Research Square

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Prevalence and Determinants of Depression and Anxiety Among Hospitalized Patients with General Medical Conditions in Sudan: A Cross-Sectional Study

Abdelaziz Osman

wedetman@yahoo.com

Emirates Health Services

Taisir Hagar

Sheikh Sultan bin Zayed Hospital (SSBZH)

Abdelaziz Omer

University of Khartoum

Eiman Elobied

ElRazi University

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Abstract

Background

The mental health of hospitalized patients with general medical conditions is increasingly recognized as a global concern, particularly in resource-limited settings such as Sudan. Depression and anxiety negatively affect recovery, quality of life, and overall prognosis (1, 2). Despite their clinical relevance, routine mental health screening is often neglected in general medical wards in low- and middle-income countries (1, 2). This study aimed to determine the prevalence and associated factors of depression and anxiety among adult medical inpatients in Sudan.

Methods

A cross-sectional hospital-based study was conducted between April and July 2022 among 261 adult inpatients admitted to Khartoum Teaching Hospital and Omdurman Teaching Hospital. Depression and anxiety were assessed using the Arabic version of the Hospital Anxiety and Depression Scale (HADS) (3, 6, 7). Univariate and multivariate logistic regression analyses were performed to identify factors associated with probable depression and probable anxiety.

Results

The prevalence of depression (HADS-D ≥ 8) was 44.8% (95% CI 38.8–50.8%) and anxiety (HADS-A ≥ 8) was 23.0% (95% CI 17.9–28.1%). In multivariable analysis, depression was independently associated with past psychiatric history (aOR 2.05, 95% CI 1.18–3.56; p = 0.011), poor family care (aOR 3.41, 95% CI 1.62–7.16; p = 0.001), and comorbid anxiety (aOR 4.15, 95% CI 2.34–7.36; p < 0.001). Anxiety was independently associated with family history of mental illness (aOR 2.43, 95% CI 1.15–5.13; p = 0.020), poor family care (aOR 3.98, 95% CI 1.79–8.82; p = 0.001), and comorbid depression (aOR 4.27, 95% CI 2.41–7.55; p < 0.001).

Conclusions

A substantial proportion of hospitalized patients with general medical conditions in Sudan are at risk for depression and anxiety. These findings provide evidence to support mental health integration within general hospital services in Sudan and similar low-resource settings.

Introduction

Hospitalized patients with general medical illnesses frequently experience psychological distress due to both their medical condition and the stress associated with hospitalization. Depression and anxiety are

among the most common psychiatric comorbidities in medical inpatient populations and are associated with poor recovery, increased healthcare utilization, and reduced quality of life (1,2).

Meta-analytic evidence indicates that the pooled prevalence of depression among general hospital inpatients ranges between 5% and 34%, with an overall estimate of approximately 12%, depending on diagnostic method and case definition (8). Similarly, clinically significant anxiety symptoms affect nearly one-third of hospital inpatients, with pooled prevalence estimates of approximately 28% (9).

Depression in medically ill patients has been linked to increased morbidity and mortality (4,10), impaired treatment adherence, and prolonged hospital stay (11). Anxiety similarly contributes to increased symptom burden and functional impairment (11). These conditions frequently coexist with chronic illnesses such as cardiovascular disease, diabetes, renal disease, and neurological disorders (12,13).

The Hospital Anxiety and Depression Scale (HADS) is a validated screening instrument designed for use in hospital settings (6,7). The Arabic version has demonstrated strong psychometric properties across Arab populations (3). Early identification and management of depression and anxiety are essential to improving patient outcomes and reducing the overall healthcare burden (14,15).

Recent hospital-based studies in sub-Saharan Africa have reported high rates of depressive symptoms among admitted medical patients, including prevalence estimates of approximately 38% in Ethiopian general hospital settings (16). These findings highlight the need for region-specific data to inform clinical practice and health policy in comparable low-resource contexts (17).

This study aimed to assess the prevalence and determinants of depression and anxiety among hospitalized patients with general medical conditions in two major Sudanese hospitals.

