

Original Research Article

Exploring the relationship between chronic pain and mental health disorders: a case-control study at a tertiary care hospital

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ABSTRACT

Background: Chronic pain is a multifaceted condition that significantly affects patients' quality of life and has been closely associated with mental health disorders such as depression, anxiety, and stress-related conditions. This study aimed to explore the association between chronic pain and mental health disorders among patients at a tertiary care hospital in India.

Methods: We conducted a case-control study involving 200 participants at a tertiary care hospital, from January 2024 to June 2024. The case group consisted of 100 patients diagnosed with chronic pain for more than three months, while the control group included 100 matched individuals without chronic pain. Data on depression, anxiety, and stress were collected using the validated depression, anxiety and stress scale-21 (DASS-21). Dietary and lifestyle habits, sleep quality, and socioeconomic factors were assessed through structured questionnaires. Statistical analysis was conducted using multivariate logistic regression to adjust for confounding variables, including age, gender, socioeconomic status, and comorbidities.

Results: The prevalence of symptoms of depression, anxiety, and stress in the chronic pain group was significantly higher compared to controls. The adjusted odds ratio (OR) for depression among the chronic pain group was 3.82 (95% CI: 2.05-7.13, $p < 0.001$), for anxiety it was 2.94 (95% CI: 1.61-5.38, $p < 0.001$), and for stress it was 4.18 (95% CI: 2.23-7.81, $p < 0.001$) compared to controls.

Conclusions: Chronic pain is strongly associated with increased symptoms of depression, anxiety, and stress, emphasizing the need for integrated care approaches that address both physical and psychological health in chronic pain management.

Keywords: Anxiety, Case-control study, Chronic pain, DASS-21, Depression, Stress

INTRODUCTION

Chronic pain is a major public health problem that substantially impairs physical functioning, psychological well-being, and overall quality of life. The International Association for the Study of Pain (IASP) defines chronic

pain as pain that persists or recurs for longer than three months and recognizes it as a complex condition influenced by biological, psychological, and social factors rather than merely a symptom of an underlying disease.¹ Chronic pain is now considered a disease entity in itself because of the profound physiological and psychosocial changes associated with its persistence.

Globally, chronic pain affects approximately one in five adults and is among the leading causes of disability and healthcare utilization. In the landmark European survey conducted by Breivik et al, nearly 19% of adults reported chronic pain lasting more than six months, with many experiencing moderate-to-severe pain that significantly interfered with daily activities, sleep, employment, and emotional well-being.² The burden of chronic pain extends beyond physical suffering, contributing substantially to reduced productivity, increased healthcare expenditure, and diminished quality of life.

In India, chronic pain is an important but under-recognized health problem. A large community-based study by Saxena et al reported a prevalence of approximately 19.3% among Indian adults, with higher prevalence among women and older individuals.³ The study further highlighted that chronic pain frequently leads to physical disability, impaired functional capacity, and considerable socioeconomic burden, emphasizing the need for comprehensive management strategies.

The relationship between chronic pain and psychological health is best explained by the biopsychosocial model, which proposes that biological mechanisms interact with psychological and social factors to influence pain perception, chronicity, and treatment outcomes. Gatchel et al demonstrated that depression, anxiety, maladaptive coping strategies, fear-avoidance behaviour, and psychosocial stress significantly contribute to the development and persistence of chronic pain.⁴ Consequently, modern pain management emphasizes multidisciplinary care that addresses both physical and psychological components of chronic pain.

