

**ORIGINAL RESEARCH**

# Assessment of role of plain radiography and MRI in evaluation of spinal tuberculosis

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**ABSTRACT**

**Background:** Spinal tuberculosis (TB) is one of the oldest diseases of mankind. The present study was conducted to assess the role of plain radiography and MRI in detection of spinal tuberculosis. **Materials & methods:** 56 patients of spinal tuberculosis of both genders underwent plain x-ray spine including cervical and dorsolumbar taken in both anteroposterior and lateral views. MRI spine scan was done on 1.5 T MRI scanner. Multiplanar reconstructed images were taken. The pulse sequences acquired were sagittal T1, T2, STIR, axial T1, T2, post contrast –T1axial and sagittal. **Results:** Out of 56 patients, males were 30 and females were 26. Collection/abscess was present in 40 and 42 and absent in 16 and 14. Spinal cord and nerve root involvement was seen in 36 and 41 and absent in 20 and 15, plain radiography and MRI showed that vertebrae involved were cervical in 25 and 21, lumbar in 15 and 14, thoracic in 9 and 11 and sacral in 7 and 10. Disc space was normal in 12 and 10 and reduced in 44 and 46. Deformities were present in 38 and 40 and absent in 18 and 16. Vertebral body height was decreased in 42 and 40 and normal in 14 and 16 respectively. The difference was significant ( $P < 0.05$ ). **Conclusion:** MRI is the modality of choice in assessment of spinal tuberculosis whereas plain x-ray is the primary and the first imaging modality to evaluate the diseases.

**Key words:** MRI, Plain radiography, spinal tuberculosis

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**INTRODUCTION**

Spinal tuberculosis (TB) is one of the oldest diseases of mankind, having been documented in ancient Egyptian mummies.<sup>1</sup> The first modern case of spinal tuberculosis was described by Sir Percival Pott who was first to describe the spinal tuberculosis in 1779, after whom the disease is commonly referred to as “Pott’s Spine”.<sup>2</sup> Spinal TB occurs most commonly by haematogenous spread from pulmonary tuberculosis but could be from extra pulmonary site as well. It usually involves the thoracic and lumbar spine with thoracolumbar junction being the most frequent site of involvement. Other sites like cervical region and sacrum being less common.<sup>3</sup>

Plain film radiography (PFR) is one of the first and the most common imaging technique used to confirm the diagnosis of spine tuberculosis by the radiologists in most clinical settings and has been reported to have a diagnostic efficacy of 91-99%.<sup>4</sup> Plain radiographs can be used in later stages of disease. MRI is sensitive in

early detection and diagnosis of edema, soft tissue changes and spinal cord involvement.<sup>5</sup> The management of the patient depends on the severity of infection levels of vertebral involvement, so early diagnosis leads to prevent bone deformities and spinal cord compression.<sup>6</sup> The present study was conducted to assess the role of plain radiography and MRI in detection of spinal tuberculosis.

**MATERIALS & METHODS**

The present study consisted of 56 patients of spinal tuberculosis of both genders. This study is conducted in the Department of Radiodiagnosis Varun Arjun Medical College & Rohilkhand Hospital, Banthra Shahjahanpur UP, India from January 2019 to December 2019. A written consent from all patients was taken for the participation in the study.

Data such as name, age, gender etc. was recorded. A careful clinical evaluation was carried out. Clinical symptoms such as backache, stiffness, tenderness was

recorded. All underwent x-ray spine including cervical and dorsolumbar taken in both anteroposterior and lateral views. MRI spine scan was done on 1.5 T MRI scanner. Multiplanar reconstructed images was taken. The pulse sequences acquired was sagittal T1, T2,

STIR, axial T1, T2, post contrast –T1axial and sagittal. ADC and DWI sequences were also taken. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**RESULTS**

**Table I: Distribution of patients**

<b>Total- 56</b>		
<b>Gender</b>	<b>Males</b>	<b>Females</b>
Number	30	26

Table I shows that out of 56 patients, males were 30 and females were 26.