Methods

Study Design and Setting

This cross-sectional hospital-based study was conducted from April to July 2022 in the medical wards of Khartoum Teaching Hospital and Omdurman Teaching Hospital.

Participants

A total of 261 adult patients aged 18 years or older were recruited consecutively. Inclusion criteria required hospitalization for at least 48 hours and absence of a primary psychiatric diagnosis. Patients with severe mental disorders or cognitive impairment were excluded.

Data Collection Instrument

Depression and anxiety were assessed using the Arabic version of the Hospital Anxiety and Depression Scale (HADS) (3,6,7). The instrument consists of 14 items divided equally into anxiety (HADS-A) and depression (HADS-D) subscales. A cut-off score of ≥8 was used to indicate probable caseness (6,7).

Variables

Dependent variables were probable depression and probable anxiety. Independent variables included age, gender, marital status, educational level, income, chronic medical illness, past psychiatric history, family history of mental illness, perceived family care, and perceived health status.

Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki (2013 revision). Ethical approval was obtained from the Research Ethics Committee of the Federal Ministry of Health, Sudan. Written informed consent was obtained from all participants prior to enrollment in the study.

Statistical Analysis

Data were analyzed using SPSS version 25 (IBM Corp., Armonk, NY, USA). Prevalence rates were calculated with 95% confidence intervals. Binary logistic regression analysis was performed to identify factors associated with probable depression and probable anxiety. Crude odds ratios (ORs) with 95% confidence intervals were calculated in univariate analysis. Variables with $p < 0.20$ in univariate analysis were entered into multivariable logistic regression models to estimate adjusted odds ratios (aORs) with 95% confidence intervals. Statistical significance was set at $p < 0.05$.

Results

Sample Characteristics

A total of 261 adult inpatients participated in the study. Participants were recruited from Khartoum Teaching Hospital (KTH) and Omdurman Teaching Hospital (OTH). The sample included 131 males (50.2%) and 130 females (49.8%).

The largest age group was patients younger than 30 years (30.3%), followed by those aged 60 years and above (19.9%), and those aged 30–39 years (18.4%) (Table 1).

Prevalence of Depression and Anxiety

Among the 261 participants, 117 met the HADS-D threshold (≥8) for probable depression, yielding a prevalence of 44.8% (95% CI: 38.8–50.8%). Sixty participants met the HADS-A threshold for probable anxiety, corresponding to a prevalence of 23.0% (95% CI: 17.9–28.1%). The prevalence of depression and anxiety is illustrated in Figure 1.

Hospital-based differences were observed. At Khartoum Teaching Hospital (KTH), 52.5% of patients met criteria for probable depression compared to a lower proportion at Omdurman Teaching Hospital (OTH) ($p = 0.002$). Similarly, anxiety prevalence was 28.1% at KTH and lower at OTH ($p = 0.013$).

Gender Distribution

Depression was observed in 43.1% of male participants and 46.6% of female participants. Although prevalence was slightly higher among females, the association between gender and depression was not statistically significant.

Anxiety was present in 24.6% of males and 21.4% of females. Gender was not significantly associated with anxiety.

Age Distribution

Depression was most prevalent in the 30–39-year age group (56.3%), followed by patients aged 60 years and above (50%). Anxiety prevalence was highest in the <30-year (29%) and 30–39-year (29.2%) groups. However, age was not significantly associated with either depression or anxiety (Table 1).

Occupation

Among female participants, 74 (56.9%) were housewives. Within this subgroup, 52.7% met criteria for probable depression, representing the highest proportion among occupational groups. Anxiety prevalence in this group was 25.7%. However, occupation was not significantly associated with either depression or anxiety.

Marital Status and Family Characteristics

Most participants were married (71.1%), while 21.1% were single, 5% widowed, and 2.3% divorced. Among married participants, 45% met criteria for probable depression and 22% for anxiety. Divorced individuals had the highest depression prevalence (55%), though the association between marital status and depression or anxiety did not reach statistical significance (Table 2).

Among married participants, 183 had children. Having children was not significantly associated with depression or anxiety.