A substantial body of evidence has demonstrated a strong bidirectional association between chronic pain and psychological disorders. In their comprehensive literature review, Bair et al concluded that patients with chronic pain have significantly higher rates of depression and anxiety than the general population, while the presence of these psychological conditions further increases pain intensity, disability, healthcare utilization, and poor treatment outcomes.⁵ Similarly, the World Health Organization Primary Care Study conducted by Gureje et al reported that persistent pain was consistently associated with impaired psychological well-being, poorer physical functioning, and reduced quality of life across multiple countries and healthcare settings.⁶

Recent advances in pain neuroscience have further strengthened this association by demonstrating that chronic pain involves central sensitization, altered pain modulation, neuroplastic changes, and complex interactions between cognitive and emotional processes. Psychological factors such as catastrophizing, emotional distress, and ineffective coping mechanisms amplify pain perception and contribute to prolonged disability, highlighting the importance of early psychological assessment in patients with chronic pain.⁷

Despite growing international evidence supporting the close relationship between chronic pain and psychological distress, studies from Indian tertiary care hospitals remain relatively limited. Given the increasing burden of chronic pain in India and its significant psychological consequences, evaluating the association between chronic pain and symptoms of depression, anxiety, and stress in patients attending a tertiary care hospital may facilitate early identification of psychological distress and promote integrated multidisciplinary interventions aimed at improving overall patient outcomes.⁸

METHODS

Study design

This study was a hospital-based case-control study designed to investigate the relationship between chronic pain and symptoms of depression, anxiety, and stress among adult patients attending a tertiary care hospital. The study aimed to compare individuals with chronic pain (cases) to those without chronic pain (controls) in terms of their mental health status, using validated tools and statistical analyses.

Study area

The study was conducted at a tertiary care hospital, SSG Hospital, Vadodara, Gujarat, which caters to a large urban and rural population. Cases were recruited from the pain clinic and general medicine outpatient department, whereas controls were recruited from healthy attendants and patients attending general medicine OPD without chronic pain, from January 2024 to June 2024.

Sample size

The sample size was calculated based on previous studies estimating the prevalence of mental health disorders among individuals with chronic pain to be around 50%, compared to 20% among individuals without chronic pain. With a 95% confidence level, a power of 80%, and a case-to-control ratio of 1:1, the required sample size was determined to be 200 participants, consisting of 100 cases and 100 controls.

Sampling procedure

Participants were recruited through consecutive sampling from the pain management and psychiatry clinics. Cases were defined as individuals diagnosed with chronic pain (pain persisting for at least three months), while controls were individuals attending the hospital for other non-pain-related issues and matched for age and gender. Informed consent was obtained from all participants.

Study period

The study was conducted over a six-month period from January 2024 to June 2024.

Inclusion and exclusion criteria

Inclusion criteria for cases included individuals aged 18 years and older, diagnosed with chronic pain for a minimum of three months. Controls were individuals without a history of chronic pain.

Exclusion criteria for both groups included Patients with previously diagnosed psychiatric illness or those receiving psychotropic medications before enrolment, those undergoing current psychiatric treatment, and individuals unable to complete the questionnaire due to cognitive impairment.

Questionnaire

Data collection involved a structured questionnaire consisting of three sections.

Demographic and clinical information

This section collected data on age, gender, education, occupation, duration of pain, and comorbidities.

Pain assessment

The brief pain inventory (BPI) was used to measure the intensity of pain and its interference with daily activities.

Psychological assessment

The depression, anxiety, and stress scale (DASS-21) was used to assess the mental health status of participants, focusing on levels of depression, anxiety, and stress. Both the BPI and DASS-21 are open-access, validated tools commonly used in clinical research.

Statistical analysis

DASS-21 scores were calculated according to the standard scoring guidelines. Participants were categorized into normal and symptomatic groups using the recommended DASS-21 severity cut-offs. Individuals with mild, moderate, severe, or extremely severe scores were classified as having symptoms of depression, anxiety, or stress, while those with normal scores were considered symptom-free. Descriptive statistics were expressed as mean $\pm$ standard deviation (SD) or frequency and percentage, as appropriate. Independent samples t-test was used to compare mean DASS-21 scores between cases and controls. Binary logistic regression analysis was performed to estimate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for the association between chronic pain and symptoms of depression, anxiety, and stress after adjusting for age, sex, musculoskeletal disorders, and cardiovascular disease. A p value <0.05 was considered statistically significant. Statistical analyses were performed using Jamovi software (version 2.6; The Jamovi Project, Sydney, Australia).

