Biomedical and Biopharmaceutical Research
Abbreviation: Biomed. Biopharm. Res.
Volume: 22: Issue: 02 |Year: 2025
Page Number: 598-503

MANGNETIC RESONANCE IMAGING IN EVALUATION OF LOWBACK ACHE OF NON TRAUMATIC ETIOLOGY

Dr. Jones Lakkenaboyina[1], Dr. S Venkateswara Rao[2] Dr. Soujanya[3], Dr. Srinidhi Srinivasan[4], Dr. Arun paul[5]

[1,2,3,4,5]Asram Medical College,eluru A.P

Corresponding Author

Dr. Jones Lakkenaboyina
Asram Medical College,eluru A.P

Article Received:29-06-2025

Article Accepted:21-07-2025

Abstract

Background:
Low backache is one of the most frequent complaints in clinical practice, particularly among individuals engaged in occupations involving prolonged standing, sitting, or improper posture. In India, it contributes significantly to the socioeconomic burden. MRI has emerged as the investigation of choice due to its superior ability to visualize spinal and paraspinal soft tissues.

Aim and Objectives:
To evaluate MRI findings in patients with low backache of non-traumatic etiology.
To distinguish between various pathological causes and levels of spinal involvement.
To assess the correlation between clinical diagnosis and MRI findings, including the differentiation of infective causes, follow-up of treated Pott's spine, and grading of disc prolapse and sacroiliitis.
Materials and Methods:
A descriptive observational study was conducted over 6 months involving 100 patients with low backache undergoing MRI at the Department of Radio-Diagnosis, Alluri Sitaramaraju Medical College, Eluru. Patients with a history of spinal surgery, trauma, or metallic implants were excluded. Imaging was performed using a 1.5T SIEMENS MRI scanner. Standard sequences included T1WI, T2WI (sagittal and axial), STIR, and contrast-enhanced studies where needed.

Results:
Degenerative changes were the most common finding (87%), particularly disc bulges, followed by disc protrusion and endplate changes.
The L4–L5 and L5–S1 levels were most frequently involved.
Infective etiologies were seen in 16.26% of cases, with tubercular spondylitis being predominant.
Neoplastic causes (8.94%) included metastases, multiple myeloma, and sacral chordoma.
MRI was highly effective in evaluating sacroiliitis, spinal canal stenosis, and congenital anomalies like myelomeningocele and AVM.

Conclusion:
MRI is the imaging modality of choice for evaluating non-traumatic low backache. It provides detailed anatomical and pathological information that is essential for diagnosis and management. Degenerative changes were the most common cause, followed by infections and neoplasms. MRI was particularly valuable in assessing Pott's spine, detecting early sacroiliitis, and evaluating spinal tumors.

Key words: Low Backache, MRI Spine, Degenerative Disc Disease, Pott's Spine, Sacroiliitis, Spinal Canal Stenosis, Neoplastic Spine Lesions, Modic Changes.

INTRODUCTION

–Low backache is a commonly encountered complaint in clinical practice with a significant economic burden to the society. In India, a high incidence of Low backache in individuals who handling heavy loads, constant sitting/standing position or working at improper body position and prolonged working hours.

–Currently MRI provides most precise visualisation of all spinal elements and paraspinal soft tissues. The ability of MRI to detect disc and subchondral bone marrow signal changes makes it an investigation of choice for evaluation of Low backache .

AIMS AND OBJECTIVES:

The aims and objectives of this study were:

– To evaluate the changes seen on MRI in patients with low backache due to various non- traumatic causes.

– To distinguish various causes of low backache with level of spinal involvement.

– To evaluate the concordance between clinical diagnosis and MR imaging, and to differentiate infective etiology,follow up of previously treated potts spine,and grading of disc prolapse and sacroiliitis.

MATERIALS AND METHODS:

– This descriptive observational study was carried out over a period of 6 months in 100 patients with low back pain who underwent MRI of the lower spine at Department of RadioDiagnosis, Alluri Sitaramaraju Medical College Sciences Eluru.