Education and Income

Nearly half of the participants (49.4%) were illiterate. Depression was more common among illiterate individuals (51.2%) compared to those with higher educational levels. Anxiety prevalence among illiterate participants was 25.5%. Nevertheless, educational level was not significantly associated with either depression or anxiety.

Regarding income, 89.3% of participants reported poor family income. Income level was not significantly associated with depression or anxiety.

Past Psychiatric History

Seventy participants (26.8%) reported a previous psychiatric illness. Among them, 58.6% met criteria for probable depression, compared with a lower prevalence among those without such history. Past psychiatric history showed a significant association with probable depression in univariable analysis ($p = 0.007$). However, it was not significantly associated with anxiety.

Family History of Mental Illness

Thirty-two participants (12.3%) reported a family history of mental illness. Among these individuals, 56.3% met criteria for probable depression and 40.6% for probable anxiety. Family history of mental illness showed a significant association with probable anxiety in univariate analysis ($p = 0.012$) but was not significantly associated with probable depression.

Chronic Medical Illness

Chronic medical conditions were present in 41.4% of participants. The most common diagnoses included hypertension, diabetes mellitus, renal disease, asthma, anemia, and cerebrovascular accidents.

Depression was significantly associated with cerebrovascular accidents and renal disease. Among patients with CVA, 64.7% met criteria for probable depression, compared with 36.8% among patients with heart disease ($p = 0.05$). These findings are presented in Figure 2.

Chronic medical illness overall was not significantly associated with anxiety.

Family and Medical Care

The majority of participants reported receiving good family care (88.9%) and good medical care (83.9%). Only 1.1% reported poor family care and 3.4% reported poor medical care (Figure 3).

Perceived poor family care was significantly associated with both depression ($p = 0.008$) and anxiety ($p < 0.001$). However, perceived quality of medical care was not significantly associated with either outcome.

Health Perception and Functional Impairment

Sixty-six percent of participants rated their health as excellent or good, 26.1% as moderate, and 7.3% as poor. Poor self-rated health was significantly associated with both depression and anxiety ($p < 0.001$ for both).

Regarding expected functional recovery, 52.9% believed they would regain prior functioning, while 7.7% believed they would not return to normal functioning. Perceived functional impairment was significantly associated with both depression and anxiety ($p < 0.001$).

Co-Occurrence of Depression and Anxiety

Depression and anxiety were strongly associated with each other ($p < 0.001$). Participants meeting criteria for probable depression were significantly more likely to meet criteria for anxiety, and vice versa.

Multivariate Analysis

In multivariate logistic regression analysis, past psychiatric history remained independently associated with probable depression (aOR 2.05, 95% CI 1.18–3.56; $p = 0.011$). Cerebrovascular accident (CVA) was also independently associated with depression (aOR 2.72, 95% CI 1.31–5.64; $p = 0.007$), as was renal disease (aOR 1.89, 95% CI 1.04–3.45; $p = 0.036$). Poor family care remained a strong independent predictor (aOR 3.41, 95% CI 1.62–7.16; $p = 0.001$), and negative self-rated health was significantly associated with depression (aOR 2.87, 95% CI 1.73–4.76; $p < 0.001$). Co-occurring anxiety showed the strongest association (aOR 4.15, 95% CI 2.34–7.36; $p < 0.001$).

For probable anxiety, family history of mental illness remained independently associated (aOR 2.43, 95% CI 1.15–5.13; $p = 0.020$). Poor family care (aOR 3.98, 95% CI 1.79–8.82; $p = 0.001$), negative self-rated health (aOR 2.65, 95% CI 1.51–4.63; $p < 0.001$), and co-occurring depression (aOR 4.27, 95% CI 2.41–7.55; $p < 0.001$) remained significant predictors. These independent associations are summarized in Figure 4.

Discussion

This cross-sectional hospital-based study demonstrates a substantial burden of psychological morbidity among adult medical inpatients in Sudan, with 44.8% meeting criteria for probable depression and 23.0% for probable anxiety. These rates exceed global community prevalence estimates (1, 18) and highlight the vulnerability of hospitalized patients with general medical conditions.

