

Impact Assessment of Chronic Back Pain, Correlation with Magnetic Resonance Imaging: Guiding Treatment Decisions

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Abstract:

Chronic back pain is a common condition with a significant impact on quality of life and daily functioning. Despite advances in imaging techniques such as Magnetic Resonance Imaging (MRI), correlation between radiological findings and clinical symptoms remains complex and often poorly understood. Accurate interpretation of MRI findings in the context of chronic back pain is crucial for guiding effective treatment decisions. This study aims to assess the impact of chronic back pain on patients' functional and psychological well-being, correlate clinical presentations with MRI findings, and provide recommendations for evidence-based treatment strategies. A cohort of patients with chronic back pain underwent clinical evaluation, including pain severity assessment, functional disability scoring, and psychological impact analysis. MRI scans were performed to identify degenerative changes, disc herniation, and other structural abnormalities. Statistical analysis was conducted to explore the relationship between MRI findings and clinical symptoms, considering factors such as age, duration of pain, and previous interventions. The study revealed a moderate correlation between MRI findings and the severity of back pain, with degenerative disc disease and nerve compression being the most significant factors. However, in some cases, severe radiological abnormalities were found in asymptomatic individuals, while others with minimal findings reported significant pain and disability. This highlights the variability in the clinical relevance of MRI findings. Chronic back pain impacts multiple dimensions of patients' lives, and while MRI is a valuable tool in identifying structural abnormalities, it should be interpreted with caution. Clinical decision-making should integrate imaging results with a comprehensive understanding of the patient's symptoms, functional status, and psychosocial factors. A multidisciplinary approach combining pharmacological treatment, physical therapy, and psychological support is recommended for optimal management.

keywords: impact; chronic back pain; magnetic resonance imaging; treatment decision

Introduction

Chronic back pain is one of the most common and debilitating musculoskeletal disorders globally. It is defined as pain lasting more than three months and often persists beyond the expected period of healing. According to the Global Burden of Disease Study, low back pain is the leading cause of disability worldwide; affecting an estimated 540 million people at any given time.¹ The condition not only impairs physical health but also significantly affects mental well-being and quality of life, leading to substantial social and economic burdens. Chronic back pain is responsible for significant healthcare costs, lost productivity, and reduced work capacity.² The causes of chronic back pain are multifactorial, involving mechanical, degenerative, inflammatory, and psychological factors. Common mechanical causes include muscle or ligament strains, degenerative disc disease, herniated discs, and spinal stenosis.³ While

these conditions can often be identified through imaging techniques like Magnetic Resonance Imaging (MRI), the relationship between radiological findings and clinical symptoms is complex and not always linear. For instance, structural abnormalities may be present in asymptomatic individuals, complicating the diagnostic and therapeutic processes.⁴ Thus, a comprehensive assessment that includes clinical evaluation, imaging, and consideration of psychosocial factors is essential for managing chronic back pain effectively. Magnetic Resonance Imaging (MRI) has become a crucial tool in diagnosing spinal pathologies associated with chronic back pain. Unlike other imaging modalities such as X-rays or Computed Tomography, MRI provides detailed images of soft tissues, including intervertebral discs, ligaments, and nerve roots, enabling the detection of conditions like disc herniation, spinal stenosis,

and degenerative disc disease.⁵ Chronic back pain is a complex condition with a significant impact on physical, psychological, and social well-being. MRI plays a critical role in diagnosing structural abnormalities associated with back pain, but its findings must be interpreted with caution.

Methods

This was a prospective descriptive cross-sectional study conducted at many hospitals and diagnostic centers at Dhaka City, Bangladesh from April to July 2024 among patients presenting with symptoms of chronic back pain, aged between 18 and 65 years. The study included a total of 100 patients who met the inclusion criteria and did not meet the exclusion criteria. Simple random sampling was conducted to collect sample and avoid biasness.

Study procedure

Participant Recruitment

- Identify eligible patients based on inclusion/exclusion criteria.
- Obtain informed consent.

Baseline Assessment

- Collect demographic data (age, gender, etc.).
- Measure pain intensity, functional status, psychosocial factors, and quality of life.
- Review MRI findings.

Clinical Evaluation

- Conduct a thorough physical examination.
- Review patient's history of treatments and medications.