– Patients who met the inclusion / exclusion criteria were included in the study

Inclusion Criteria:

– Patients with low-back ache of non-traumatic etiology who underwent MRI of lower spine and follow up cases of potts spine and to rule out any vertebral metastasis.

Exclusion Criteria:

–Patients with previous history of spinal surgery and acute trauma and any implant

Method of collection of data:
The study was conducted in patients who underwent MRI for evaluation of low backache and agreed to participate in the study. An informed consent was taken from the patient before including them in study.

- SIEMENS 1.5 T MRI scanner used in the study

The following sequences of the lower spine were performed:

1. T2 weighted imaging (T2 WI) sagittal spine,
2. T1 weighted imaging (T1 WI) sagittal spine,
3. T1 WI axial images of relevant segments of spine,
4. T2 WI axial images of relevant segments of spine,
5. Coronal short τ wave inversion recovery (STIR) sequence of region of interest,
6. T1 fat saturation (FS) sagittal spine
7. T1 FS axial images of relevant segments of spine

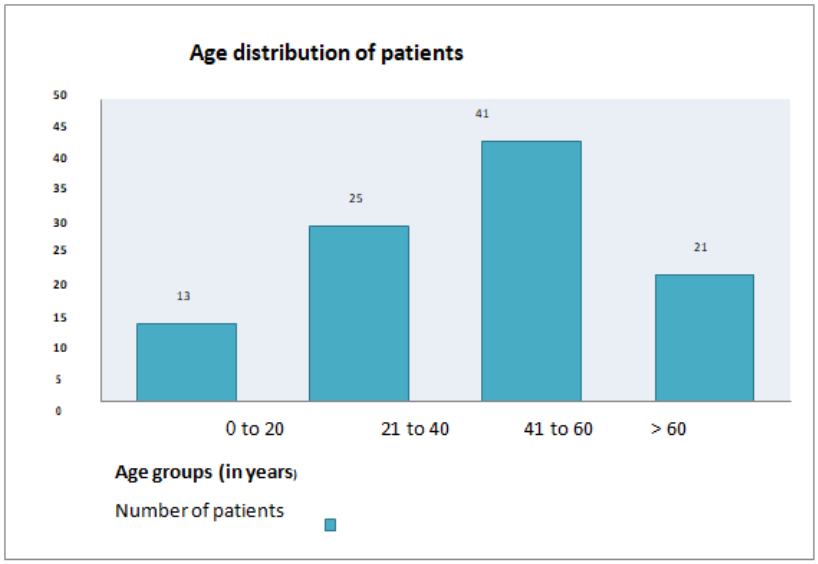
Slice thickness of 4mm ,spacing 1mm ,flip angle -150°Contrast MR study (I.V gadolinium injection) was performed wherever required. Patient's renal function was assessed

Common Causes of Low Backache

Degenerativedisease	Degenerativediscdiseases	Discbulge
		Discprotrusion
		Discextrusion
		Discsequestration ±migration
	Vertebralbodychanges	Spondylolysis
		Spondylolisthesis
		Hemangioma
		Schmorl,snodes
		Osteophytes
		Endplatechanges
	Ligamentumflavumchanges	
	Posteriorelementchanges	Facetalarthrosis
Trauma		
Infective/Inflammatory	Tuberculosisspine	
	Pyogenic	
	Echinococcosis	
	Ankylosingspondylitis (ip.ludingsacroiliitis)	
Neoplasms	Extradural	Lymphoma
		Myeloma
		Metastases
		Hemangioma
		Vertebralbodytumours
		Chordoma
		Sarcoma
	Intraduralextramedullary	Schwannoma
		Neurofibroma
		Meningioma
		Ganglioneuroma
		Paraganglioma
		DermoidIEpidermoid
		Arachnoidcyst
		Metastases
		Ependymoma
	Intrarnedullary	Ependymoma
		Astrocytoma
		Hemangioblastoma
		Glioblastoma
		Metastases
		Hydrosyringomyelia