Comparison With Previous Studies

The prevalence of depression observed in this study aligns with international evidence showing high rates of depressive symptoms among medically ill populations (8, 11, 19).

Our findings are higher than pooled estimates from interview-based meta-analyses of general hospital in-patients, which report an average prevalence of approximately 12% (8), but are consistent with screening-based hospital studies in low-resource settings. For example, a hospital-based study in Ethiopia reported depressive symptoms in 38% of admitted patients (17).

Similar findings have been reported in sub-Saharan Africa and South Asia, although variability exists depending on methodology and clinical setting (5, 10, 12). The strong association between depression and anxiety observed in our sample is consistent with established comorbidity patterns (11, 20), which are known to increase functional impairment and healthcare utilization (10, 21).

Meta-analytic data suggest that anxiety symptoms are present in approximately 28% of hospital inpatients (9), which is comparable to the 23% prevalence observed in our cohort.

Medical and Clinical Correlates

Depression was significantly associated with cerebrovascular accidents (CVA) and renal disease. Post-stroke depression is well documented and may involve both neurobiological and psychosocial mechanisms (22, 23). Chronic renal disease similarly carries elevated psychiatric risk due to illness burden and functional limitation (8, 24). These findings reinforce the bidirectional relationship between physical and mental health, where depressive symptoms may both result from and worsen medical illness (4, 17, 25).

Past psychiatric history was also independently associated with depression, underscoring the importance of systematic screening in patients with prior vulnerability. Early identification is particularly relevant in hospital settings, where psychiatric symptoms often remain underrecognized (2, 5).

Psychosocial Factors

Poor perceived family support and negative self-rated health were strongly associated with both depression and anxiety. Social support is a well-established protective factor, particularly in collectivist cultures (26). In the Sudanese context, diminished family support during hospitalization may amplify emotional distress. Additionally, pessimistic health perceptions are consistent with cognitive models of depression and anxiety, where maladaptive illness appraisals contribute to affective symptoms (16, 17).

Unlike some international studies (12, 15), demographic factors such as gender, marital status, income, and education were not significantly associated with psychological outcomes in this sample. This may reflect cultural buffering effects, limited statistical power, or the dominant impact of acute medical stressors during hospitalization.

Hospital-Level Differences

Higher prevalence rates at Khartoum Teaching Hospital compared with Omdurman Teaching Hospital may reflect differences in case complexity and chronic disease burden. As a tertiary referral center, Khartoum Teaching Hospital likely manages more severe conditions, particularly renal and neurological cases, which may partly explain the elevated psychiatric morbidity.

Clinical and Health-System Implications

The findings support the integration of routine mental health screening in medical wards, particularly for patients with neurological and renal conditions. Collaborative care models and task-sharing approaches may be especially relevant in low-resource settings (2, 21). Addressing comorbid depression and anxiety is essential not only for improving psychological well-being but also for enhancing treatment adherence, functional recovery, and healthcare efficiency (4, 11, 27).

Evidence from hospital-based psychiatric comorbidity research in African settings further supports integrating mental health services within medical wards to improve outcomes and reduce recurrence of

hospital utilization (17).

Limitations

The cross-sectional design limits causal inference. The use of HADS identifies probable rather than confirmed diagnoses. Convenience sampling and the absence of adjustment for certain confounders, such as substance use or illness severity, may affect generalizability. Future longitudinal studies using diagnostic interviews would provide a clearer understanding of the trajectory and impact of psychological distress during and after hospitalization.

Conclusion

Depression and anxiety are highly prevalent among hospitalized medical patients in Sudan, particularly among those with cerebrovascular disease, renal illness, prior psychiatric history, and limited perceived family support. These findings emphasize the need for integrated mental health services within general hospitals to improve patient outcomes and strengthen healthcare delivery in resource-limited settings.

Declarations

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Ethical approval was obtained from the Research Ethics Committee of Federal Ministry of Health, Sudan.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Author Contribution

Dr. Abdelaziz Osman conceived and designed the study, supervised data collection, performed data interpretation, and drafted the manuscript as the main author. Dr. Taisir Hagar contributed to data collection, coordination between study sites, and manuscript review. Dr. Abdelaziz Omer contributed to methodological design and statistical guidance. Dr. Eiman Elobied assisted in literature review, data

organization, and critical revision of the manuscript. All authors approved the final version of the manuscript.

