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Relationship between pain catastrophizing, anxiety and depressed mood across physical therapy treatments in chronic low back pain

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Abstract

This study aimed to investigate the relationship between psychological factors—specifically pain catastrophizing, depressed mood, and anxiety—and their influence on pain perception and treatment outcomes in individuals undergoing physical therapy for chronic low back pain. Conducted at the Department of Physical Medicine, Sri Ramakrishna Hospital, Coimbatore, the study included 100 participants aged between 45 and 65 years. A non-experimental, correlational design was used to assess the natural association between psychological variables and pain experience. Data were collected over two months using standardized self-report questionnaires to measure levels of pain catastrophizing, anxiety, and depression.

The results revealed a significant positive correlation between pain catastrophizing and anxiety, with 18 participants showing a strong correlation, 23 showing a moderate correlation, and 6 showing a mild correlation. The mean anxiety score was 23.7 with a correlation coefficient of 0.220. Similarly, a positive correlation was observed between pain catastrophizing and depressed mood, with 11 participants exhibiting strong correlation, 24 moderate, and 9 mild. The mean depression score was 21.3 with a correlation coefficient of 0.267. Statistical analysis indicated that higher levels of anxiety and depression were associated with increased pain catastrophizing, which in turn contributed to greater pain intensity.

In conclusion, the study highlights that psychological factors such as anxiety, depression, and pain catastrophizing play a crucial role in the perception and severity of pain among patients with chronic low back pain. These findings emphasize the need for integrated treatment approaches that include psychological support alongside physical therapy. Addressing these psychosocial components may lead to improved treatment outcomes and more effective pain management in clinical practice.

Keywords: Pain catastrophizing, anxiety, depression, chronic low back pain, physical therapy, psychosocial factors

Introduction

Chronic low back pain (CLBP) is a complex and multifactorial condition that affects a significant portion of the global population, leading to profound physical limitations, emotional distress, and economic consequences. It is estimated that approximately 60-80% of individuals will experience low back pain at some point in their lives, making it one of the most common reasons for physician visits, disability claims, and absenteeism from work [6, 7]. The persistent nature of CLBP, defined as pain lasting more than three months, frequently interferes with activities of daily living and compromises quality of life.

The biopsychosocial model is increasingly acknowledged as a more comprehensive approach to understanding CLBP. While structural and mechanical abnormalities such as disc degeneration, spinal stenosis, and musculoskeletal dysfunctions play a role, a growing body of evidence highlights the influence of psychological and social factors in the onset and persistence of chronic pain [11, 12]. Among these, pain catastrophizing, depression, and anxiety are particularly significant. These psychological comorbidities not only intensify the subjective experience of pain but also hinder rehabilitation and recovery efforts.

Depression and anxiety are prevalent in individuals with CLBP and have been shown to exacerbate pain perception, reduce engagement in physical activity, and negatively impact adherence to treatment protocols [8, 9]. Anxiety contributes to hypervigilance and avoidance behavior, while depression often results in helplessness, reduced self-efficacy, and increased

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disability^[13]. These psychological variables can increase the risk of pain chronicity and poor treatment outcomes.

Pain catastrophizing is one of the most potent psychological predictors of chronic pain. Introduced by Albert Ellis (1962) and adapted by Aaron Beck, it is characterized by magnification of pain, rumination, and feelings of helplessness. Early researchers such as Chaves and Brown identified catastrophizing as a tendency to amplify the threat value of pain, while Spanos emphasized its role in diverting attention and increasing emotional distress. Sullivan *et al.* later defined it as a maladaptive cognitive-affective response pattern that is closely linked to pain intensity and disability^[14].

Catastrophizing also plays a key role in the fear-avoidance model, where fear of pain or re-injury leads to avoidance of physical activity, disuse, and ultimately, worsening of the pain condition^[5]. This fear-avoidance behavior contributes to a vicious cycle of pain, inactivity, and psychological deterioration. Vlaeyen and Linton emphasized how these cognitive-behavioral patterns mediate the transition from acute to chronic pain^[15].