The study included a total of 100 patients. More than 40% of patients (n = 41) were in the age group of 41 to 60 years. There were 25 patients in the age group of 21 to 40 years, followed by age group of > 60 years (n = 21) and least patients

were in the age group of <20 years (n = 13). In our study we observed a slight male preponderance with 58% of patients being males



MRI diagnosis of various causes of low back pain

RESULTS

Figure No.1 : (A) Sagittal and (B) axial T2 weighted MRI of LS

MRI diagnosis	No.of patients	%
Degenerative changes	87	82.08
infective	20	18.87
inflammatory	4	3.77
neoplastic	11	10.38
congenital	4	3.77
Arachnoid cyst	2	1.89

DISCUSSION

– The study included a total of 100 patients. More than 40% of patients were in the age group of 41 to 60 years. There were 25 patients in the age group of 21 to 40 years, followed by age group of > 60 years and <20 years .

– Nearly half of the patients had bilateral radiculopathy.All the patients with radiculopathy had nerve root impingement /compression on MRI

– Degenerative changes were seen in more than 80% of patients ,followed by infective (16.26%)and neoplastic (8.94%) etiologies. Degenerative changes were considered primary cause for the low back pain in 65 patients.

Degenerative Changes

– Degenerative changes were observed in 87 patients in our study.

– Among this degenerative disc changes were the most common abnormality seen in > 70% of patients (71.7%) followed by endplate changes (59.4%), vertebral changes (54.7%) joint and ligament changes (41.5%).

– Disc bulges were most commonly seen followed by disc protrusion, annular fissure/tears, disc extrusion and disc sequestration. The most commonly affected discs were L4-5 followed by L5-S1 and L3-4. L1-2 and L2-3 were least commonly affected discs.

• Degenerative Vertebral End Plate Changes

• In our study vertebral end plate changes were seen in the form of Schmorl's nodes in 48 patients and Modic endplate changes seen in 51 patients . Type II Modic end plate changes were commonest and seen in 37 patients followed by type I and type III Modic end plate changes.

• Degenerative Vertebral Changes

• In our study, vertebral changes were seen in the form of spondylolysis, spondylolisthesis and osteophytes. Most of the cases of spondylolisthesis were common in patients > 40 years or older (19 of 23 patients; 82.6%).

• Degenerative facet and ligament changes

• In our study degenerative joint and ligament changes were seen in the form of ligamentum flavum hypertrophy (LFH) and facetal arthropathy (FA). LFH and FA were almost always associated with degenerative changes (41 of 43 patients; 95.34%).

• Lumbar spinal canal stenosis

• (defined as <10 mm of AP diameter) was seen in 60 patients in the present study . Degenerative changes were the commonest cause of lumbar canal stenosis (71.7%) followed by infections (13.3%), tumours , arachnoid cyst (3.3%) and congenital lumbar spinal canal stenosis (1.7%).

