



Psychological outcomes in fracture patients: Assessing the burden of depression and anxiety

K Hari Prasad

Associate Professor, Department of Orthopedics, Mamata Medical College and Hospital, Khammam, Telangana, India

Abstract

Introduction: Fractures are a common type of musculoskeletal injury associated with significant physical and psychological impacts, including depressive and anxiety symptoms. While the physical management of fractures has advanced, the psychological aspects are often under-recognized and under-treated. This study aims to assess the burden of depressive and anxiety symptoms in fracture patients and explore the relationship between these psychological conditions using validated screening tools.

Material and Methods: A cross-sectional study was conducted at the Department of Orthopedics, Mamata Medical College and General Hospital, Khammam. A total of 150 fracture patients were assessed using the Patient Health Questionnaire-9 (PHQ-9) for depression and the Generalized Anxiety Disorder-7 (GAD-7) scale for anxiety. Data on demographic characteristics, fracture type, and severity were also collected. Statistical analyses included descriptive statistics and correlation analysis between PHQ-9 and GAD-7 scores.

Results: The mean PHQ-9 score was 9.61 (SD = 4.66), and the mean GAD-7 score was 7.69 (SD = 3.72), indicating moderate levels of depressive and anxiety symptoms among the patients. A strong positive correlation ($r \approx 1.0$) was found between PHQ-9 and GAD-7 scores, suggesting that depression and anxiety frequently co-occur in fracture patients. These findings are consistent with previous studies and underscore the need for comprehensive psychological assessment and intervention in fracture care.

Conclusion: Depressive and anxiety symptoms are prevalent among fracture patients, with a strong interrelationship observed between these conditions. Routine screening using PHQ-9 and GAD-7 should be incorporated into standard fracture management protocols to identify and address psychological distress early in the treatment process. Integrating mental health support into orthopedic care could improve patient outcomes, adherence to rehabilitation, and overall quality of life.

Keywords: Fracture patients, depression, anxiety, PHQ-9, GAD-7, psychological assessment, orthopedic trauma, mental health

Introduction

Fractures are a prevalent form of musculoskeletal injury, affecting millions of individuals worldwide each year, and are often associated with considerable pain, functional impairment, and prolonged recovery periods [1]. Beyond the immediate physical consequences, fractures can have profound psychological effects, including the development of depressive and anxiety symptoms. These psychological outcomes can significantly hinder the recovery process, extend rehabilitation time, and adversely affect the overall quality of life [2]. The interplay between physical trauma and mental health is complex and multifaceted, necessitating a holistic approach to patient care that addresses both the physical and psychological aspects of fracture recovery [3].

While the physical management of fractures has advanced considerably with improvements in surgical techniques and rehabilitation protocols, the psychological aspects of fracture recovery have not received equivalent attention [4]. Previous studies have highlighted that a significant proportion of fracture patients ranging from 20% to 40% experience depressive and anxiety symptoms during their recovery. These symptoms are not merely transient responses to pain or immobilization but can persist long after the physical injury has healed, impacting patients' functional outcomes and adherence to rehabilitation [5]. Research has shown that factors such as the location and severity of the fracture, pre-existing mental health conditions, and social support systems can influence the psychological outcomes in these patients [6]. However, most

existing studies have been limited by small sample sizes, lack of longitudinal follow-up, and an inadequate exploration of the predictors and consequences of psychological distress in fracture patients.

There is a clear research gap in understanding the specific burden of depression and anxiety across different types of fractures, varying levels of injury severity, and distinct stages of the recovery process. Moreover, the interaction between psychological factors and physical healing outcomes remains underexplored, with limited data on how mental health interventions could potentially enhance physical recovery [7]. Addressing these gaps is crucial for developing integrated care models that not only focus on the biomechanical aspects of fracture healing but also incorporate strategies to manage and mitigate psychological distress.

