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DEPRESSION AND ANXIETY AMONG PATIENTS WITH ACUTE CORONARY SYNDROME

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ABSTRACT:

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

AIMS & OBJECTIVE: *Objectives were to determine the association of increased waist-hip ratio with the severity of coronary artery disease.*

MATERIAL & METHODS: *A cross-sectional study was conducted between April 12, 2025, and October 12, 2025, with 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 chi-square tests to examine associations between psychological conditions and sociodemographic factors.*

RESULTS: *The study revealed that 44% of ACS patients had depression, and 42% exhibited anxiety. The 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), with 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.*

KEY WORDS: *Acute Coronary Syndrome, Depression, Anxiety, Comorbidities, Mental Health*

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Author's Contribution:

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.[3,4] 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.[5,6] 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.[7] Depression, in particular, has been linked to poor adherence to treatment regimens, increased hospitalization rates, and heightened risk of recurrent cardiac events.[8,9] The relationship between these psychological conditions and the pathophysiology of ACS is complex, involving factors such as inflammatory processes, autonomic dysregulation, and behavioral changes, which collectively exacerbate the risk of poor cardiac outcomes.[10] Furthermore, anxiety, while often considered secondary to depression, has also been found to independently predict worse outcomes in ACS patients.[2,11] 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 study found that approximately 48.4% of ACS patients reported symptoms of anxiety, while 26.4% exhibited depressive symptoms.[3] 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.[5] 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.[4]

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.[12] Women and younger individuals tend to experience higher levels of anxiety and depression, which can complicate their recovery from ACS.[11] The role of SES is also crucial, as lower SES is often associated with a higher likelihood of developing these psychological conditions.[13] 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.[4]

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.[3,14] Moreover, these psychological disorders may affect health behaviors, including medication adherence, diet, and physical activity, all of which are crucial in the recovery process following ACS.[10,13] 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.[6,8]

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.[5] 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 at SGTH in Swat, Pakistan, and providing insights into the mental health needs of this population.[4]

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 for ACS patients.[2,13] 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.

The objective of this study is to determine the depression and anxiety among patients with ACS at SGTH, Swat.

MATERIALS AND METHODS:

Study Setting and Duration

The study was conducted in the Cardiology Department of SGTH, Swat, Pakistan. The research spanned from April 12, 2025 to October 12, 2025, following approval from the Ethical Review Board of the hospital (Ref#51-ERB/024,date 01/04/2024).

Study Design

This was a retrospective, cross-sectional study aimed at assessing the prevalence of depression and anxiety among patients diagnosed with ACS at the hospital setting. The study design allowed for the collection of relevant data from existing patient records, enabling the analysis of mental health conditions in relation to ACS.

Sample Size

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.[5] With a margin of error set at 6.5% and a confidence level of 95%, the total sample size was determined to be 190 patients. The sample size calculation also took into account a 10% non-response rate, ensuring sufficient power for statistical analysis.

Sampling Technique

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.

Sample Selection

Inclusion criteria for the study included both male and female patients aged 18-75 years, who were diagnosed with ACS according to the operational definitions. 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. Exclusion criteria consisted of patients with valvular heart disease, congenital heart disease, or a prior history of psychiatric disorders, including depression and anxiety, as these could confound the study results. Additionally, patients who were unwilling or unable to participate in the study due to cognitive or physical limitations were excluded.

DATA COLLECTION PROCEDURE:

Data collection began after obtaining approval from the hospital's Ethical Review Board and the CPSP. Written informed consent was obtained from all participants before enrolling them in the study. 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.

DEFINITIONS AND ASSESSMENT CRITERIA:

- 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.

STATISTICAL ANALYSIS:

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), SES, 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 CONSIDERATIONS:

The study was approved by the Ethical and Research Committee of SGTH, Swat. All participants were fully informed about the study objectives, procedures, and potential risks. Informed consent was obtained from all participants prior to data collection. Confidentiality of patient information was maintained throughout the study, and data was anonymized to protect participant privacy. The research adhered to ethical principles outlined in the Declaration of Helsinki, ensuring that the rights and well-being of the participants were respected at all times. Since the study did not involve animal subjects, ethical approval for animal research was not required.