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Tables

Table 1

Age Group (years)	Prevalence of Depression (%)	Prevalence of Anxiety (%)
<30	45	29
30-39	56.3	29.2
40-49	50	12.5
50-59	35.7	25
60+	50	25

Table 2

Marital Status	Prevalence of Depression (%)	Prevalence of Anxiety (%)
Married	45	22
Single	42	23
Widowed	50	25
Divorced	55	30

Figures

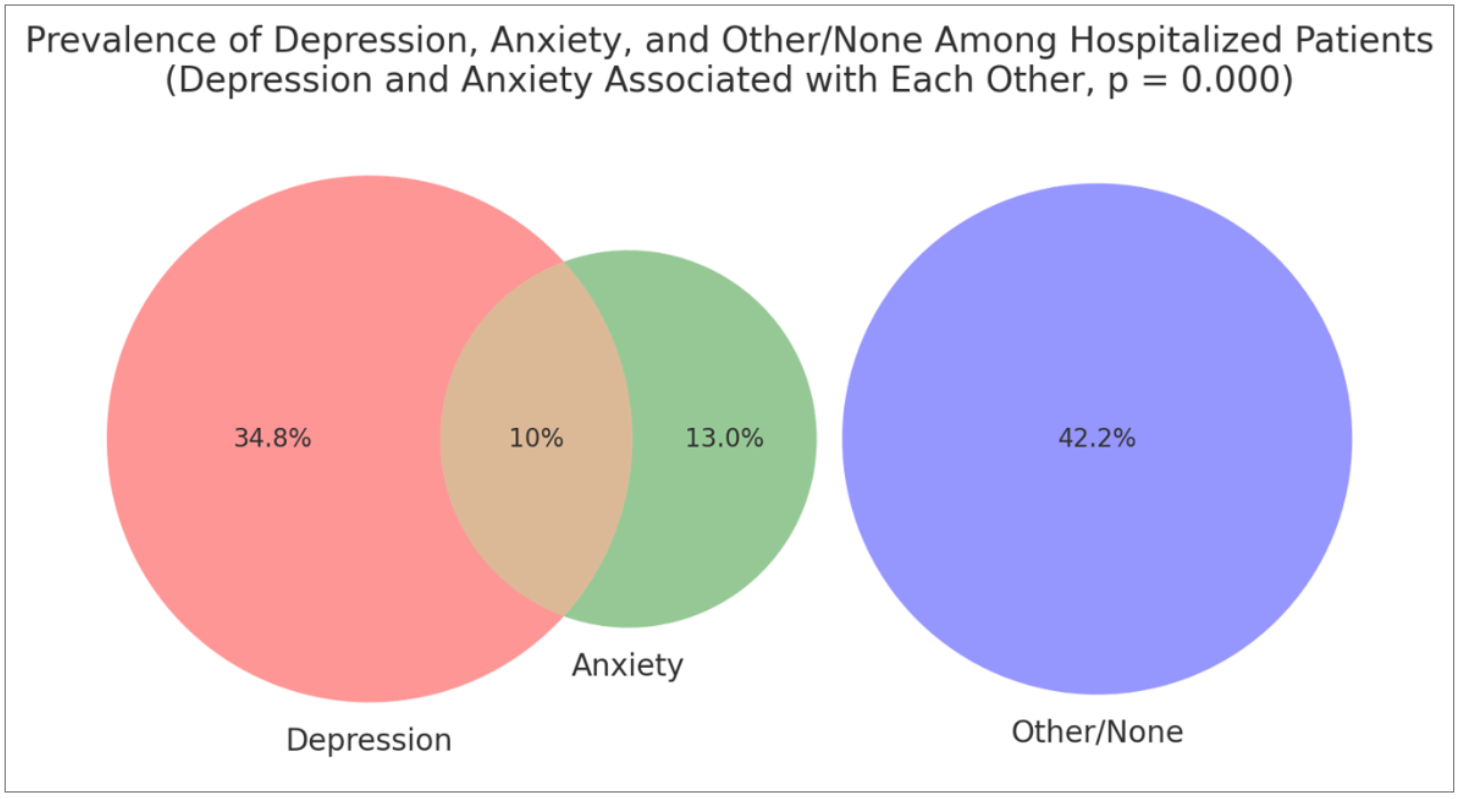


Figure 1

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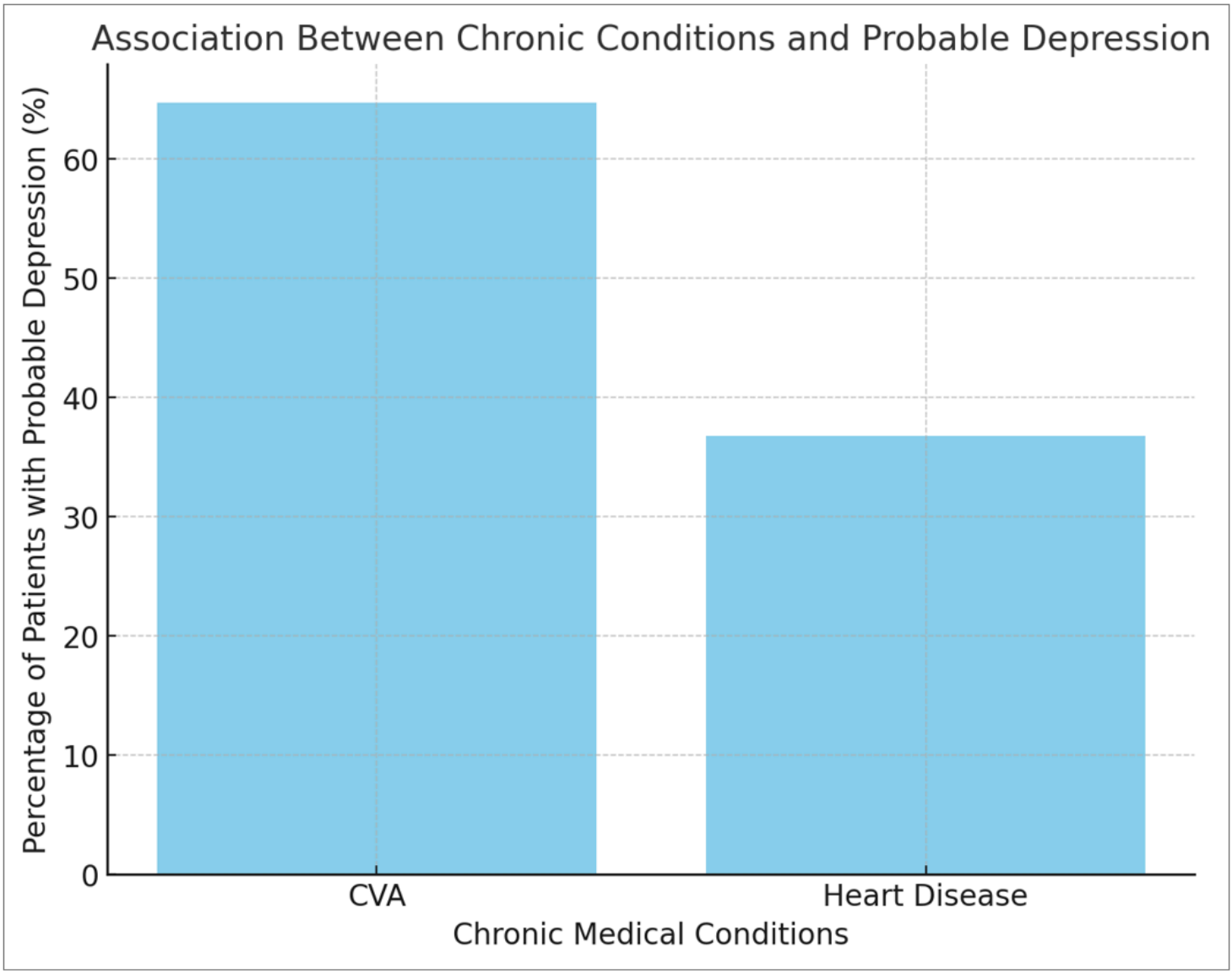