RESULTS

The study included 200 participants, comprising 100 individuals with chronic pain (cases) and 100 controls without chronic pain. The demographic and clinical characteristics of the participants are summarized in Table 1. The mean age of the cases was 46.5 ± 8.7 years (range: 33-61 years), while the mean age of controls was 45.1 ± 8.9 years (range: 32-61 years). The study included 100 cases and 100 controls. The mean age of the cases was 46.5 ± 8.7 years compared with 45.1 ± 8.9 years among controls. Males constituted 57 (57.0%) cases and 55 (55.0%) controls.

Table 1: Demographic and clinical characteristics.

Characteristics		Chronic pain group (n=100)	Control group (n=100)
Age (mean$\pm$SD)		46.5 $\pm$ 8.7	45.1 $\pm$ 8.9
Gender (%)	Male	57	55
	Female	43	45
Musculoskeletal disorders (%)		49	22
Cardiovascular diseases (%)		37	21
Duration of pain (mean$\pm$SD, years)		4.7 $\pm$ 2.6	NA

Demographic and clinical characteristics

Participants with chronic pain had a higher prevalence of musculoskeletal disorders (49%) and cardiovascular diseases (37%) compared to the control group (22% and 21%, respectively). The average duration of pain in the chronic pain group was 4.7 years.

Table 2: Mental health scores (DASS-21).

	Chronic pain group (n=100)	Control group (n=100)	P value
Depression score (mean$\pm$SD)	13.9 $\pm$ 4.5	7.1 $\pm$ 3.2	<0.001
Anxiety score (mean$\pm$SD)	12.5 $\pm$ 3.9	6.3 $\pm$ 2.8	<0.001
Stress score (mean$\pm$SD)	14.7 $\pm$ 4.2	8.5 $\pm$ 3.6	<0.001

Mental health assessment

Mental health assessments revealed significantly higher levels of symptoms of depression, anxiety, and stress among individuals with chronic pain compared to controls. The mean DASS-21 depression score was 13.9 ± 4.5 in the chronic pain group versus 7.1 ± 3.2 in the control group. Similarly, the mean anxiety and stress scores were higher in the chronic pain group (12.5 ± 3.9 for anxiety and 14.7 ± 4.2 for stress) compared to the control group (6.3 ± 2.8 for anxiety and 8.5 ± 3.6 for stress).

Statistical analysis

Multivariable logistic regression analysis revealed that individuals with chronic pain had significantly higher odds of exhibiting symptoms of depression, anxiety, and stress. The adjusted odds ratio (OR) for depression among the chronic pain group was 3.82 (95% CI: 2.05-7.13, $p < 0.001$), for anxiety it was 2.94 (95% CI: 1.61-5.38, $p < 0.001$), and for stress it was 4.18 (95% CI: 2.23-7.81, $p < 0.001$) compared to controls.

Table 3: Prevalence of psychological symptoms.

	Cases (%)	Controls (%)	P value
Depression	61 (61.0)	29 (29.0)	<0.001
Anxiety	58 (58.0)	33 (33.0)	<0.001
Stress	64 (64.0)	27 (27.0)	<0.001

After categorization of DASS-21 scores according to the recommended severity cut-offs, binary logistic regression analysis was performed. Chronic pain was independently associated with significantly higher odds of symptoms of depression, anxiety, and stress after adjustment for age, sex, musculoskeletal disorders, and cardiovascular disease (Table 4).

Table 4: Multivariable logistic regression.

	Adjusted odds ratio (95% CI)	P value
Depression	3.82 (2.05-7.13)	<0.001
Anxiety	2.94 (1.61-5.38)	<0.001
Stress	4.18 (2.23-7.81)	<0.001

These findings demonstrate a significant association between chronic pain and a higher prevalence of symptoms of depression, anxiety, and stress among the study participants.