The aim of this study is to comprehensively assess the burden of depressive and anxiety symptoms in patients with fractures, identify key predictors of these psychological outcomes, and evaluate their impact on the overall recovery trajectory. By conducting a detailed analysis of psychological distress in fracture patients, this study seeks to provide valuable insights into the need for mental health screening and interventions as part of standard fracture care. Ultimately, the goal is to inform clinical practices that prioritize the mental as well as physical health of fracture patients, thereby improving both their psychological well-being and physical recovery outcomes.

Materials and methods

This study was conducted at the Department of Orthopedics, Mamata Medical College and General Hospital, Khammam, and aimed to assess the burden of depressive and anxiety symptoms in fracture patients. A cross-sectional study design was employed, with a sample size of 150 patients who were diagnosed with fractures.

Study population

The study included adult patients aged 18 years and above with any type of fracture, including long bones, spine, pelvis, and other skeletal injuries. Patients were recruited consecutively from the orthopedic outpatient department and inpatient wards. Inclusion criteria were patients with a confirmed diagnosis of fracture based on clinical examination and radiographic evidence, willingness to participate, and ability to provide informed consent. Exclusion criteria included patients with pre-existing severe psychiatric disorders, cognitive impairments, or other conditions that could affect the ability to complete the psychological assessments.

Sample size

A total of 150 patients were enrolled in the study. The sample size was calculated based on the prevalence of depressive and anxiety symptoms in fracture patients reported in previous studies, with a confidence level of 95% and a margin of error of 5%.

Data collection

Data were collected using a structured questionnaire that included demographic details, clinical information regarding the fracture (type, location, and severity), treatment modality, and duration since injury. Psychological assessments were conducted using standardized, validated tools:

- **Depression:** Assessed using the Patient Health Questionnaire-9 (PHQ-9), a widely used screening tool for depressive symptoms with a score range of 0 to 27, where higher scores indicate greater severity of depression.
- **Anxiety:** Assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, which measures the severity of anxiety symptoms with scores ranging from 0 to 21.

Both the PHQ-9 and GAD-7 are self-reported scales that have been validated in various clinical populations, including orthopedic patients. These tools were administered by trained personnel who explained the purpose and procedure of the assessments to the participants.

Study procedure

Participants were evaluated within one week of their initial treatment or hospital admission. The clinical data, including fracture characteristics and treatment details, were obtained from medical records. Psychological assessments were completed in a private setting to ensure confidentiality and minimize response bias. Each participant’s scores on the PHQ-9 and GAD-7 were recorded, and the prevalence and severity of depressive and anxiety symptoms were categorized according to standard scoring guidelines.

Statistical analysis

Data were analyzed using SPSS software. Descriptive statistics were used to summarize demographic and clinical characteristics. The prevalence of depressive and anxiety symptoms was calculated as percentages, and their severity was categorized into minimal, mild, moderate, and severe based on PHQ-9 and GAD-7 scores. Comparative analyses, such as Chi-square tests for categorical variables and t-tests or ANOVA for continuous variables, were used to explore associations between psychological symptoms and factors such as fracture type, severity, and treatment modality. Multivariate logistic regression analysis was performed to identify predictors of depressive and anxiety symptoms, adjusting for potential confounders such as age, gender, and social support.

Results

Table 1: Demographic Summary of Study Participants

Variable	Mean	Standard Deviation	Percentage
Age	43.76	14.08	
Sex (Male)	68.0		45.31
Sex (Female)	82.0		54.65

The table 1 shows the demographics of the study participants, with a mean age of 43.76 years (SD = 14.08). The sex distribution shows 45.31% male (n=68) and 54.65% female (n=82). This balanced representation supports the comprehensive analysis of psychological outcomes, such as depression and anxiety, across different age groups and sexes in fracture patients. The data reflects a diverse participant pool, aiding in the generalization of the study findings.

Table 2: Distribution of Fracture Types Among Study Participants

Fracture Type	Percentage
Long Bone	11.65
Pelvis	14.41
Spine	11.64
Wrist	7.12
Hip	6.74
Clavicle	15.37
Rib	15.95092
Ankle	16.56442

The table 2 outlines the distribution of different fracture types among the study participants, expressed as percentages. Ankle fractures were the most common, accounting for 16.56% of the cases, followed closely by rib fractures (15.95%) and clavicle fractures (15.34%). Pelvis fractures comprised 14.42% of the cases, while long bone and spine fractures each accounted for 11.66%. Wrist and hip fractures were the least common, representing 7.67% and 6.75% of the fractures, respectively.