Figure 2

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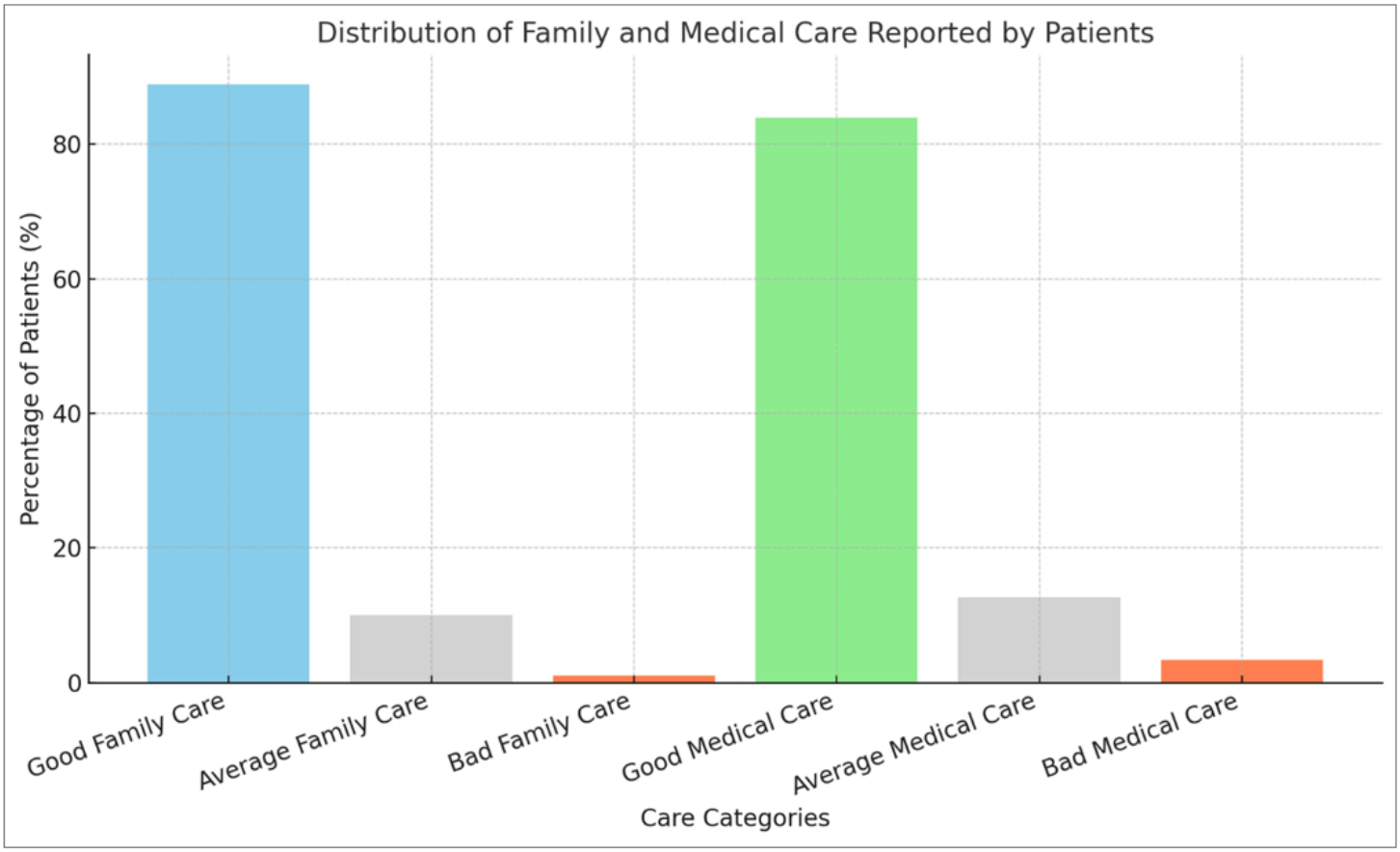