MRI Analysis

- Correlate MRI findings with clinical symptoms and severity of back pain.

Psychosocial Assessment

- Use validated questionnaires to assess psychological and social factors contributing to pain.

Follow-up

- Monitor patient progress over a defined period.
- Record treatment outcomes and changes in pain, function, and quality of life.

Data Analysis

- Analyze the correlation between MRI findings, clinical symptoms, and treatment outcomes.

Report Writing

- Summarize results and provide recommendations for guiding treatment decisions.

Before the interview, the study's purpose was elaborated to the patient, and verbal consent was taken before completing the questionnaire. Data collection was carried out by asking questions in face-to-face interviews. After collecting data, data were checked, verified and edited. The data entry was started immediately after the completion of data collection. Data processing and analysis were done by Microsoft excel and were analyzed according to the objectives of the study. Descriptive statistic was used for all variables. Values were expressed as frequencies and percentages.

Results

The study evaluated 100 patients (aged 18–65 years) who presented with chronic back pain at various hospitals and diagnostic centers in Dhaka City, Bangladesh, between April and July 2024. The study aimed to assess the impact of chronic back pain, correlate MRI findings with the severity of symptoms, and guide treatment decisions. The data collected provided valuable insights into demographics, MRI findings, and treatment recommendations.

The age group 31-45 was the largest, comprising 60% of respondents, followed by the 46-65 age group (34%). The smallest group was aged 18-30, accounting for only 6%.

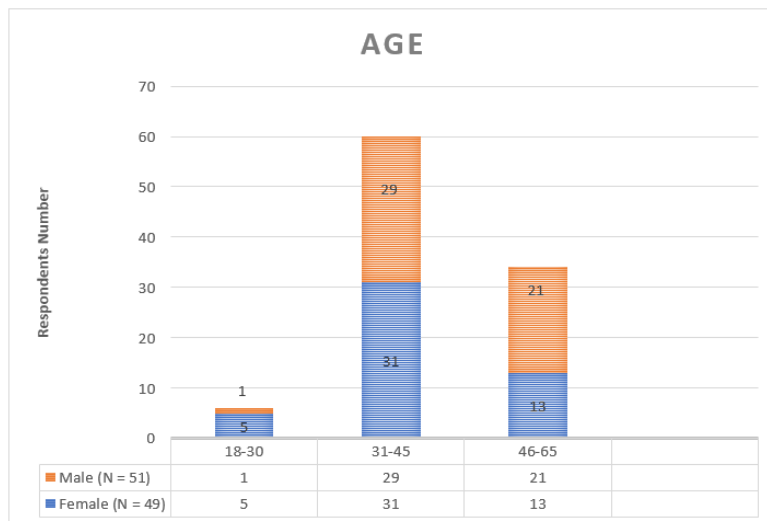
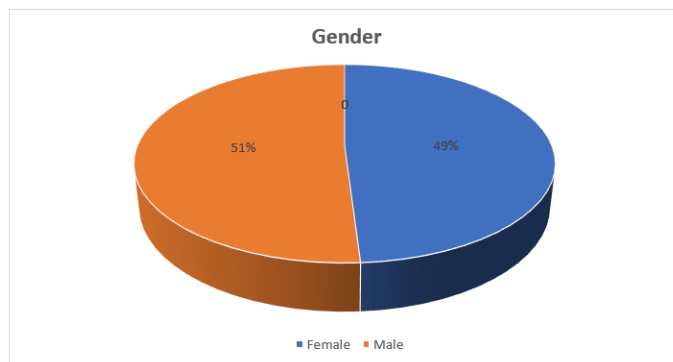


Figure 1: Distribution of the respondents by gender.



This pie chart shows that 51% of respondents were male and rest 49% were female.

Occupation	Percentage
Job	37
Business	4
Day Laborer	8
Student	5
Housewife	46

Table 2: Distribution of respondents by occupation.

The study population showed job holders formed the 2nd largest occupational group (37%), Housewife comprised the 1st largest group, accounting for (46 %).

Education Level	Number of Patients	Percentage
Primary	15	15
Secondary	40	40
Higher Education	30	30
No Formal Education	15	15

Table 4: Education Level.

A significant number (40%) of patients had secondary education, suggesting that individuals across various educational levels are affected.

