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*Research Article*

## IMPORTANCE OF MAGNETIC RESONANCE IMAGING (MRI) FINDINGS IN TUBERCULOSIS OF THE SPINE

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**Abstract:**

***Objective:** To determine the results of magnetic resonance imaging in tuberculosis of the spine.*

***Study Design:** A descriptive study.*

***Place and Duration:** In the Radiology department of Services Hospital Lahore for one-year duration from March 2019 to March 2020.*

***Methods:** The study included 109 cases of tuberculosis known to both sexes. Patients were selected with convenient probability sampling. Patients were diagnosed based on clinical examination, history and the following tests: sputum cytology, CBC and ESR. Chest radiography was also performed to diagnose pulmonary tuberculosis. Histopathological biopsies were the gold standard in diagnosing inflammatory spinal injury. All MRI features observed in proven biopsy cases were carefully evaluated.*

***Results:** Patient ages ranged from 5 to 50 years old. The mean age of patients was  $34.91 \pm 7.33$ . Of 109 cases of tuberculosis of the spine, 62 (56.9%) were men and 47 (43.1%) were women. The most common clinical features of tuberculosis of the spine were low grade fever 84.4% and back pain 65.1%. MRI of the spine tuberculosis was found: reduction of intervertebral disc space 95 (87.2%), collapse of body wedge 35 (32.1%), total destruction of body 42 (39.5%), paravertebral abscess, calcification 34 (31, 2%) and cord compression 28 (25.7%)*

***Conclusion:** Magnetic resonance imaging is an excellent diagnostic method for tuberculosis of the spine and is more sensitive than ordinary radiography. It presents a diagnosis of spinal tuberculosis earlier than conventional methods and offers the advantages of previous diagnosis and treatment.*

***Keywords:** spinal tuberculosis, magnetic resonance imaging, gadolinium.*

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**INTRODUCTION:**

Tuberculosis of the spine is an older type of disease known to people and was found in Egyptian mummies before 3400 BC. C. In 1778, Percival Pott first described spinal tuberculosis in a classic way. Spinal tuberculosis is a common type of skeletal tuberculosis, with 50 percent of all cases of bone and joint tuberculosis. As a result of Mycobacterium tuberculosis, tuberculosis remains a significant public health problem, especially in developing countries where it is combined to spread the presence of drug resistant strains. Spinal tuberculosis is a destructive type of tuberculosis. It accounts for about fifty percent of all cases of musculoskeletal tuberculosis. Spinal tuberculosis is slightly more common in children and adolescents. The prevalence of spinal tuberculosis is increasing in developed countries around the world. Hereditary susceptibility to spinal tuberculosis has recently been studied. The exact incidence of spinal tuberculosis is unknown in most countries around the world. In countries with high pulmonary tuberculosis burden, the incidence should be proportionally high. Neurological problems are the most terrible complication of spinal tuberculosis. Patients with paraplegia, which develops in the active phase of tuberculosis of the spine, need active treatment of spinal tuberculosis and have a better prognosis than patients with paraplegia, which develops several years after early disease. He recovered. The sad result of tuberculosis of the spine in the period before the antibiotic improved significantly as a result of strong anti-tuberculosis drugs, modern diagnostic aids and improved surgical treatment. Magnetic resonance imaging allows you to diagnose tuberculosis changes with 100% sensitivity and 88% specificity long before the deformation occurs. In the technique of coping with spine diseases, doctors faced the problem of diagnosis despite advanced imaging tests and exposed patients to invasive procedures for final diagnosis. Spine tuberculosis is one of the most common spinal changes in an endemic country similar to India, with an extremely high incidence of pulmonary tuberculosis and in neurosurgical practice, which affects about 1.7% of patients. A combination of T1 and T2 sequences or a STIR combination is required for magnetic resonance imaging of the spine infection. MRI images often show a loss of cortical definition of affected vertebral segments. Magnetic resonance imaging is an ideal method for detecting early tuberculosis of the spine, assessing the degree of the disease and identifying complications such as spinal compression, vertebral deformity, paravertebral and epidural abscess. The use of gadolinium is promising in the early detection of the disease because it always causes bone healing and can help diagnose when the

soft tissue mass pattern that heals the border is shown. In the study by Bajwa, the magnetic resonance imaging of the spine in the spine is as follows: reduced space on the intervertebral disc (95%). body wedge fall 18 (30%), total body destruction 12 (20%), paravertebral abscess 24 (40%). Calcification in 18 cases (30%) and spinal compression in 16 cases (26.6%).