DISCUSSION

The present hospital-based case-control study demonstrated a significant association between chronic pain and symptoms of depression, anxiety, and stress. Symptoms of depression, anxiety, and stress were observed in 61%, 58%, and 64% of patients with chronic pain, respectively, compared to 29%, 33%, and 27% among controls. After adjustment for age, sex, musculoskeletal disorders, and cardiovascular disease, chronic pain remained independently associated with symptoms of depression (adjusted OR: 3.82, 95% CI: 2.05-7.13), anxiety (adjusted OR: 2.94, 95% CI: 1.61-5.38), and stress (adjusted OR: 4.18, 95% CI: 2.23-7.81).

Our findings are consistent with the systematic review by Bair et al, which reported that depression occurs considerably more frequently among patients with chronic pain than in the general population, with prevalence estimates ranging from 30% to 54% depending on the

study population and assessment tool used.⁵ The prevalence of depressive symptoms observed in the present study (61%) was slightly higher, which may be attributable to the tertiary care setting where patients often present with more severe or longstanding pain.

Similarly, Tsang et al evaluated data from 17 countries and demonstrated that individuals with chronic pain had significantly higher odds of mood and anxiety disorders than those without chronic pain, with odds ratios generally ranging between 2 and 49. Our adjusted odds ratios for depression (3.82) and anxiety (2.94) are comparable with these findings, indicating that the association between chronic pain and psychological symptoms is consistent across different populations and healthcare settings.

Comparable findings have also been reported in India. Desai et al conducted a large cross-sectional study involving 7,165 adults attending primary healthcare centres in Kerala and reported that chronic pain was independently associated with depressive disorders, anxiety disorders, greater disability, and poorer quality of life. The authors emphasized that chronic pain frequently coexists with both physical and mental health conditions, highlighting the need for integrated management approaches.¹⁰ The higher prevalence of symptoms of depression (61%), anxiety (58%), and stress (64%) observed in the present study further supports the importance of routine psychological assessment among patients with chronic pain attending tertiary care hospitals in India.

The World Health Organization primary care study by Gureje et al demonstrated that persistent pain is strongly associated with poorer psychological well-being and impaired daily functioning across multiple countries.⁶ Likewise, patients with chronic pain in our study had significantly higher DASS-21 depression, anxiety, and stress scores than controls, reinforcing the close relationship between persistent pain and psychological distress.

The findings are also supported by the biopsychosocial model proposed by Gatchel et al, which emphasizes that biological, psychological, and social factors interact to influence pain perception and chronicity.¹¹ Furthermore, Turk et al advocated a multidisciplinary approach to chronic pain management incorporating psychological assessment alongside pharmacological and physical interventions.¹² The present findings support these recommendations and highlight the importance of integrating routine psychological screening into chronic pain management protocols.

Overall, the present study confirms that chronic pain is significantly associated with symptoms of depression, anxiety, and stress among patients attending a tertiary care hospital. Early identification of psychological symptoms and timely multidisciplinary intervention may improve both psychological well-being and pain-related outcomes.

This study has several limitations. First, the case-control design precludes establishing a temporal or causal relationship between chronic pain and psychological symptoms. Second, psychological symptoms were assessed using the DASS-21, a validated screening instrument that identifies symptoms rather than providing a clinical diagnosis of psychiatric disorders. Third, the study relied partly on self-reported information, which may be subject to recall and reporting bias. Fourth, the study was conducted at a single tertiary care hospital, which may limit the generalizability of the findings to the broader community. Finally, although adjustments were made for important confounding variables, the influence of residual or unmeasured confounders cannot be completely excluded. Prospective multicenter cohort studies with comprehensive psychiatric evaluation are warranted to further clarify the temporal relationship between chronic pain and psychological health.

CONCLUSION

This study demonstrates a significant association between chronic pain and symptoms of depression, anxiety, and stress among patients attending a tertiary care hospital in Vadodara. Individuals with chronic pain had significantly higher adjusted odds of experiencing psychological symptoms compared with controls. These findings highlight the importance of integrating psychological assessment and support into the routine management of patients with chronic pain. Early screening for symptoms of depression, anxiety, and stress using validated instruments may facilitate timely intervention, improve quality of life, and optimize overall treatment outcomes. A multidisciplinary approach involving physicians, psychologists, and pain specialists is therefore recommended to provide comprehensive care for patients with chronic pain.

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