International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 4, April 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.4.2025.184

ORIGINAL RESEARCH

Role of MRI in diagnosis of Potts spine

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Received: 18 March, 2025 Accepted: 30 March, 2025 Published: 25 April, 2025

ABSTRACT

Introduction: Spinal tuberculosis (Pott's spine) is the most common form of skeletal tuberculosis and often presents with nonspecific clinical features, leading to delayed diagnosis and complications such as spinal deformity and neurological deficits. Early imaging is essential for accurate diagnosis and management. The objective of the study is to evaluate the diagnostic role of Magnetic Resonance Imaging (MRI) in patients with clinically suspected Pott's spine by analyzing characteristic imaging findings, level and extent of involvement. **Materials and Methods:** This prospective observational study was conducted on 50 patients with clinical suspicion of spinal tuberculosis over a period of one year at a tertiary care hospital. MRI scans of the entire spine were obtained using a 1.5 Tesla scanner, including T1, T2, STIR, and contrast-enhanced sequences where indicated. Data on demographic profile, clinical presentation, and MRI findings were collected and analyzed descriptively. **Results:** The majority of patients were males (60%), predominantly in the 31–40 years age group. The thoracic spine was most frequently involved (40%), followed by lumbar (30%) and thoracolumbar regions (20%). MRI revealed vertebral body involvement in 90%, intervertebral disc changes in 80%, paravertebral abscesses in 70%, epidural abscesses in 60%, and spinal cord compression in 30% of cases. These imaging features supported clinical diagnosis and guided management. **Conclusion:** MRI is a highly sensitive, non-invasive imaging modality that facilitates early detection and comprehensive evaluation of Pott's spine. It plays a crucial role in diagnosing characteristic features, assessing disease extent, and preventing complications through timely intervention.

Keywords: Role of MRI, Diagnosis, Pott's Spine

INTRODUCTION

Tuberculosis (TB) continues to be a major public health problem globally, particularly in developing countries such as India, where a significant proportion of the population is affected. [1] While pulmonary tuberculosis constitutes the majority of cases, extrapulmonary TB accounts for nearly 10-20% of cases, and within this group, skeletal TB comprises approximately 10%, with spinal tuberculosis (also known as Pott's disease or Pott's spine) being the most frequent and severe form. [2] Spinal TB typically affects the anterior part of the vertebral body, with subsequent involvement of intervertebral discs, leading to vertebral collapse, kyphotic deformity, and in some cases, spinal cord compression. If not diagnosed and managed early, the disease can result in permanent neurological damage, spinal instability, or deformity. [3]

The clinical presentation of spinal tuberculosis is often insidious and nonspecific. Patients may initially present with constitutional symptoms such as low-grade fever, malaise, weight loss, and night sweats. Localized back pain, stiffness, and tenderness may develop over time. [4] Neurological manifestations, including weakness or paralysis of the lower limbs, bladder and bowel dysfunction, or sensory loss, are usually late signs and often indicate advanced disease. Due to its slow progression and overlapping features with other spinal pathologies such as malignancies or pyogenic infections, diagnosing Pott's spine based solely on clinical and routine radiographic findings can be challenging. [5,6]

Imaging plays a pivotal role in the early detection and management of spinal TB. While conventional radiographs may show gross bony changes and vertebral collapse in advanced stages, they lack sensitivity for early disease. [7] Computed Tomography (CT) offers better detail of bony structures but is limited in assessing soft tissue and spinal cord involvement. In contrast, Magnetic Resonance Imaging (MRI) provides detailed visualization of vertebral marrow edema, intervertebral disc involvement, paraspinal abscesses, epidural extension, and spinal cord compression. [8] MRI not only facilitates early diagnosis but also aids in differentiating TB from other spinal pathologies,

DOI: 10.69605/ijlbpr_14.4.2025.184

guides the need for surgical intervention, and is valuable in monitoring treatment response. [9]

The objective of this study is to evaluate the diagnostic role of MRI in patients with suspected Pott's spine, by analyzing the characteristic imaging features, level and extent of involvement, and associated complications, in order to support early diagnosis and timely clinical management.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Radiology at Mamata Medical College and General Hospital, Khammam, over a period of one year, from January 2024 to January 2025. The study aimed to evaluate the role of Magnetic Resonance Imaging (MRI) in the diagnosis of Pott's spine among patients presenting with clinical suspicion of spinal tuberculosis. Ethical clearance was obtained from the institutional ethics committee prior to the initiation of the study, and informed consent was taken from all participants.

