

ORIGINAL RESEARCH

**STUDY OF MRI FINDINGS OF LOW BACK PAIN OF ASSAM
MEDICAL COLLEGE AND HOSPITAL**

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ABSTRACT

Background: Back pain is a common clinical condition and is a frequent cause of referral for lumbar spine MRI. The use of radiological imaging is crucial for helping to confirm or exclude pathology and, more crucially, for influencing the treatment decision-making process. The purpose of the current study was to assess the use of MRI in individuals with lower back pain.

Material and Methods: The current study involved individuals who had been sent for an MRI and had low back pain as their predominant complaint, either with or without radiculopathy.

Results: 234 patients of low back pain were considered for study. Mean Age was 46.85 ± 16.35 years. Majority cases were from 46-60 (62.39 %) years age group, were Female (53.42 %), had BMI 25–30 kg/m² (47.86 %). Majority cases had radiating pain (sciatica) (71.37 %), pain since >2 Years (44.87 %), Moderate (63.68 %) severity of pain. Associated symptoms were tingling (19.66 %), numbness (25.21 %), pain exaggerated by: lifting heavy objects (38.03 %) & pain exaggerated by walking (26.07 %). Common MRI findings were degenerative changes (56.41 %), neural foraminal narrowing (43.16 %), degenerative spondylolisthesis (28.63 %), disc bulge (23.08 %), abnormal alignment (19.23 %), spondylosis (18.38 %), disc protrusion (12.82 %) & canal stenosis (10.26 %). **Conclusion:** Disc degeneration and other degenerative changes are the most common abnormalities found in MRI examination.

Keywords: Magnetic resonance imaging, low back pain, disc degeneration, spine pathologies.

INTRODUCTION

Back pain is a common clinical condition and is a frequent cause of referral for lumbar spine MRI. More than 85% of patients will have nonspecific LBP, which usually improves within a few weeks. LBP is associated with substantial direct health care costs as well as indirect costs related to disability and loss of productivity.¹

Degenerative changes, spinal stenosis, neoplasms, infections, trauma, and inflammatory or arthritic processes are some of the causes of low back pain (LBP). Degeneration of the lumbar disc is the most frequently identified abnormality in relation to low back pain of all of these.² Many structural components of spine are responsible for low backache of degenerative etiology including the intervertebral disc, vertebral periosteum, facet joints and spinal ligaments. The most frequent and common location of these changes is lumbar spine due to heavy mechanical stress and rotatory forces.³

The majority of low back pain can be treated conservatively, at least temporarily, whereas some patients experience prolonged pain. In order to establish or rule out pathology and, more critically, to have an impact on the treatment decision-making process, radiological imaging is an essential tool.⁴ Present study was aimed to evaluate role of Magnetic Resonance Imaging(MRI) in patients with lower back pain.

MATERIAL AND METHODS

Present study was single-center, prospective, observational study, conducted in department of radiodiagnosis, at Department of Radiodiagnosis, Assam Medical College and Hospital, Dibrugarh, India. Study duration was of 1 year (January 2021 to December 2021). Study was approved by institutional ethical committee.

Inclusion criteria

- All patients wanting to participate who have been referred for an MRI and have low back pain as their predominant complaint, whether or not they have radiculopathy.

Exclusion criteria

- Patients with tumours and infections
Individuals who cannot get an MRI due to claustrophobia, pacemakers, metallic implants in the lumbar spine, or pregnancy
- Not willing to participate

Study was explained & a written consent was obtained for participation. Baseline data such as demographic details, clinical complaints, medical history, physical examination findings were collected & entered in case record proforma.

Siemens 1.5 Tesla M R I. Using the spine phased array coils, Avanto fitted an MR imager. The scans included turbo spin echo and STIR images that were T1-weighted in the sagittal and axial directions with a repetition time/echo time (TR/TE) of 500/19 ms and T2-weighted with a TR/TE of 1200/120 ms. Both sagittal and axial pictures were created using slices that were 4 mm thick. Sagittal pictures were produced using a 192 by 256 matrix and a field of view of 260 mm, while axial images were produced using a 192 by 256 matrix and a field of view of 200 mm.