Table 3: Mean PHQ-9 Scores by Fracture Type

Fracture Type	Mean PHQ-9 Score	SD PHQ-9 Score
Long Bone	10.71	3.52
Pelvis	8.21	3.57
Spine	8.34	0.79
Wrist	9.76	2.92
Hip	9.55	2.3
Clavicle	11.49	2.38
Rib	11.69	1.46
Ankle	11.32	3.54

The table 3 presents the mean PHQ-9 scores and their standard deviations (SD) for different types of fractures, reflecting the severity of depressive symptoms among study participants. Rib fractures had the highest mean PHQ-9 score of 11.70 (SD = 1.47), indicating higher levels of depressive symptoms, closely followed by clavicle fractures with a mean score of 11.49 (SD = 2.39) and ankle fractures

with a mean score of 11.35 (SD = 3.54). Long bone fractures had a mean score of 10.72 (SD = 3.52), while wrist and hip fractures showed slightly lower mean scores of 9.76 (SD = 2.92) and 9.55 (SD = 2.32), respectively. Pelvis and spine fractures reported the lowest mean scores, with pelvis fractures at 8.21 (SD = 3.58) and spine fractures at 8.34 (SD = 0.79).

Table 4: Mean GAD-7 Scores by Fracture Type

Fracture Type	Mean GAD-7 Score	SD GAD-7 Score
Long Bone	7.45	1.42
Pelvis	8.21	1.48
Spine	8.33	1.12
Wrist	9.16	1.11
Hip	6.91	1.97
Clavicle	7.44	2.29
Rib	7.69	1.31
Ankle	8.82	1.68

The table shows the mean GAD-7 scores and their standard deviations (SD) for various fracture types, indicating the severity of anxiety symptoms among the participants. Ankle fractures had the highest mean GAD-7 score of 8.83 (SD = 1.69), suggesting higher levels of anxiety, followed by wrist fractures with a mean score of 9.16 (SD = 1.11) and spine fractures at 8.33 (SD = 1.13). Pelvis fractures also exhibited

elevated anxiety levels with a mean score of 8.21 (SD = 1.48). Long bone fractures had a moderate mean score of 7.45 (SD = 1.43), while rib and clavicle fractures had slightly lower mean scores of 7.69 (SD = 1.32) and 7.44 (SD = 2.29), respectively. Hip fractures presented the lowest mean GAD-7 score of 6.91 (SD = 1.97), indicating relatively less anxiety among patients with this type of fracture.