• Infections of Spine

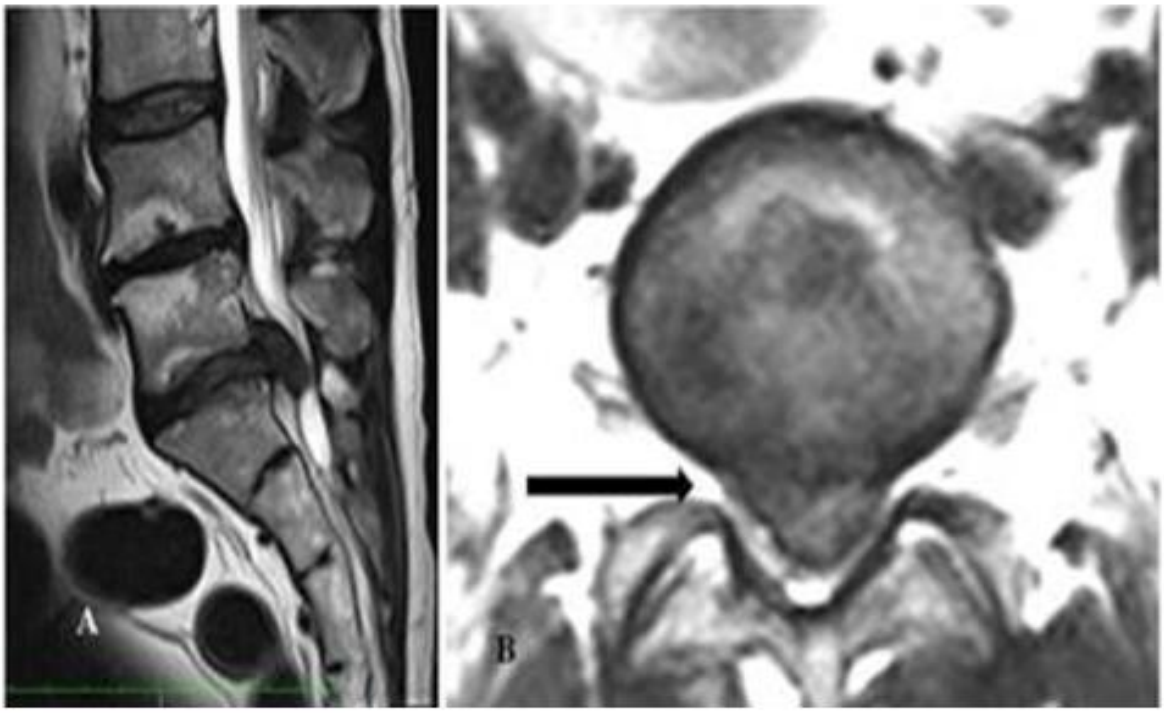
• Tubercular spondylitis was the commonest infective condition seen in 17 patients (85%) followed by pyogenic spondylitis (15%). In all these cases ,final diagnosis was confirmed by demonstrating acid fast bacilli on Ziehl Neelson staining for tubercular spondylitis and culture/sensitivity for pyogenic spondylitis.

• Pott's spine was seen mostly in patients aged 40 years or older (11 of 16; 68.75%) (range 20 to 75 years) without any gender predilection

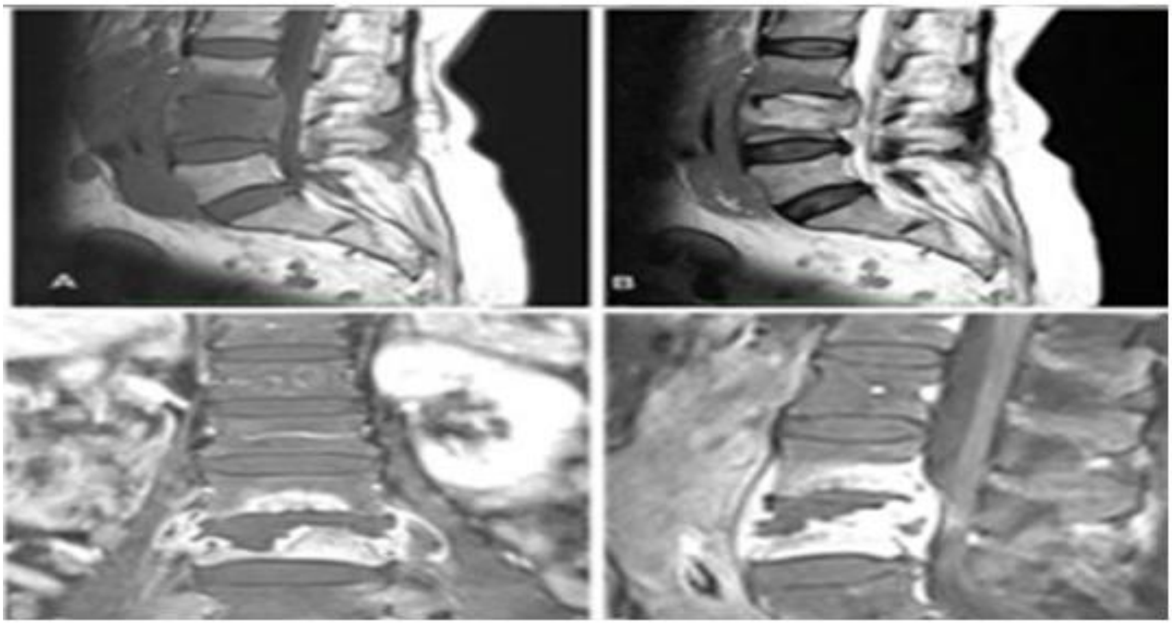
• There were three cases of pyogenic spondylitis in our study . Among pyogenic spondylitis, S. aureus was reported in two cases and E. coli in one case. All the cases with tubercular spondylitis were treated with antitubercular treatment and pyogenic spondylitis were treated with appropriate antibiotics.

