Clinico-radiological manifestation of TB spine and its complications

Manoranjan Dash*, Sumant Ku Samal

*Assistant Professor, Consultant, Dept. of Pulmonary Medicine, S L N Medical College & Hospital, Koraput, Odisha, India

Abstract
Background: Vertebral tuberculosis is the most common form of skeletal tuberculosis and it constitute 50% of all skeletal tuberculosis. Nearly 88% of cases of chronic infection of spine are of tuberculosis in origin. In developing countries diagnosis of tuberculosis of bone and joints can reliably made on clinical and radiological examinations. Here we had taken up the study of clinic radiological manifestation of TB spine and its complications.

Methodology: Patients attended OPD and IPD of Chest and TD Dept. of VSS Medical College and hospital, Burla with TB spine were taken up for study after taking proper consent. The patients who showed clinical evidence of TB spine were selected basing on hematological findings, radiological examinations, Mantoux test with clinical signs and symptoms for the diagnosis. Children under 10 years were excluded from the study.

Results: 30 patients with TB spine were taken up for the study. It was found that TB spine is more prevalent among males then females with highest incidence in the age group of 41 to 50 years. Majorities of patient with low socioeconomic status. Dorso-lumabar vertebra is the most commonly involved. Back pain and spinal tenderness are the most common features. About 16.6% cases pulmonary involvement seen. There is moderate degree of anemia with raised ESR seen in 93.2% of cases. About 80% cases found to have tuberculin positive. Bony destruction and joint space reduction seen in most of the cases.

Conclusion: Patients having pain in back, fever and weight loss should be investigated in the line of tuberculosis. Of spine so that early diagnosis can be done and complications could be prevented.

Keywords: Tuberculosis, Spine.

Introduction
Vertebral tuberculosis is the most common form of skeletal tuberculosis and it constitute 50% of all skeletal tuberculosis [1]. Nearly 88% of cases of chronic infection of spine is of tuberculosis in origin [2]. In developing countries diagnosis of tuberculosis of bone and joints can reliably made on clinical and radiological examinations. Here we had taken up the study of clinic radiological manifestation of TB spine and its complications.

Materials and Methods
Patients attended OPD and IPD of Chest and TD Dept. of VSS Medical College and Hospital, Burla with TB spine were taken up for study. The patients who showed clinical evidence of TB spine were selected basing on hematological findings, radiological examinations, Mantoux test with clinical signs and symptoms for the diagnosis.

Inclusion Criteria
Patients having TB spine in the age group of 10-70 years taken in the study.

Exclusion Criteria
Children less than 10 years, pregnant ladies were excluded in the study.

The present study comprises of 30 patient of tuberculosis spine who have attended chest OPD or admitted to indoor of chest department during the period of Sept.2016 to August 2018.

Results
Table 1: Sex distribution

| Sex     | No. of cases | Percentage |
|---------|--------------|------------|
| Male    | 22           | 73.33%     |
| Female  | 8            | 26.67%     |
| Total   | 30           | 100%       |

The incidence of tuberculosis of spine is more among males (73.33%) than female 26.67%.

Age Distribution

Table 2: Age in years

| Age in Years | Male | Female | Total | Percentage |
|--------------|------|--------|-------|------------|
| 11-20        | 2    | 1      | 3     | 10%        |
| 21-30        | 3    | 3      | 6     | 20%        |
| 31-40        | 5    | 2      | 7     | 23.33%     |
| 41-50        | 9    | 1      | 10    | 33.33%     |
| 51-60        | 2    | 1      | 3     | 10%        |
| ≥60 years    | 1    | 0      | 1     | 3.33%      |

The incidence of pott’s spine is highest in the age group between 41-50 years (33.33%) and least above 60 years of age (3.33%).

Distribution According to Religion

About 97% of cases are Hindu, Christians sharing the remaining 3% as the catchments area has majority Hindu population.
Table 3

| Religion | No. of Cases | Percentage |
|----------|--------------|------------|
| Hindu    | 29           | 96.66%     |
| Christian| 1            | 3.34%      |
| Total    | 30           | 100%       |

Table 4: Distribution according to area

| Area       | No. cases | Percentage |
|------------|-----------|------------|
| Urban      | 10        | 33.33%     |
| Rural      | 20        | 66.67%     |
| Total      | 30        | 100%       |

Majority of patients hailed from rural area (66.67%) and 33.33% cases are from urban population, the ration being 3:1.

Table 5: Distribution according to occupation

| Occupation            | No. of cases | Percentage |
|-----------------------|--------------|------------|
| Labourer & Cultivators| 15           | 50%        |
| House wives           | 7            | 23.33%     |
| Student               | 2            | 6.66%      |
| Employees             | 2            | 6.66%      |
| Small Businessman     | 4            | 13.33%     |
| Total                 | 30           | 100%       |

The labourers and cultivators i.e. manual Workers with poor socio-economic status showed the higher incidence (50%) of involvement. Housewives constitute the next common group in order frequency.