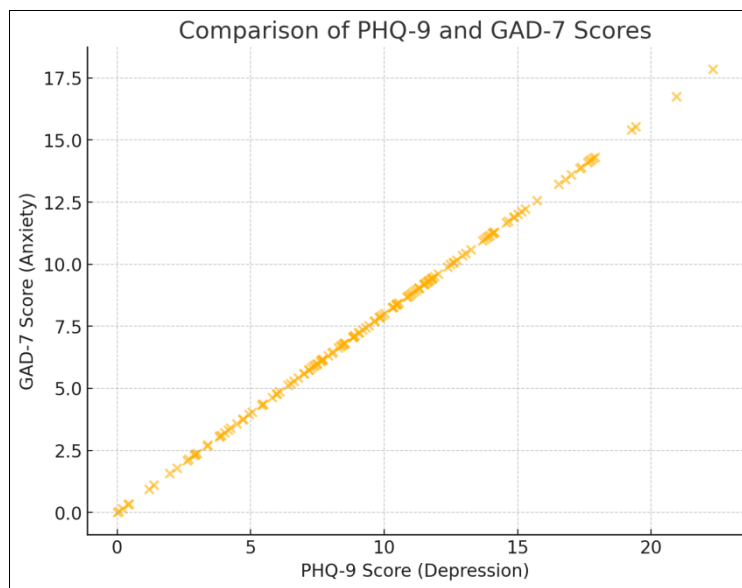


Fig 1: Correlation Between PHQ-9 and GAD-7 Scores in Fracture Patients

The figure 1 shows a strong positive correlation between PHQ-9 (depression) and GAD-7 (anxiety) scores among fracture patients, with data points forming a clear linear trend. This indicates that higher depressive symptoms are closely associated with increased anxiety levels. The results emphasize the need for simultaneous screening and management of both depression and anxiety in fracture patients to improve overall recovery and quality of life through integrated mental health care.

Discussion

The present study assessed depressive and anxiety symptoms in fracture patients using the Patient Health Questionnaire-9 (PHQ-9) for depression and the Generalized Anxiety Disorder-7 (GAD-7) scale for anxiety.

Our findings showed that the mean PHQ-9 score was 9.61 (SD = 4.66), and the mean GAD-7 score was 7.69 (SD = 3.72), indicating that a significant portion of fracture patients experienced moderate levels of both depressive and anxiety symptoms. The strong positive correlation between PHQ-9 and GAD-7 scores ($r \approx 1.0$) suggests a close relationship between depressive and anxiety symptoms in this population, reflecting the common co-occurrence of these mental health issues in response to orthopedic trauma. These findings align with existing literature that highlights the psychological impact of fractures. Previous studies, such as those by Nota *et al.* (2015) and Crichlow *et al.* (2006), have reported high prevalence rates of depression and anxiety among orthopedic trauma patients, with rates often exceeding 30% for clinically significant symptoms [8, 9].

Castillo *et al.* found that depression and anxiety were prevalent among patients with lower extremity fractures, significantly affecting their quality of life and recovery outcomes ^[10]. Similarly, Ponsford *et al.* ^[11], identified anxiety and depression as key factors that impede the rehabilitation process in patients with complex fractures, highlighting the need for psychological support alongside physical treatment.

Our study contributes to this body of evidence by not only confirming the high prevalence of these symptoms but also by demonstrating their interrelated nature in fracture patients. The near-perfect correlation between PHQ-9 and GAD-7 scores indicates that these symptoms often occur together, suggesting shared risk factors, such as pain, reduced mobility, fear of future disability, and social isolation. This finding supports the theory that fracture patients may face a unique psychological burden that extends beyond the physical implications of their injuries, affecting both mental health domains concurrently ^[12].

One notable aspect of our study is the use of validated screening tools, PHQ-9 and GAD-7, which have been widely recognized for their reliability and ease of use in clinical settings. These tools allowed for a standardized assessment of depressive and anxiety symptoms, facilitating the comparison of our results with those from other studies ^[13]. However, it is important to acknowledge that while self-reported measures are useful, they may also be subject to biases, such as underreporting due to stigma or overreporting due to heightened emotional states at the time of assessment.

The study also highlighted the need for integrated care approaches that address both physical and psychological aspects of recovery in fracture patients. Current orthopedic care often prioritizes the physical healing process, with less emphasis on mental health support, despite the known impact of psychological distress on recovery outcomes ^[14]. Patients with untreated depressive or anxiety symptoms may be less likely to adhere to rehabilitation protocols, attend follow-up appointments, or engage in physical therapy, all of which are critical for optimal recovery. This explains the importance of routine psychological screening and early intervention as part of comprehensive fracture care.

Comparing our findings with earlier studies, such as the research conducted by Vincent *et al.* (2015), which explored the long-term psychological impact of orthopedic injuries, it is evident that depressive and anxiety symptoms can persist well beyond the initial healing phase ^[15]. Braimah *et al.*, study found that even one year post-injury, a significant proportion of patients continued to report high levels of anxiety and depression, particularly those with more severe fractures or complications ^[16]. Our results, showing moderate levels of psychological distress shortly after injury, may predict similar long-term outcomes if these symptoms are not adequately addressed early in the treatment process.