• Sacroiliitis

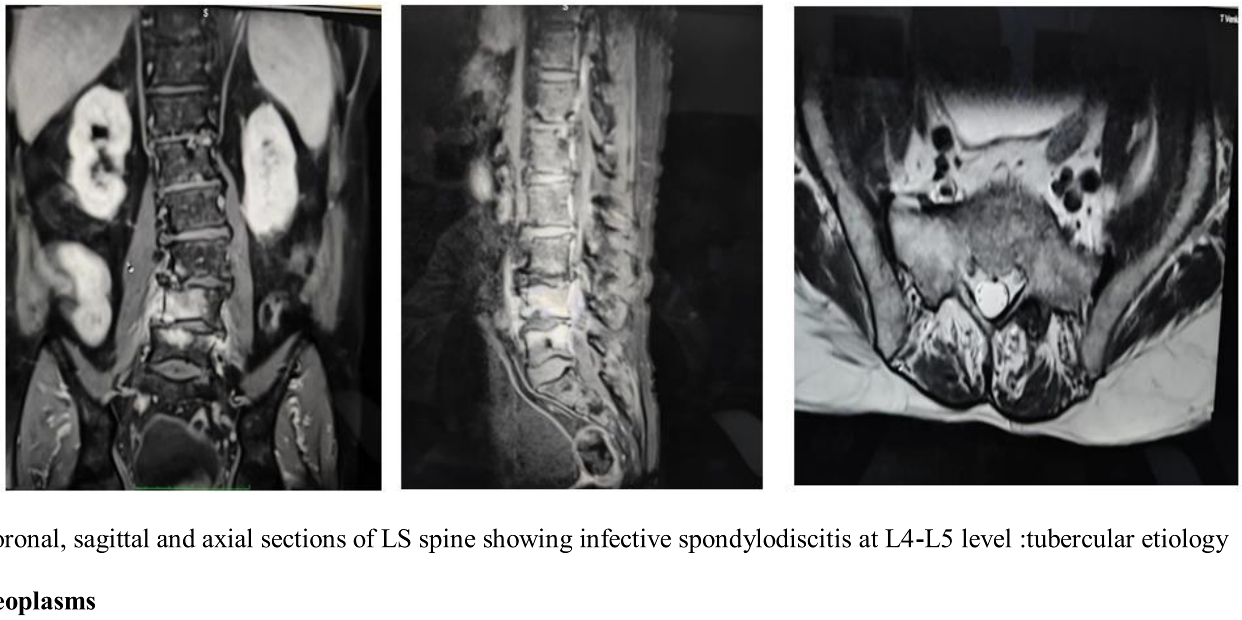
• In our study there were four cases of sacroiliitis . Three cases were bilateral and one case was unilateral (left side). MRI showed a high positive predictive value in the diagnosis of sacroiliitis in our study. Changes of sacroilities are seen earliest on MRI.Bone marrow edema along the sacroiliac joints was the most common feature and was seen in three patients