Although some physical risk factors such as lifting, bending, whole-body vibration, and postural strain are well-documented^[11], their associations with CLBP are often weaker compared to psychosocial variables. Notably, patients' beliefs and attitudes about their pain condition are found to be stronger predictors of disability and treatment resistance than many biomedical or ergonomic risk factors^[12,16].

In light of these findings, the integration of psychological assessment and cognitive-behavioral interventions into physiotherapy and pain management programs is critical. A multidisciplinary approach that addresses both physical and psychosocial dimensions of chronic pain offers the best potential for long-term recovery and improved quality of life for patients with CLBP.

Materials and Methods

Materials

The following tools and resources were used in the study:

- Consent Form - To ensure ethical participation.
- Pain Catastrophizing Scale (PCS) - To assess catastrophic thinking related to pain.
- Hospital Anxiety and Depression Scale (HADS) - To measure anxiety and depression levels.

Methods

Study Setting

The study was conducted in the Department of Physical Medicine, Sri Ramakrishna Hospital, Coimbatore, under the supervision of the College of Physiotherapy, S.R.I.P.M.S.

Selection Criteria

Inclusion Criteria

- Age 45-65 years
- Both men and women
- Non-specific chronic low back pain
- Post-physiotherapy treatment
- Willingness to participate

Exclusion Criteria

- Diagnosed cognitive impairment
- Existing psychological illness

Sample Size

Out of an initial 150 patients:

- 30 were excluded based on criteria
- 10 did not respond
- 10 could not continue
- Final sample: 100 participants with chronic low back pain who *met all* inclusion criteria

Study Design

A non-experimental design was used to explore the natural variations in psychological factors—specifically anxiety and depression—and their association with pain catastrophizing.

Study Type

The study followed a correlational approach, aiming to determine the relationships between the PCS, anxiety, and depression levels in the context of physical therapy outcomes.

Sampling Method

A convenience sampling method was used to recruit participants who were readily available and willing, allowing for practical and timely data collection.

Study Duration

The study was conducted over a period of 4 months, during which all assessments, questionnaire administration, and data collection were completed.

Procedure

Participants were selected based on inclusion and exclusion criteria. They were informed about the study in their preferred language (primarily Tamil), and written informed consent was obtained. The subjects included individuals undergoing physiotherapy for chronic low back pain.

Each participant completed the following standardized questionnaires:

1. Pain Catastrophizing Scale (PCS) - 13 items measuring thoughts and feelings related to pain, including rumination, magnification, and helplessness.
2. Hospital Anxiety and Depression Scale (HADS) - A closed-ended tool for classifying participants' anxiety and depression levels.

Results

The study found a significant positive correlation between pain catastrophizing and both anxiety and depressed mood in patients with chronic low back pain. Specifically, 18 participants showed a high positive correlation, 23 showed a moderate correlation, and 6 showed a low correlation between pain catastrophizing and anxiety, with an average anxiety score of 23.7.