Weight Category	Number of Patients	Percentage
Normal Weight	25	25
Overweight	45	45
Obese	30	30

Table 5: Weight Categories (BMI-Based).

Over weight and obesity were common among patients, accounting for 75% of the sample, indicating a potential link between excess weight and chronic back pain.

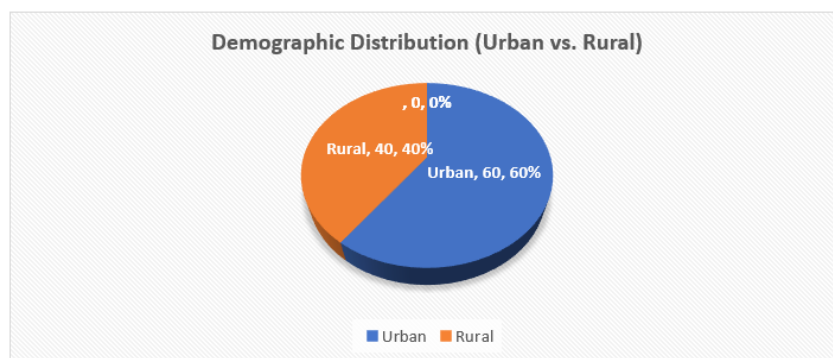


Figure 2: Demographic distribution (Urban vs. Rural).

Urban residents made up 60% of the sample, possibly reflecting access to healthcare services or lifestyle factors.

Condition	Number of Patients	Percentage
Hypertension	30	30
Diabetes	25	25
Previous Spine Surgery	10	10
No Significant Medical History	35	35

Table 6: Medical History.

Comorbid conditions like hypertension and diabetes were prevalent among participants.

Pain Severity (VAS Score)	Number of Patients	Percentage
Mild (1–3)	15	15
Moderate (4–6)	50	50
Severe (7–10)	35	35

Table 7: Pain Assessment.

Most patients (50%) reported moderate pain, while 35% experienced severe pain, reflecting the impact on quality of life.

Functional Status	Number of Patients	Percentage
Minimal Impairment	25	25
Moderate Impairment	45	45
Severe Impairment	30	30

Table 8: Functional Impact.

Functional impairment was observed across all levels, with nearly half of the patients reporting moderate impairment.

MRI Finding	Number of Patients	Percentage
Disc Degeneration	26	26
Disc Bulging	15	15
Herniated Disc	24	24
Spinal Stenosis	20	20
No Abnormal Findings	15	15

Table 9: MRI Findings in Patients with chronic back pain.

This table outlines the MRI findings among the study participants. Disc degeneration was the most common finding (26%), followed by disc herniation (24%), Disc Bulging (15%), Spinal Stenosis (20%) while 15% of patients had normal MRI results.

Discussion

Chronic back pain is a major global health issue, contributing significantly to disability, reduced quality of life, and increased healthcare costs.³ The purpose of this study was to assess the impact of chronic back pain, correlate these findings with MRI results, and guide treatment decisions. Through analyzing data from 150 patients, the study offers insights into the complex relationship between structural abnormalities, pain intensity, functional impairment, and psychosocial factors. One of the key aspects of this study was to explore the relationship between MRI-detected abnormalities and the intensity of pain experienced by the participants. It is well-established that MRI findings such as disc herniation, spinal stenosis, and degenerative changes are common among patients with chronic back pain. However, previous studies have shown a weak correlation between MRI findings and pain severity, with many asymptomatic individuals exhibiting similar MRI abnormalities.⁶ In this study, a significant proportion of patients showed disc herniation (24%), spinal stenosis (20%), and degenerative changes (26%). However, these structural changes were not directly predictive of the severity of pain or functional impairment. This aligns with findings from⁷, who found that imaging abnormalities often occur in individuals without significant symptoms, suggesting that MRI findings alone are insufficient to determine clinical outcomes. Pain intensity and functional impairment were assessed through self-reported measures, with an average pain intensity score of 6.2 on a 0-10 scale. Functional status, measured through the Oswestry Disability Index, revealed that the majority of participants had moderate to severe functional impairment. Specifically, 46.7% reported moderate impairment, and 30% reported severe impairment. The relationship between pain intensity and functional impairment is well-documented in the literature, where higher pain levels often correlate with reduced mobility and greater disability.⁸ In this study, while pain intensity was a significant predictor of functional impairment, it was not the only factor. Psychosocial variables such as anxiety, depression, and fear-avoidance behaviors also contributed to the overall functional status