A.Sagittal and b.Axial T2 weighted MRI of LS spine showing central disc protrusion with caudal extension causing spinal canal stenosis



Acase of tubercular spondylodiscitis. Sagittal (A) T1 and (B) T2 weighted MRI showing altered marrow signal L4 [illegible] L5 L4 [illegible] L3 [illegible] [illegible] L3 [illegible] [illegible] –suggestive



Coronal, sagittal and axial sections of LS spine showing infective spondylodiscitis at L4-L5 level :tubercular etiology

Neoplasms

– There were 11 neoplasms noted in our study, 10 were malignant and one tumour was benign. Among the malignant conditions, most of them were metastasis, seen in eight patients (age ranging from 41 to 65 years).

– The primary lesions were carcinoma prostate in four patients, carcinoma lung in three patients and carcinoma esophagus in one patient . There was one each case of multiple myeloma and sacral chordoma. There was a case of benign giant cell tumour.

– Chordomas are most commonly seen in the sacrococcygeal region (> 50 to 60%) . Presence of concurrent paresthesias, bladder/bowel disturbance should direct the clinician to suspect sacrococcygeal chordoma. Multiple myeloma is a commonly encountered primary malignancy of bone and constitutes for approximately 10% of all hematologic malignancies. Giant cell tumours (GCT) involving the spine are rare and comprise <3% of all GCT.
Congenital lesions
–There are two cases of myelomeningocele,one case each of diastematomyelia and arteriovenous malformation (AVM)of spinal cord in our study .there were two cases of arachnoid cysts seen in patients aged 49 and 55 ,both of which caused mass effect in the form of compression of cauda equina fibres.
–All these cases underwent surgery and final diagnosis was confirmed.
–Other findings seen in our study were LSTV-L , LSTV-S , Tarlov cyst (perineural cyst)and

CONCLUSION

– In this study of 100 patients, degenerative changes were the commonest cause for low backache followed by infective and neoplastic etiologies. L4-L5 disc was the most commonly involved spinal level in our study followed by L5-S1 and L3-L4. Additionally, the ability of MRI to detect disc and vertebral signal changes has made it an investigation of choice for evaluation of low backache.
– Pott's spine was the commonest infection followed by pyogenic spondylitis. MRI helped in narrowing down differential diagnosis and helped in arriving to more accurate diagnosis.
– MRI is the modality of choice for evaluation of spinal cord neoplasms as it can provide diagnosis or differential diagnosis in majority of cases as clinical findings are often insufficient to arrive at working diagnosis

REFERENCES

1. Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, et al. Asystematic review of the global prevalence of low back pain. Arthritis Rheum 2012;64:2028-37.
2. Bindra S, Sinha AGK, Benjamin AI. Epidemiology of low back pain in Indian population: Areview. Intl J Basic Appl Med Sci 2015:166-79.
3. Gopalakrishnan N, Nadhamuni K, Karthikeyan T. Categorization of pathology causing low back pain using magneti resonance imaging (MRI). J Clin Diagnos Res 2015;9:TC17-20.
4. Lee KY. Comparison of pyogenic spondylitis and tuberculous spondylitis. AsianSpine J 2014;8:216-23.
5. LaBerge JM, Brant-Zawadzki M. Evaluation of Pott's disease with computed4 Lee KY. Comparison of pyogenic spondylitis and tuberculous spondylitis. Asian Spine J 2014;8:216-23
6. Mut M, Schiff D, Shaffrey ME. Metastasis to nervous system: spinal epidural and intramedullary metastases. J Neurooncol 2005;75:43-56.
7. Munk PL, Helms CA, Holt RG, Johnston J, Steinbach L, Neumann C. MR imaging of aneurymal bone cysts.AJR Am J Roentgenol 1989;153:99-101.
8. Farsad K, Kattapuram SV, Sacknoff R, Ono J, Nielsen GP. Sacral chordoma.radiographics 2009;29:1525-30