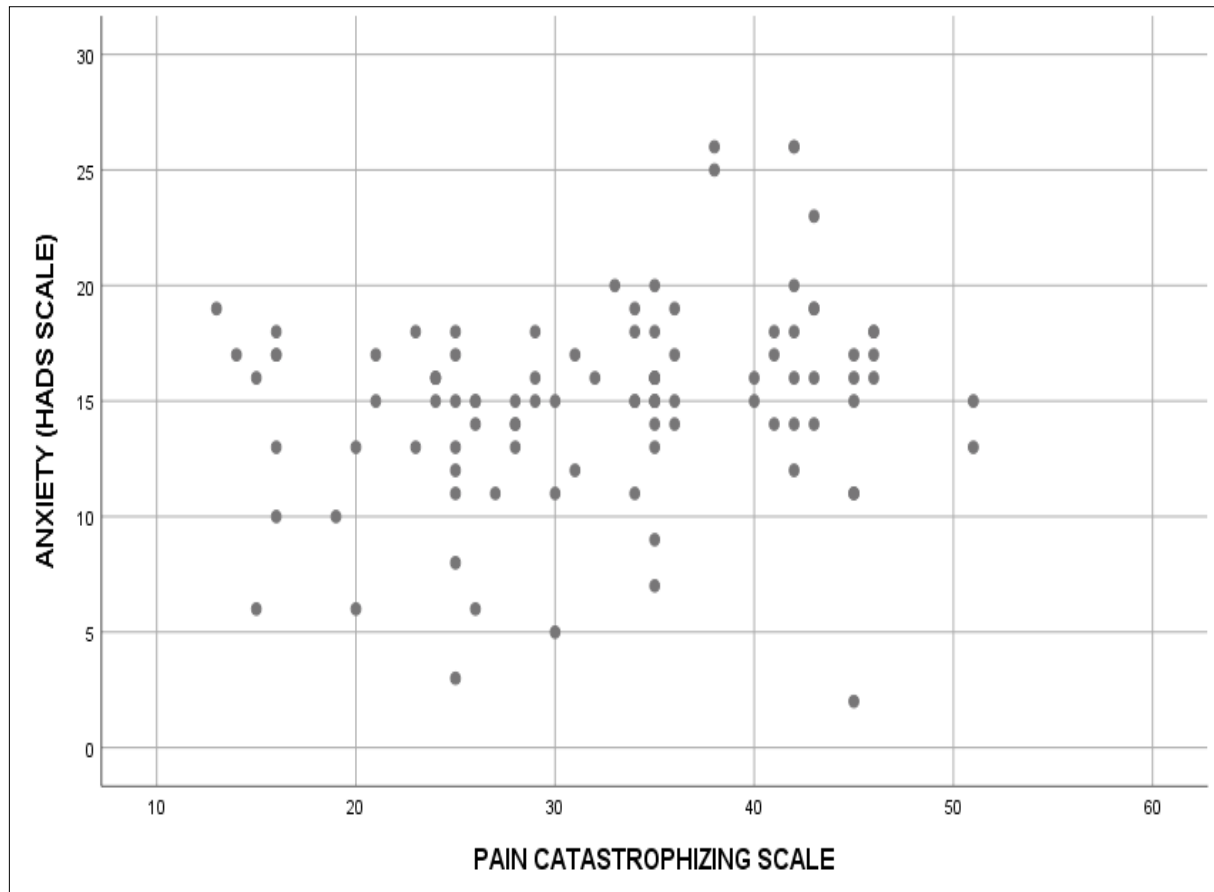
Similarly, in the relationship between pain catastrophizing and depressed mood, 11 participants showed a high positive correlation, 24 showed a moderate correlation, and 9 showed a low correlation, with an average depression score of 21.3.