**METHODOLOGY:**

The study was conducted at the Radiology department of Services Hospital Lahore for one year duration from March 2019 to March 2020. One hundred and nine known patients of tuberculosis fulfilling inclusion criteria were selected in this study. The study design was descriptive and patients were selected on the basis of non-probability fitness sampling. The calculated sample size was 109 patients when the 95% confidence interval, 7.5% error margin and the expected 20% frequency of complete body destruction were calculated. Chest radiography was also performed to diagnose pulmonary tuberculosis. Histopathological biopsies were the gold standard in diagnosing inflammatory spinal injury. All MRI features observed in proven biopsy cases were carefully evaluated. Clinical features included low fever, back pain, intestinal bladder involvement, scoliotic deformity, kyphotic deformity, and a history of contact with tuberculosis patients. Exclusion criteria are those with back pain associated with neurological symptoms due to metastatic disease, trauma and discogenic problems. The histological findings for diagnosis were adenomas, epithelial cells and Langhans giant cells. MRI cases of tuberculosis of the spine were as follows: reduction in the number of intervertebral disc space in the disk, collapse of the wedge in the body, complete destruction of the body, paravertebral abscess, calcification and spinal compression. Patient criteria; Increased vertebral density on T2 weighted images and low intensity signal on T2 weighted images. Erosion of end vertebral plaques and reduced area of the intervertebral disc, para-vertebral mass, deposition of epidural anesthesia, deformation of the vertebrae and compression of the spinal cord. Magnetic resonance imaging was carried out using a superconducting system operating at 1.5 T (MR Gyro Scan Philips). T1 and T2 weighted sagittal and axial images were obtained with the spine sequences TR / TE 500 600, 2040 and 1800-2000, 60-90, respectively. In selected cases T2 coronal and T1 coronal especially after contrast were performed. Post contrast images were repeated in T1 sagittal and axial planes using Gd-DPTA in a dose of 0.1 mmol/kg body weight. Mostly

slice thickness was 4mm in sagittal plane and 3.5mm in coronal plane with 1 mm interslice gap.

### RESULTS:

Patient ages vary between 5-50 years. The mean age of patients was  $34.91 \pm 7.33$  (Table 1).

**Table 1: Distribution of age (n = 109)**

Age (Year)	n	%
5-20	27	24.8
21-30	13	11.9
31-40	42	38.5
41-50	27	24.8
<b>Mean <math>\pm</math>SD</b>	<b>34.9 <math>\pm</math>7.33</b>	

**Table 2: Distribution of gender (n = 109)**

Gender	n	%
Male	62	56.9
Female	47	43.1

62 (56.9%) of 109 cases of spinal tuberculosis were men and 47 (43.1%) were women (Table 2). The thoracolumbar region was more common in study 52 (47.7%), followed by thoracic spine 24 (22.0%), lumbar spine 21 (19.3%), and cervical spine 9 (8.3%). and widespread involvement of 3 (2.7%) (Table 3).

**Table 3: Distribution of spinal tuberculosis according to region (n = 109)**

Region	n	%
Cervical spine	9	08.3
Thoracic spine	24	22.0
Thoracolumbar	52	47.7
Lumbar spine	21	19.3
Diffuse involvement	03	02.7

The most common clinical features of tuberculosis of the spine are low grade fever 84.4% and back pain 65.1% (Table 4).

**Table 4: Clinical features of spinal tuberculosis (n=109)**

Region	n	%
Backache	71	65.1
Low grade fever	92	84.4
Kyphotic deformity	63	57.8
History of contact with TB patients	58	53.2
Scoliotic deformity	30	27.5
Paraparesis	47	43.1
Bowel bladder involvement	56	51.4

MRI of the spine tuberculosis was found: reduction of intervertebral disc space 95 (87.2%), collapse of body wedge 35 (32.1%), total destruction of body 42 (39.5%), paravertebral abscess, calcification 34 (31, 2%) and disc compression 28 (25.7%) (Table 5).

**Table-5: MRI findings of spinal tuberculosis (n=109)**

MRI Findings	n.	%
Reduced inter - vertebral disc space	95	87.2
Wedge collapse of body	35	32.1
Complete destruction of body	42	39.5
Paraspinal abscess, calcification	34	31.2
Cord compression.	28	25.7

**DISCUSSION:**

Tuberculosis of the spine can occur at almost any age. Middle-aged people typically suffer from tuberculosis. In this study, the most common age group with tuberculosis infection of the spine were 31-40 years old (38.5%). In Europe, as in other developed countries, tuberculosis is a late presentation because it plays a key role only because the risk factor is diabetes, old age and, more recently, immunodeficiency states such as AIDS. The resulting ailments depend on the stage of the disease and the degree of umbilical cord involvement. Due to the ability to reproduce magnetic resonance imaging, a large area of the spine can be imaged in the sagittal, coronal and axial planes. There is no radiation exposure compared to other imaging methods. Magnetic resonance imaging is of great importance for the early detection of soft tissue masses and the involvement of an intermediate disk, which cannot be easily identified by the degree of vertebral damage and routine radiography. This increased the findings of Yılmaz et al. They showed the same findings. Our study reveals spinal tuberculosis by region as follows: cervical spine 8.3%, thoracic spine 22.0%, thoracolumbar 47.7%, lumbar spine 19.3%, common involvement in 2.7% of cases. Similar results were seen in the Bajwa study at the Sargodha District Central Training Hospital. Despite that MRI is more expensive investigation nevertheless it provides more information in relation to soft tissue involvement as well as degree of spinal cord or root compression than plain X-Ray, CT scan. It provides information regarding details of disease and consequently gives information to treatment. It really is useful in monitoring response to treatment by serial MRI scans.

**CONCLUSION:**

Magnetic resonance imaging is an excellent diagnostic method for tuberculosis of the spine and is more sensitive than ordinary radiography. It presents a diagnosis of spinal tuberculosis earlier than conventional methods and offers the advantages of previous diagnosis and treatment. In spinal tuberculosis, it is useful to demonstrate better resolution of MRI contrast, adjacent spine involvement, spinal injuries and paravertebral

collections. In the case of tuberculosis of the spinal joints, knowledge of the MR result spectrum, especially in the high-risk patient population, can prevent delaying diagnosis and reduce morbidity caused by this aggressive but treatable infectious disease. The use of gadolinium is promising in the early detection of the disease because it always causes bone healing and can help diagnose when the soft tissue mass model that heals the border is shown.

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