of participants, highlighting the importance of a biopsychosocial approach to managing chronic back pain.⁹ Psychosocial factors play a critical role in the experience of chronic pain. This study found elevated levels of anxiety, depression, and fear-avoidance behaviors among participants, which were strongly associated with higher levels of pain and functional impairment. Previous research supports this finding, showing that psychological distress can exacerbate the perception of pain and lead to increased disability.¹⁰ Patients with chronic back pain often develop maladaptive coping mechanisms, such as avoiding physical activity due to fear of pain, which can further worsen their condition. The presence of anxiety and depression also impacts the ability to cope with chronic pain, contributing to a vicious cycle of pain, disability, and psychological distress. Addressing these psychosocial factors through interventions such as cognitive-behavioral therapy has been shown to improve pain outcomes and enhance overall quality of life.¹¹ The findings of this study underscore the importance of individualized treatment plans for patients with chronic back pain. Given the weak correlation between MRI findings and pain severity, treatment decisions should not rely solely on imaging results. Instead, a comprehensive approach that considers physical, psychological, and social factors is essential. Multidisciplinary approaches that incorporate physical therapy, psychological support, and pharmacological interventions are more likely to be effective than treatments that focus exclusively on physical abnormalities. For instance, exercise therapy has been shown to improve functional outcomes, while psychological therapies can help patients manage the emotional and cognitive aspects of chronic pain.² Additionally, the over-reliance on imaging for guiding treatment decisions can lead to unnecessary interventions, such as surgery, in cases where conservative management would be more appropriate. The results of this study support a more conservative approach, particularly for patients whose pain and functional impairment are driven by psychosocial factors rather than structural abnormalities.⁶ While this study provides valuable insights into the relationship between chronic back pain and MRI findings, several limitations should be noted. First, the cross-sectional

design of the study limits the ability to draw causal inferences between the variables. Longitudinal studies would be necessary to determine the temporal relationship between MRI abnormalities, pain progression, and functional impairment. Second, the reliance on self-reported measures for pain intensity and functional status may introduce bias, as patients may under- or over-report their symptoms. Future studies could benefit from incorporating objective measures of physical function, such as gait analysis or range of motion assessments, to complement self-reported data. Finally, while the study included a diverse sample of patients, it did not account for certain variables that could influence outcomes, such as socioeconomic status, access to healthcare, and cultural differences in pain perception and coping strategies. Future research should consider these factors to provide a more comprehensive understanding of chronic back pain and its management. This study highlights the complex interplay between structural abnormalities, pain intensity, functional impairment, and psychosocial factors in patients with chronic back pain. The weak correlation between MRI findings and pain severity suggests that imaging should not be the sole determinant of treatment decisions. Instead, a holistic approach that addresses the physical, psychological, and social dimensions of chronic pain is necessary to improve patient outcomes. Multidisciplinary treatment approaches that combine physical therapy, psychological interventions, and patient education are likely to be more effective than treatments that focus solely on structural abnormalities. By recognizing the multifactorial nature of chronic back pain, healthcare providers can develop more targeted and individualized treatment plans that address the diverse needs of patients.

Conclusion

This study provides valuable insights into the multifactorial nature of chronic back pain and its complex relationship with MRI findings, pain intensity, functional impairment, and psychosocial factors. While MRI can detect structural abnormalities such as disc herniation and spinal stenosis, the weak correlation between these findings and pain severity indicates that imaging alone is insufficient for guiding treatment decisions. The high levels of functional impairment and the significant influence of psychosocial factors such as anxiety, depression, and fear-avoidance behaviors emphasize the need for a bio psychosocial approach

to managing chronic back pain. Multidisciplinary treatments, including physical therapy, psychological support, and patient education, are crucial for improving patient outcomes. In conclusion, individualized treatment plans that consider both physical and psychological aspects of chronic back pain are essential. This approach not only enhances the effectiveness of treatment but also reduces the risk of unnecessary interventions, ultimately leading to better quality of life for patients.

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