Statistical analysis revealed

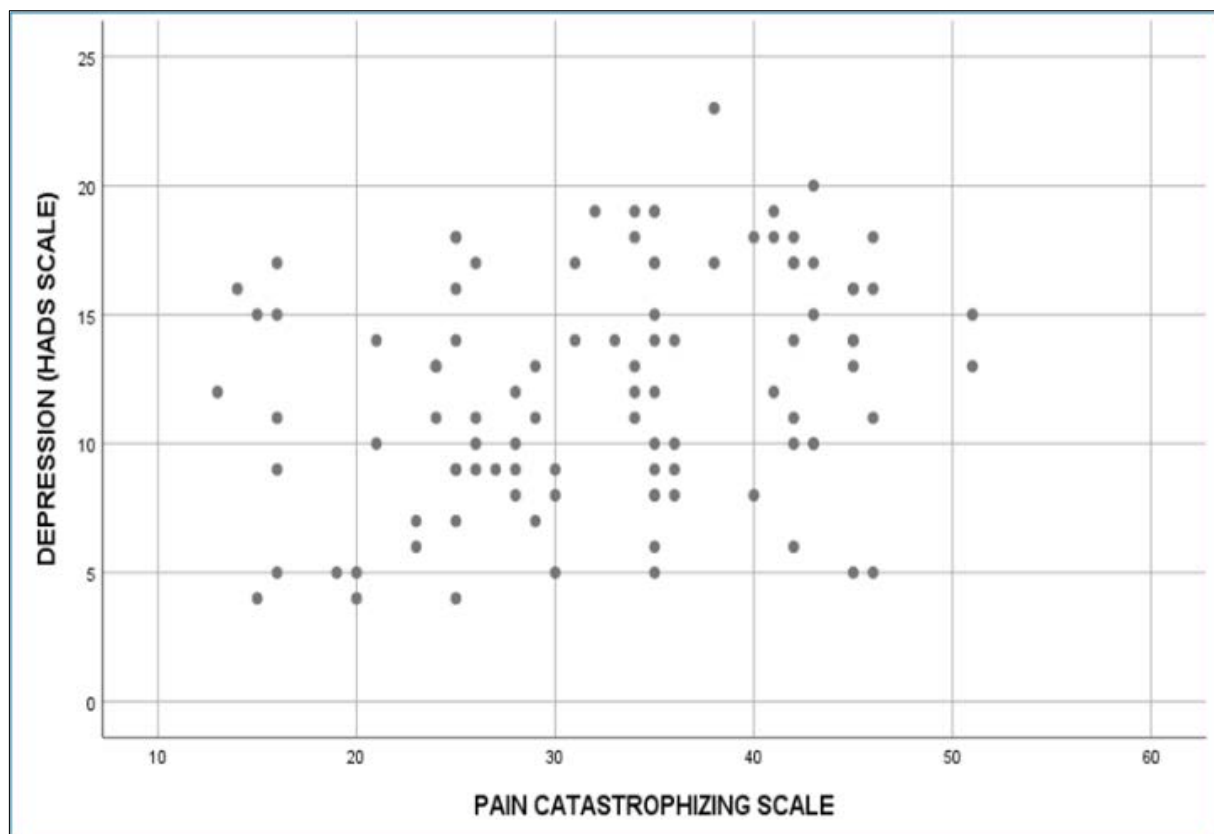
- A correlation coefficient (r value) of 0.220 between anxiety and pain catastrophizing.
- A correlation coefficient (r value) of 0.267 between depressed mood and pain catastrophizing.

These findings indicate that higher levels of anxiety and depression are associated with increased pain

catastrophizing, which in turn contributes to greater pain intensity in individuals with chronic low back pain.



Graph 1: Scatter plot of pain catastrophizing vs anxiety - hads



Graph 2: Scatter Plot of Pain Catastrophizing Vs Depression - Hads

Discussion

This study highlights the significant influence of psychological factors—pain catastrophizing, anxiety, and depression—on pain perception in patients with chronic low back pain undergoing physiotherapy. The findings demonstrated a positive correlation between these variables, with higher levels of anxiety and depression associated with increased pain catastrophizing and pain intensity.

These results are supported by previous research. Best and Nir noted that pain catastrophizing contributes to the transition from acute to chronic pain, while Velly *et al.* emphasized its role alongside depression in chronic pain and disability. Meyer *et al.* also found that positive psychological outlooks are linked to lower perceptions of pain and disability.

Overall, the study confirms the importance of addressing psychological distress in chronic pain management. Incorporating mental health strategies into physiotherapy could lead to better pain outcomes and improved quality of life for patients.

Conclusion

This study concludes that anxiety, depression, and pain catastrophizing are key psychological factors that significantly influence individuals with chronic low back pain, impacting their response to physical therapy. These findings suggest that addressing poor psychological health is essential for effective pain management, as patients experiencing high levels of psychological distress are more prone to increased pain catastrophizing. Therefore, integrating psychological care into treatment plans is crucial for achieving better outcomes in this patient population.

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