A total of 50 patients were included in the study based on the following inclusion criteria: individuals presenting with persistent back pain, fever, weight loss, neurological symptoms, or clinical suspicion of spinal tuberculosis referred for MRI. Patients of all age groups and both sexes were included, provided they had not received prior anti-tubercular therapy. Patients with a known diagnosis of spinal malignancy, trauma, or degenerative disc disease, or those with a history of spinal surgery, were excluded to avoid diagnostic overlap.

Each patient underwent a thorough clinical assessment including history-taking, physical examination, and relevant laboratory investigations such as erythrocyte sedimentation rate (ESR), complete blood count (CBC), and chest X-ray. MRI of the spine was performed using a 1.5 Tesla scanner. Standard sequences included sagittal and axial T1-weighted, T2-weighted, and STIR images, with contrast-enhanced sequences acquired in select cases. The entire spine was evaluated, with a focus on symptomatic regions, to identify vertebral, discal, paravertebral, and epidural pathology.

Collected data were compiled and analyzed using descriptive statistical methods. Frequencies and percentages were calculated for categorical variables such as age group, sex, clinical presentation, spinal level involvement, and MRI findings. Results were summarized in tabular format for clarity and interpretation. Statistical analysis was performed using Microsoft Excel, and findings were interpreted in the context of current literature to assess the diagnostic significance of MRI in Pott's spine.

RESULTS

A total of 50 patients with clinically suspected Pott's spine were evaluated. The majority of patients were in the age group of 31–40 years (30%), followed by 41–50 years (24%), and 21–30 years (20%). The disease was found to affect individuals predominantly in the productive age group. Male patients constituted a larger proportion of the study population (60%) compared to females (40%), indicating a slight male preponderance. These demographic findings reflect the high burden of spinal tuberculosis among working-age adults, with implications for both social and economic impact. (Table 1)

Table 1: Demographic Distribution

Parameter	Number of Patients	Percentage (%)
Age Group		
21–30 years	10	20%
31–40 years	15	30%
41–50 years	12	24%
51–60 years	8	16%
60 years	5	10%
Gender		
Male	30	60%
Female	20	40%

The most frequently reported symptom was chronic back pain, present in 80% of the cases. Fever was observed in 60% of the patients, followed by weight loss in 40%, and neurological deficits such as weakness or numbness in 30%. Kyphotic deformity, a more advanced clinical feature, was seen in 20% of patients. The symptomatology indicates a mix of constitutional and localized signs, highlighting the insidious progression of spinal TB and the need for early diagnostic imaging to confirm the diagnosis. (Table 2)

Table 2: Clinical Presentation

Symptom	Number of Patients	Percentage (%)
Back pain	40	80%
Fever	30	60%
Weight loss	20	40%

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Neurological deficits	15	30%
Kyphotic deformity	10	20%

In terms of anatomical localization, the thoracic spine was the most commonly involved region, seen in 40% of patients, followed by the lumbar spine in 30%. Combined thoracolumbar involvement accounted for 20% of cases, while cervical spine disease was comparatively rare (10%). This distribution is consistent with the literature, as the thoracic and lumbar vertebrae are more susceptible to hematogenous spread of Mycobacterium tuberculosis due to their rich vascular supply. (Table 3)

Table 3: Spinal Level Involvement

Spinal Level	Number of Patients	Percentage (%)
Thoracic	20	40%
Lumbar	15	30%
Cervical	5	10%
Thoracolumbar	10	20%

MRI evaluation revealed vertebral body involvement in the majority of patients (90%), underscoring its role as a hallmark imaging feature of spinal tuberculosis. Intervertebral disc involvement was seen in 80% of patients, and paravertebral abscesses were detected in 70%. Epidural abscess formation was noted in 60%, while spinal cord compression was present in 30% of cases, correlating clinically with neurological deficits. Vertebral collapse and posterior element involvement were observed in 40% and 20% of patients, respectively. These findings demonstrate the comprehensive diagnostic capability of MRI in assessing both osseous and soft tissue components of the disease. (Table 4)

