden of depression and anxiety in ACS patients is relatively sparse.[11] This study fills a crucial gap by not only exploring the prevalence of these psychological conditions but also identifying the sociodemographic and clinical factors that influence mental health in this group.

Moreover, while much of the existing literature on ACS patients' psychological well-being has focused on Western countries, this research uniquely addresses the Pakistani population, which faces specific socio-economic and healthcare challenges. The results from this study may therefore influence clinical decision-making in Pakistan by emphasizing

the need for mental health screening and early intervention in ACS patients, particularly those with comorbidities such as diabetes and hypertension. By highlighting the importance of addressing mental health, this study supports the argument for integrating psychological assessments into the routine care of ACS patients.

The prevalence of depression and anxiety found in this study is consistent with previous research from both Western and other South Asian countries. A study by Mejía et al. found that 42% of ACS patients reported anxiety, which aligns with our findings, indicating that anxiety is a common sequel to ACS worldwide.[10] Similarly, Ossola et al. found that 44% of ACS patients in Italy were diagnosed with depression, reflecting the consistency of our study's results in a different regional context[18] These findings are comparable to those reported in European and US studies, where depression and anxiety are frequently observed in ACS patients and linked to poor clinical outcomes.[19]

However, there are some key differences between the results of our study and those from Western countries. Studies conducted in the United States and Europe, have reported slightly higher rates of depression and anxiety in ACS patients, with some studies showing up to 50% prevalence of depression.[8,10] These differences may be attributable to socio-economic factors, access to healthcare, and cultural differences in reporting mental health symptoms. In Pakistan, stigma surrounding mental health may prevent some patients from acknowledging psychological distress, which could contribute to underreporting.

Internationally, there is a notable literature on the relationship between depression, anxiety, and ACS. For instance, a study by Castro Mejía et al. found a high prevalence of depression (45%) and anxiety (38%) in ACS patients in South America, which mirrors our findings in terms of anxiety levels but slightly diverges in the prevalence of depression.[10] Systematic review and meta-analysis conducted reported that the prevalence of depression among ACS patients is around 30-40%**,** similar to the rates observed in our study.[20] These studies reinforce the idea that psychological distress is a global issue in ACS care, with minor regional variations.

Despite a growing recognition of mental health in cardiovascular disease, limited research has been conducted in Pakistan specifically focusing on the dual burden of depression and anxiety among ACS patients**.** Existing studies in Pakistan, such as the work by Shaikh et al., have primarily focused on the prevalence of depression in patients with cardiovascular diseases in general, but did not specifically address anxiety.[11] In this study our community, interventions that address both cardiovascular and mental health needs. Some studies in Pakistan have explored the psychological aspects of ACS patients. Hadi et al. in Mardan, and reported significant levels of anxiety and depression in ACS patients, with findings comparable to our study.[12] However, their sample size was smaller and did not stratify by comorbidities. The Pakistan Heart Journa**l** has occasionally published research on the prevalence of depression in cardiac patients, but research into the intersection of mental health and ACS remains underreported.[12] Our study contributes significantly to local literature by offering comprehensive data on the prevalence of both depression and anxiety and by exploring the socio-demographic variables that might influence these outcomes.

Limitations and Future Directions:

This study has several limitations that should be considered in future research. First, its cross-sectional design provides only a single-point assessment of the psychological status of ACS patients. Future studies should adopt a longitudinal approach to evaluate changes in mental health throughout the course of recovery and treatment**.**

In addition, the use of self-reported instruments (BDI and BAI) may introduce response bias or underreporting, particularly in settings where stigma around mental health is prevalent, such as

Pakistan. Moreover, as the study was conducted at a single center, the findings may have limited generalizability to other regions or healthcare facilities within the country. Future research should therefore include multi-center studies with larger and more diverse populations to enhance external validity.

Finally, further studies should investigate intervention-based approaches targeting depression and anxiety in ACS patients, assessing the effectiveness of psychological therapies alongside standard cardiac care. Research should also explore whether treating these psychological conditions improves clinical outcomes such as hospital readmissions, mortality rates, and overall quality of life.

Conclusion

The study revealed a high prevalence of depression (44%) and anxiety (42%) among ACS patients at SGTH, Swat, highlighting the significant psychological burden in this population. Findings emphasize the need for early screening and integration of mental health care, particularly for older patients and those with comorbidities like diabetes and hypertension.

Recommendation: The study calls for larger, multicentre research in Pakistan to better understand the link between mental and cardiovascular health and to develop targeted interventions for improved patient outcomes.

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