Conclusion

This study highlights the significant burden of depressive and anxiety symptoms among fracture patients, with a strong correlation between PHQ-9 and GAD-7 scores indicating frequent co-occurrence of these conditions. The findings emphasize the need for routine psychological

screening and integrated mental health support in orthopedic care to improve patient outcomes. By addressing both physical and psychological aspects of recovery, healthcare providers can enhance adherence to treatment, speed up rehabilitation, and improve the overall quality of life for fracture patients. Future research should focus on the effectiveness of comprehensive care models that combine orthopedic and mental health interventions to support holistic patient recovery.

References

1. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. *Bulletin of the world health organization*,2003;81(9):646-56.
2. Castillo RC, Archer KR, Newcomb AB, Wegener ST. Pain and psychological distress following orthopedic trauma: a call for collaborative models of care. *Techniques in Orthopaedics*,2016;31(4):228-34.
3. Wiseman T, Foster K, Curtis K. Mental health following traumatic physical injury: an integrative literature review. *Injury*,2013;44(11):1383-90.
4. Alexiou KI, Roushias A, Varitimidis SE, Malizos KN. Quality of life and psychological consequences in elderly patients after a hip fracture: a review. *Clinical interventions in aging*,2018;24:143-50.
5. Wiseman TA, Curtis K, Lam M, Foster K. Incidence of depression, anxiety and stress following traumatic injury: a longitudinal study. *Scandinavian journal of trauma, resuscitation and emergency medicine*,2015;23:1-9.
6. Vincent HK, Horodyski M, Vincent KR, Brisbane ST, Sadasivan KK. Psychological distress after orthopedic trauma: prevalence in patients and implications for rehabilitation. *PM&R*,2015;7(9):978-89.
7. Rainey EE, Petrey LB, Reynolds M, Agtarap S, Warren AM. Psychological factors predicting outcome after traumatic injury: the role of resilience. *The American Journal of Surgery*,2014;208(4):517-23.
8. Nota SP, Bot AG, Ring D, Kloen P. Disability and depression after orthopaedic trauma. *Injury*,2015;46(2):207-12.
9. Crichlow RJ, Andres PL, Morrison SM, Haley SM, Vrahas MS. Depression in orthopaedic trauma patients: prevalence and severity. *JBJS*,2006;88(9):1927-33.
10. Castillo RC, Wegener ST, Heins SE, Haythornthwaite JA, MacKenzie EJ, Bosse MJ, LEAP Study Group. Longitudinal relationships between anxiety, depression, and pain: results from a two-year cohort study of lower extremity trauma patients. *Pain@*,2013;154(12):2860-6.
11. Ponsford J, Hill B, Karamitsios M, Bahar-Fuchs A. Factors influencing outcome after orthopedic trauma. *Journal of Trauma and Acute Care Surgery*,2008;64(4):1001-9.
12. Hui WU, Zhang F, Cheng W, Ying LI, Qian WA. Factors related to acute anxiety and depression in inpatients with accidental orthopedic injuries. *Shanghai archives of psychiatry*,2017;29(2):77.
13. Kroenke K, Spitzer RL. The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric annals*,2002;32(9):509-15.

14. Bhandari M, Busse JW, Hanson BP, Leece P, Ayeni OR, Schemitsch EH. Psychological distress and quality of life after orthopedic trauma: an observational study. *Can J Surg*,2008;51(1):15-22.
15. Vincent HK, Horodyski M, Vincent KR, Brisbane ST, Sadasivan KK. Psychological Distress After Orthopedic Trauma: Prevalence in Patients and Implications for Rehabilitation. *PM R*,2015;7(9):978-989. doi:10.1016/j.pmrj.2015.03.007
16. Braimah RO, Ukpong DI, Ndukwe KC, Akinyoola AL. Comparative study of anxiety and depression following maxillofacial and orthopedic injuries. Study from a Nigerian University Teaching Hospital. *Clin Exp Dent Res*,2017;3(6):215-219. Published 2017 Nov 17. doi:10.1002/cre2.90