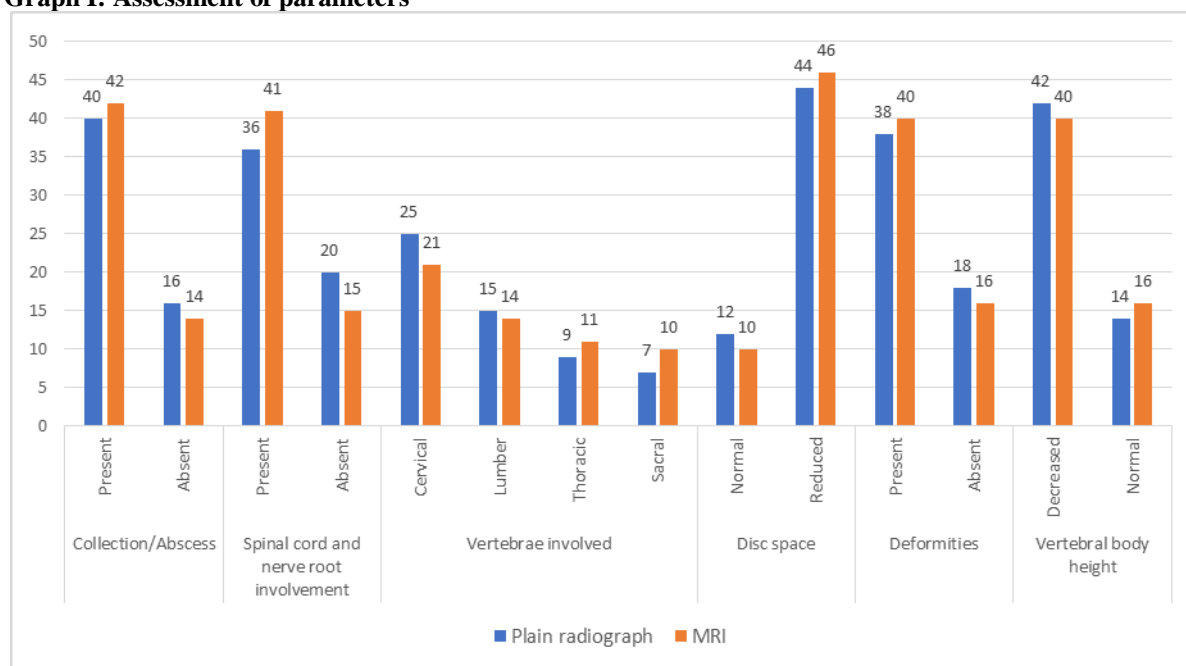
**Table II: Assessment of parameters**

Parameters	Variables	Plain radiograph	MRI	P value
Collection/Abscess	Present	40	42	0.01
	Absent	16	14	
Spinal cord and nerve root involvement	Present	36	41	0.05
	Absent	20	15	
Vertebrae involved	Cervical	25	21	0.91
	Lumber	15	14	
	Thoracic	9	11	
	Sacral	7	10	
Disc space	Normal	12	10	
	Reduced	44	46	
Deformities	Present	38	40	
	Absent	18	16	
Vertebral body height	Decreased	42	40	
	Normal	14	16	

Table II, graph I shows that collection/abscess was present in 40 and 42 and absent in 16 and 14. Spinal cord and nerve root involvement was seen in 36 and 41 and absent in 20 and 15, plain radiography and MRI showed that vertebrae involved were cervical in 25 and 21, lumber in 15 and 14, thoracic in 9 and 11

and sacral in 7 and 10. Disc space was normal in 12 and 10 and reduced in 44 and 46. Deformities were present in 38 and 40 and absent in 18 and 16. Vertebral body height was decreased in 42 and 40 and normal in 14 and 16 respectively. The difference was significant (P< 0.05).

**Graph I: Assessment of parameters**



## DISCUSSION

Tuberculosis (TB) is an infectious disease caused by various strains of mycobacteria usually *Mycobacterium tuberculosis*. It is more common in the Eastern hemisphere of the world.<sup>7,8</sup> Four radiological types of vertebral involvement have been described: paradiscal, anterior, central, neural arch or appendiceal. Out of these paradiscal type is the most common.<sup>9,10</sup> The best diagnostic modality in the present scenario for the diagnosis of spinal tuberculosis is MRI.<sup>11</sup> It is more sensitive than radiography and more specific than CT in the diagnosis and can also provide the diagnosis of Pott's spine 4-6 months earlier than conventional methods, offering the benefits of earlier detection and treatment.<sup>12,13</sup> The present study was conducted to assess the role of plain radiography and MRI in detection of spinal tuberculosis.

We found that out of 56 patients, males were 30 and females were 26. Bhanudas<sup>14</sup> compared plain radiographs and MRI spine of 60 patients. MRI was used to detect soft tissue changes, paravertebral abscesses. ADC and DWI were used to diagnose abscesses. MRI found to be superior to radiographs in identifying soft tissue changes, neural involvement, spinal cord involvement. MRI found to be more sensitive to detect the severity and extent of disease process. MRI was more superior for early diagnosis of Potts spine and in various stages of disease progression and follow up after treatment.

We found that collection/abscess was present in 40 and 42 and absent in 16 and 14. Spinal cord and nerve root involvement was seen in 36 and 41 and absent in 20 and 15, plain radiography and MRI showed that vertebrae involved were cervical in 25 and 21, lumbar in 15 and 14, thoracic in 9 and 11 and sacral in 7 and 10. Disc space was normal in 12 and 10 and reduced in 44 and 46. Deformities were present in 38 and 40 and absent in 18 and 16. Vertebral body height was decreased in 42 and 40 and normal in 14 and 16 respectively. Kukreja<sup>15</sup> in their study 65 patients suspected of spinal tuberculosis were subjected to plain radiographs and MRI. Dorsal vertebrae were most commonly involved with the paradiscal type being the most common radiological type of involvement. Disc involvement, endplate irregularity, abscess, calcification, reduction in vertebral height and spinal cord compromise were important radiological features.

Anleyet<sup>16</sup> compared the MRI features of spinal tuberculosis in HIV positive and negative patients. Fifty patients with confirmed spinal tuberculosis, HIV status and available MRI scans were identified. HIV status was positive in 20 and negative in 30. Females were predominant (34:16). The HIV positive group was younger at 32.4 versus 46 years. Blood parameters (WCC, ESR, Hb, Lymphocyte count) were not significantly different between the HIV groups. MRI scans were reviewed by a radiologist who was blinded to the HIV status. Site, extent of disease, body

collapse, abscess location and volume, kyphotic deformity and cord signal were reported. There was no difference between the number of vertebral bodies affection with TB involvement, presence of cord signal or incidence of non-contiguous lesions. The HIV negative group had significantly more total vertebral collapse and greater kyphosis. The HIV positive group had a trend to larger anterior epidural pus collection.

The limitation the study is small sample size.

## CONCLUSION

Authors found that MRI is the modality of choice in assessment of spinal tuberculosis whereas plain x-ray is the primary and the first imaging modality to evaluate the diseases.

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