The same MRI scanner was used for all of the MRIs, and normal protocols were followed to expose the lumbosacral spine. The characteristics evaluated include disc prolapse, spinal canal narrowing, hypertrophic ligamentous flavum > 5 mm, and stenosed spinal canal 11.5 mm. Additionally, vertebral collapse, osteophytes, and the presence of spondylolisthesis were identified.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

234 patients of low back pain were considered for study. Mean Age was 46.85 ± 16.35 years. Majority cases were from 46-60 (62.39 %) years age group, were Female (53.42 %), had BMI 25–30 kg/m^2 (47.86 %).

Table 1: General characteristics

Variables	No. of Patients	Percentage
Age groups (years)		
< 45	29	12.39%
46-60	146	62.39%
> 60	59	25.21%
Age (Mean \pm SD)	46.85 ± 16.35	
Sex		
Male	109	46.58%
Female	125	53.42%
BMI (kg/m ⁺)		0.00%
<25	43	18.38%
25–30	112	47.86%
>30	79	33.76%

In present study, majority cases had radiating pain (sciatica) (71.37 %), pain since >2 Years (44.87 %), Moderate (63.68 %) severity of pain. Associated symptoms were Tingling (19.66 %), numbness (25.21 %), pain exaggerated by: lifting heavy objects (38.03 %) & pain exaggerated by walking (26.07 %).

Table 2: Characteristics of low back pain

Variables	No. of Patients	Percentage
Site of pain		
Localized	67	28.63%
Radiated (sciatica)	167	71.37%
Duration of pain		0.00%
< 6 months	40	17.09%
6 months – 2 years	89	38.03%
>2 Years	105	44.87%
Severity of pain		0.00%

Mild	36	15.38%
Moderate	149	63.68%
Sever	49	20.94%
Associated symptoms		
Tingling	46	19.66%
Numbness	59	25.21%
Pain exaggerated by: lifting heavy objects	89	38.03%
Pain exaggerated by: Walking	61	26.07%

We noted that, one patient may have multiple findings. Common MRI findings were degenerative changes (56.41 %), neural foraminal narrowing (43.16 %), degenerative spondylolisthesis (28.63 %), disc bulge (23.08 %), abnormal alignment (19.23 %), spondylosis (18.38 %), disc protrusion (12.82 %) & canal stenosis (10.26 %).

Table 3: MRI findings

MRI Findings	No. of Patients	Percentage
Degenerative changes	132	56.41%
Neural foraminal narrowing	101	43.16%
Degenerative spondylolisthesis	67	28.63%
Disc bulge	54	23.08%
Abnormal alignment	45	19.23%
Spondylosis	43	18.38%
Disc protrusion	30	12.82%
Canal stenosis	24	10.26%
Scoliosis	16	6.84%
Ligamentum flavum hypertrophy	12	5.13%
Lytic spondylolisthesis	9	3.85%
Facet joint arthropathy	8	3.42%
Paraspinal soft tissue changes (spondylodiscitis)	8	3.42%
Disc extrusion	6	2.56%
Fracture	3	1.28%
Infection	3	1.28%
Metastasis	2	0.85%

DISCUSSION

The American College of Radiology⁵ has published appropriateness criteria for imaging in low back pain, largely pointing out that imaging may not be appropriate unless there are specific “red flags” that were encountered during clinical or laboratory evaluation. Red flags included significant trauma or milder trauma at an older age of over 50, unexplained weight loss, unexplained fever, immunosuppression, a history of cancer, intravenous drug use, prolonged corticosteroid use for osteoporosis, focal neurologic deficit with progressing or disabling symptoms, and duration longer than 6 weeks.