Figure 3

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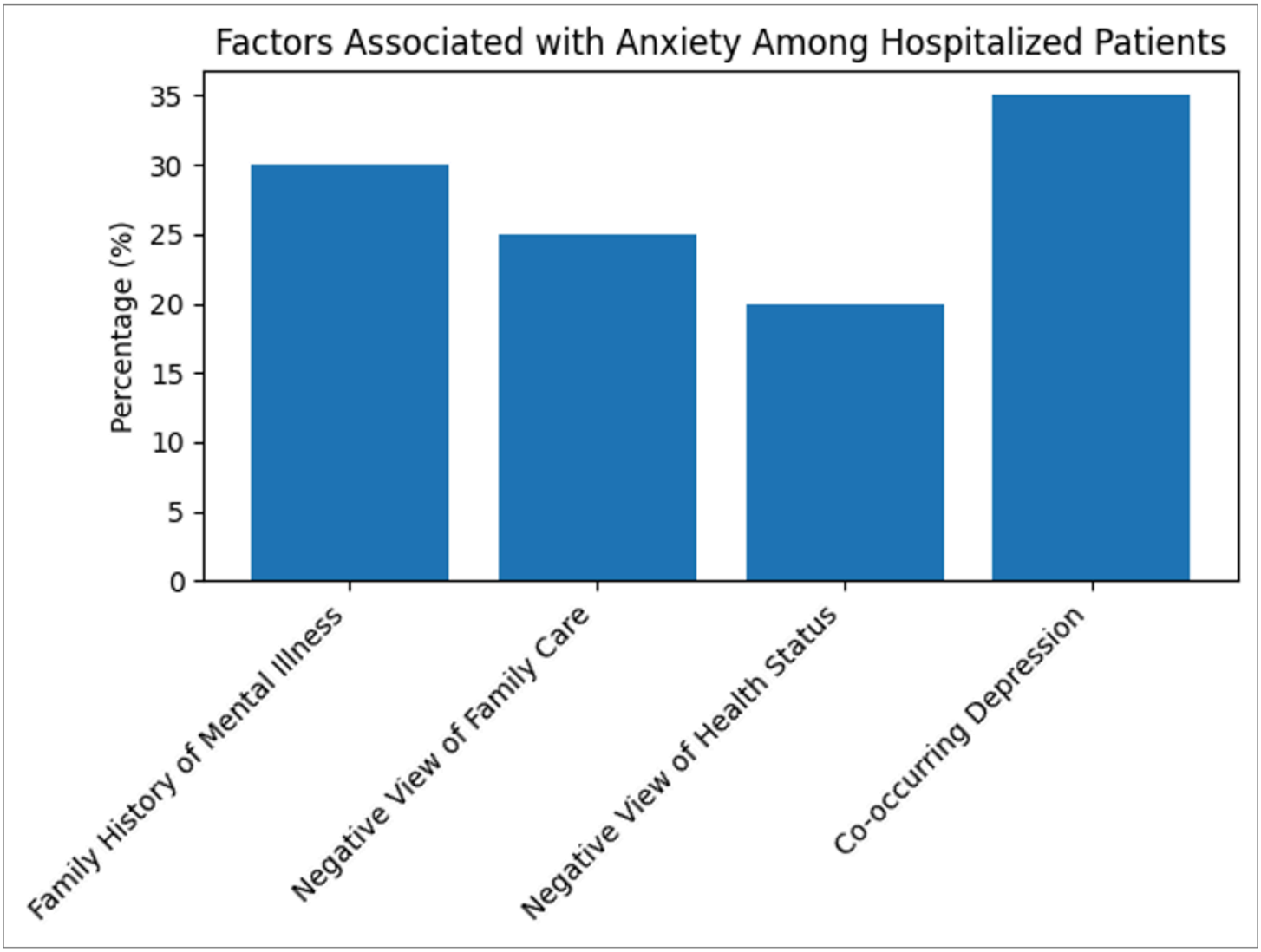


Figure 4

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