Table 4: MRI Findings

MRI Finding	Number of Patients	Percentage (%)
Vertebral body involvement	45	90%
Intervertebral disc involvement	40	80%
Paravertebral abscess	35	70%
Epidural abscess	30	60%
Spinal cord compression	15	30%
Vertebral collapse	20	40%
Posterior element involvement	10	20%

DISCUSSION

Tuberculosis continues to be a significant public health concern, especially in developing countries, where factors such as poverty, malnutrition, overcrowding, and poor hygiene contribute to its widespread prevalence. Spinal tuberculosis, also known as Pott's disease, remains the most common form of skeletal tuberculosis and accounts for a significant proportion of extrapulmonary TB cases. It typically results from hematogenous spread from a distant primary site, commonly the lungs. The disease often begins in the anterior aspect of the vertebral body and spreads to involve adjacent vertebrae and intervertebral discs, particularly in adults where disc involvement is usually secondary to vertebral infection. [10]

In our study, the most affected age group was 31–40 years, with a male predominance (60%), aligning closely with observations by Bhatnagar et al., who also reported a higher incidence in males and in the fourth decade of life. [11] The thoracic spine was the most commonly involved region (40%), followed by the lumbar (30%) and thoracolumbar (20%) segments. Similar findings were reported by Rauf et al., who found thoracic spine involvement in 45% of cases, supporting the predilection of TB for the dorsal spine due to its rich vascular supply. [12] This pattern of spinal involvement underscores the importance of thorough imaging of the thoracolumbar region in patients presenting with suggestive symptoms.

Clinically, the most frequent symptoms observed in our patients were back pain (80%), fever (60%), weight loss (40%), and neurological deficits (30%). These findings are consistent with previous studies, including those by Shashikumar MR et al. and Bhatnagar et al., who also noted constitutional symptoms combined with local neurological compromise. [10,11] The presence of kyphotic deformity in 20% of our cases highlights the progressive structural damage associated with delayed diagnosis and reinforces the importance of early imaging and intervention.

MRI findings in our study were consistent with classical descriptions of tuberculous spondylitis. Vertebral body involvement was seen in 90% of cases, followed by intervertebral disc changes (80%), paravertebral abscesses (70%), epidural abscesses (60%), and spinal cord compression (30%). These imaging patterns closely resemble those described by Shashikumar et al., who emphasized the hypointense

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signal on T1-weighted images and hyperintensity on T2-weighted images as typical features of infected marrow. [10] Contrast-enhanced MRI also revealed rim-enhancing abscesses and involvement of posterior elements in 20% of cases. Similar observations were made by Pursey J et al. and Andronikou et al., highlighting MRI's superior capability in assessing disease extent and detecting features such as posterior element destruction, which is often linked to kyphotic deformity. [13,14]

MRI remains the gold standard for early and accurate diagnosis of spinal TB due to its high-resolution soft tissue contrast and multiplanar imaging capabilities. Differentiation from pyogenic spondylitis is critical for appropriate treatment planning, as TB tends to show thin-walled abscesses, subligamentous spread, and multi-level involvement, features not commonly seen in pyogenic infections. [15] Our findings reinforce the role of MRI not only in diagnosis but also in monitoring response to therapy and in guiding surgical planning when necessary.

CONCLUSION

Magnetic Resonance Imaging (MRI) plays a pivotal role in the early diagnosis, comprehensive evaluation, and management planning of Pott's spine. Its superior soft tissue resolution, multiplanar capability, and ability to detect subtle vertebral, discal, and paraspinal changes make it the imaging modality of choice for spinal tuberculosis. In our study, MRI effectively identified characteristic findings such as vertebral body involvement, intervertebral disc changes, paravertebral and epidural abscesses, and spinal cord compression, facilitating timely diagnosis and intervention. Early and accurate MRI-based evaluation is essential to prevent irreversible complications like kyphotic deformity and neurological deficits, ultimately improving patient outcomes.

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