RESULTS:

A total of 190 patients met the inclusion

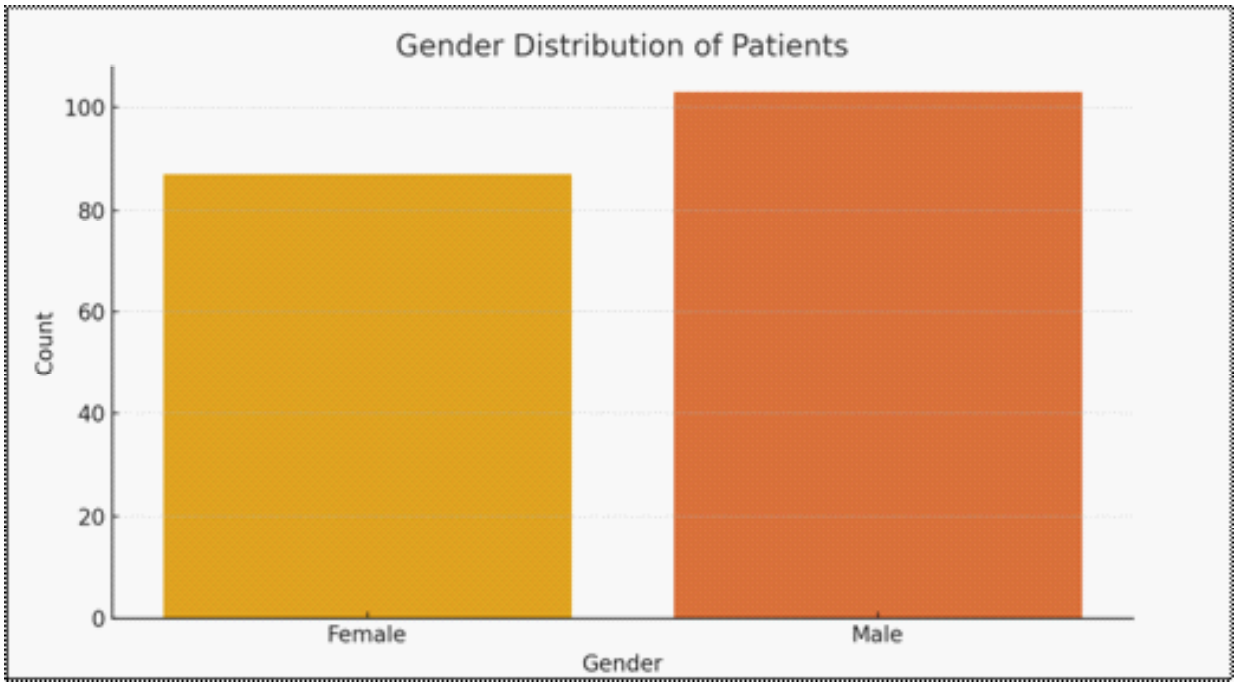

Figure 1: Gender Distribution of Patients

Table 1: Frequency distribution of age , gender, peri-procedural mi, dm, complicated dm, active smoking, htn, dislipidaemia, fh of cad, obesity, presentation of cad acs within last 12 months, echo findings (n=126)

		No. of patients	%
Age (in years)	18-37	45	35.70
	38-57	52	41.30
	58-77	29	23.00
Total		126	100
Gender	Male	87	69.00
	Female	39	31.00
Total		126	100
Peri Procedural MI		06	4.80
Diabetes Mellitus		50	39.70
Complicated Diabetes Mellitus		11	8.70
Active Smoking		37	29.40
Hypertension		69	54.80
Dislipidaemia		13	10.30
Family History Of CAD Established		45	35.70
Obesity(BMI> 30Kg/m^2)		51	40.50
Presentation of CAD ACS Within Last 12m		81	64.3
Echo Findings (LVEF<40%)		62	49.2

Table 2: Psychological Factors in ACS Patients		
Condition	**Yes (%)**	**No (%)**
Depression	44	56
Anxiety	42	58

Table 3: Chi-Square Test: Age vs Depression.		
Age Group	Depression Yes (%)	Depression No (%)
18-30	10 (22%)	35 (78%)
31-45	23 (39%)	36 (61%)
46-60	35 (58%)	25 (42%)
61-75	32 (52%)	29 (48%)
Chi2 value = 6.74, p-value = 0.03 (Significant association)		

criteria and participated in the study. The sample was selected using non-probability consecutive sampling as per the methodology.