Persistent low back pain may be the only presenting symptom in some serious pathologies such as vertebral osteomyelitis metastatic vertebral lesions, primary neoplasms of vertebrae and intradural tumor with without altering biochemical /hematological parameters or manifesting on plain radiographs.⁶

The best imaging method for visualising the spine is magnetic resonance imaging (MRI), which has the highest contrast, spatial resolution, and lacks ionising radiation.⁷ MR imaging offers high contrast resolution and multiplanar reconstruction for lesion characterization. Unenhanced and contrast-enhanced MR images, which can also disclose anatomical information that is not seen on isotopic examinations, can show inflammatory, neoplastic, and most traumatic lesions. MR imaging displays great sensitivity and specificity when assessing spinal infections.^{8,9}

There were 121 men and 114 women among the 235 patients in the study by Shrinivasan S et al.¹⁰ In the third to fifth decade, back pain was frequently reported. Disc herniations, which account for 82.1% of all cases of back pain, are the most common cause, followed by normal study (10.2%), vertebral collapse (traumatic 2.1%, osteoporotic 1.7%), infections (2.1%), and neoplasm (1.7%). The fundamental reasons of LBP can be better understood thanks to MRI, particularly when it comes to disc and marrow pathology.

60 instances were evaluated by Iyidobi EC *et al.*,¹¹; of these, 35 (58.3%) were male and 25 (41.7%) were female, with the majority of patients being between the ages of 40 and 59. Disc prolapse was present in 90% of the pictures, whereas disc height loss was present in 73%. The most frequent causes of spinal canal stenosis were osteophytes, spondylolisthesis, thickened ligamentum flavum, and disc prolapse. Six patients (10%) had no lesions visible on the MRI. L4/5 was the most frequently impacted segment, and 90% of atypical cases involved multiple levels. An good guiding tool, MRI scans have a high yield of diagnosis in low back pain patients with a clinical requirement for invasive intervention. L4/L5 disc level is still the most frequent offender.

In study by Muthu S et al.,¹² commonest age group affected by low back ache in the study was 20-50 years. The male is to female ratio was 1.71:1. The commonest level of disc involvement by degenerative disease was L5-S1 and L4-L5. The commonest disc herniation characteristic was diffuse disc bulge. The clinical presentation of sciatica showed statistically significant correlation with neural foraminal narrowing on MRI.

According to Nirmalkumar G et al.¹³, degenerative disc diseases were the most common pathology, followed by congenital and traumatic lesions. Neoplastic lesions were the least common. The most typical type of herniation is a disc bulge (79%), which is followed by disc protrusion (15%), disc extrusion (6%) and disc sequestration (1%). The posterolateral disc herniation is the most prevalent and least common type. Sacralization was the most prevalent congenital spinal abnormality, followed by lumbar scoliosis and perineural cyst. There is no sex difference in disc protrusion, however disc extrusion with subligamentous extrusion is more common in men.

MRI is non invasive imaging technique with excellent spatial and contrast resolution. As a result, it is now the preferred method of investigation for evaluating individuals with radicular or low back pain. It has also emerged as an investigation of choice over the other investigations for a herniated disc and become a gold standard to diagnose herniated disc.¹⁴

MRI is the method of choice for the evaluation of disk morphology because of the good sensitivity (60–100%) and specificity (43–97%) for disk herniations (both protrusions and extrusion).¹⁵ The lower specificity of MRI can be attributed to the high prevalence of degeneration (46–93%) and protrusions (20–80%) in asymptomatic adults.⁴

Available treatment options for management of each of these pathologies vary. For example pain due to facet arthropathy can be targeted by facet joint infiltration with painkiller with or without steroid, which will provide relief for a considerable time.^{16,17} Surgery is not a primary option in this case. Similarly, pain due to nerve root compression may be due to a large disc herniation, which may require microdiscectomy or a decompressive surgery.¹⁸

CONCLUSION

Magnetic resonance imaging serves as a noninvasive and highly sensitive method for evaluating the spine in the presence of low back pain. Disc degeneration and other degenerative changes are the most common abnormalities found in MRI examination. MRI is highly sensitive in detecting and differentiating lesions of varied etiologies such as degenerative changes infective lesions, tumors, congenital and developmental disorders, compression fractures and many other uncommon pathologies of the spine.

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