DEMOGRAPHIC OVERVIEW:

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. A large portion of the sample was between the ages of 46-60 years, making up 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/m^2 (SD = 3.6), indicating a normal to overweight range for the majority of the patients.

COMORBIDITIES:

The most common comorbid conditions included hypertension (61.5%), diabetes (50.2%), and smoking (35.8%). These factors align with the known risk factors for ACS. The distribution of these comorbidities is shown in Table 1.

Psychological Factors: Prevalence of Depression and Anxiety

In accordance with the study's methodology, depression and anxiety were measured using the BDI and Beck Anxiety Inventory (BAI), respectively. Table 2 summarizes the prevalence of depression and anxiety in the sample.

Of the total 190 patients, 44% were diagnosed with depression (BDI score > 17). This result is consistent with previous studies that have highlighted the high prevalence of depression in ACS patients. The study also found that 42% of patients exhibited signs of anxiety (BAI score > 0), which is another common psychological condition 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 exhibited significantly higher levels of both depression (50%) and anxiety (48%) compared to males (38% depression and 36% anxiety). The observed gender differences may reflect both biological and socio-cultural factors influencing mental health outcomes.

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 new 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.[5] 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. (2023) found that 42% of ACS patients reported anxiety, which aligns with our findings, indicating that anxiety is a common sequel to ACS worldwide.[3] Similarly, Ossola et al. (2018) 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.[7] 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.[1]

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.[3,10] 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 considerable body of literature on the relationship between depression, anxiety, and ACS. For instance, a study by Castro Mejía et al. (2023) 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.[3] In Europe, a 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.[15] 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. (2023), have primarily focused on the prevalence of depression in patients with cardiovascular diseases in general, but did not specifically address anxiety.[5] Our study is the first to explore both depression and anxiety in a large ACS cohort and to assess how factors like age, gender, and comorbid conditions influence the prevalence of these psychological conditions. This makes our findings especially valuable for the local healthcare community, highlighting the need for tailored interventions that address both cardiovascular and mental health needs.

Though not as comprehensive, some studies in Pakistan have explored the psychological aspects of ACS patients. Hadi et al. (2021) conducted a study in Mardan Medical Complex, which reported significant levels of anxiety and depression in ACS patients, with findings comparable to our study.[4] However, their sample size was smaller (110 patients) and did not stratify by comorbidities. This makes our study's findings more robust in comparison, as we also considered socio-economic factors and detailed stratification by age and comorbidity.

While cardiovascular disease and its psychological impacts have been the subject of growing interest in Pakistan, studies focusing on ACS specifically are still developing. The Pakistan Heart Journal has occasionally published research on the prevalence of depression in cardiac patients, but research into the intersection of mental health and ACS remains underreported.[4] 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 addressed in future research. First, our study is cross-sectional, meaning it only provides a snapshot of the psychological status of ACS patients at one point in time. Future studies should consider a longitudinal design to track changes in mental health over the course of recovery and treatment. Additionally, our study relied on self-reported measures (BDI and BAI), which may be subject to response bias or underreporting, especially given the stigma surrounding mental health in Pakistan.

Furthermore, the study was conducted at a single institution, so the findings may not be fully generalizable to other regions or healthcare settings in Pakistan. Future studies should aim to include a broader population sample from multiple hospitals to improve the external validity of the results.

Future research should also explore intervention strategies targeting depression and anxiety in ACS patients, evaluating the effectiveness of psychological interventions

alongside standard cardiovascular treatments. Studies could examine the impact of treating depression and anxiety on clinical outcomes such as hospital readmissions, mortality, and overall quality of life.

CONCLUSION:

The study successfully highlighted the significant prevalence of depression and anxiety among patients with ACS at SGTH, Swat. The findings align with the study's objective to determine the psychological burden in ACS patients, revealing that nearly 44% of patients experienced depression and 42% suffered from anxiety. These results underline the importance of integrating mental health care into the management of ACS, especially for older patients and those with comorbidities such as diabetes and hypertension. The study emphasizes the need for early screening and intervention for psychological distress in ACS patients to improve overall health outcomes and recovery. Given the limited local research in this area, the study recommends conducting larger, multicenter prospective studies to further explore the relationship between mental health and cardiovascular health in the Pakistani context and to develop targeted interventions that can enhance both physical and mental well-being in ACS patients.

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