Table 6: Level of lesion in carries spine

| Site                              | No. of cases | Percentage |
|-----------------------------------|--------------|------------|
| Cervical (C₁ to T₁) & Cervico-dorsal | 1            | 3.33%      |
| Dorsal (T₂-T₉)                    | 5            | 16.66%     |
| Dorso lumbar (T₁₀-L₁)             | 13           | 43.33%     |
| Lumbar (L₂ – L₄)                  | 10           | 33.33%     |
| Lumbosacral (L₅ –S₃)              | 1            | 3.33%      |
| Total                             | 30           | 100%       |

From the present series it is seen that Dorso-lumbar vertebra (43.33%) are the commonest area of involvement. Lumbar vertebra (33.33%) is next common area of involvement. Cervical and sacral area each have 3.33% involvement. The incidence of pott’s spine is less in cervical and sacral region.

Table 7: Frequency of involvement vertebra

| Vertebra | Frequency of involvement | Percentage |
|----------|--------------------------|------------|
| C1       | 0                        | 0          |
| C2       | 0                        | 0          |
| C3       | 0                        | 0          |
| C4       | 0                        | 0          |
| C5       | 1                        | 3.33%      |
| C6       | 1                        | 3.33%      |
| C7       | 0                        | 0          |
| T1       | 0                        | 0          |

Table 8: Clinical Presentation

| Clinical Presentation | No. of cases | Percentage |
|-----------------------|--------------|------------|
| Back Pain             | 30           | 100%       |
| Bony Tenderness       | 30           | 100%       |
| Gibbus (Bony Swelling)| 15           | 50%        |
| Paraparesis           | 7            | 23.33%     |
| Paraplegia            | 2            | 6.69%      |
| Cold abscess/Paravertebral abscess | 7 | 23.33% |
| Sinus                 | 2            | 6.66%      |
| Fever                 | 18           | 60%        |
| Weight loss           | 18           | 60%        |
| Loss of appetite      | 14           | 46%        |
| Cough                 | 9            | 30%        |
| Incontinence of Bowel | 2            | 6.66%      |
| Incontinence of Bladders | 1       | 3.33%      |

Table 9: Hemoglobin percentage

| Hb% in gms | No. of cases | Percentage |
|------------|--------------|------------|
| 0-8gm%     | 5            | 16.66%     |
| 8-10gm%    | 13           | 43.33%     |
| >10gm%     | 12           | 40.00%     |

Most of the patient have low hemoglobin level may be due to disease and malnutrition.

Table 10: ESR percentage

| ESR in mm 1st hour | No. of cases | Percentage |
|--------------------|--------------|------------|
| 0-20               | 2            | 6.6%       |
| 21-100             | 26           | 86.6%      |
| >100               | 2            | 6.6%       |

ESR remain high during active disease.
In this study it is found that 80% of cases are mantoux positive and 20% cases of spinal tuberculosis are mantoux negative.

In the analysis of radiological finding all 30 cases (100%) Some form of bone destruction seen. In 29 cases (96.66%) involvement of disc space seen. Next in order of frequency are kyphosis 50% cases and paravertebral abscess in 23.33% cases.

Angle of kyphosis increased with increases in degree of kyphosis. Kyphotic deformity <60° has better prognosis and more than 60° has poor prognosis. In this study 14 cases has mild kyphosis and one case have moderate kyphosis.

**Table 11**: Mantoux test

| Mantoux Test | No of cases | Percentage |
|--------------|-------------|------------|
| Positive     | 24          | 80%        |
| Negative     | 6           | 20%        |
| Total        | 30          | 100%       |

**Table 12**: Complications in carries spine

| Complications | No. of cases | Percentage |
|---------------|--------------|------------|
| Paraplegia    | 9            | 30%        |
| Kyphosis      | 15           | 50%        |
| Sinus         | 2            | 6.66%      |
| Paravertebral abscess & Cold Abscess | 7 | 23.33% |

Commonest complication is kyphosis seen in 50% of cases. Paraplegia (30%) is the dreadest complication occurring in approximately one third of total cases. Cold abscess and sinus are found in 23.33% and 6.66% cases respectively.

**Table 13**: Incidence of Paraplegia

| Incidence     | No. of cases | Percentage |
|---------------|--------------|------------|
| Paraplegia    | 9            | 30%        |
| Non-paraplegia| 21           | 70%        |

Incidence of paraplegia is 30%. Remaining 70% cases did not have any neurological deficit.

**Table 14**: Associated tubercular lesion in other parts of the body

| Body parts    | No. of cases | Percentage |
|---------------|--------------|------------|
| Lungs         | 5            | 16.66%     |
| Lymph nodes   | 2            | 6.66%      |
| Pleural effusion | 2          | 6.66%      |

16.66% of cases have associated with pulmonary tuberculosis. 6.66% cases of pott’s spine cases are associated with pleural effusion and 6.66% cases associated lymphnode involvement seen. Therefore 30% of pott’s spine cases have associated tubercular lesion in other parts of the body.

**Table 15**: Pott’s spine associated with other diseases

| Diseases           | No. of cases | Percentage |
|--------------------|--------------|------------|
| Diabetes mellitus  | 2            | 6.66%      |
| Sickle Cell Disease| 1            | 3.33%      |
| SLE                | 1            | 3.33%      |

In this series out of 30 cases 2 cases were diabetic, 1 case was suffering from sickle cell disease and 1 case was a SLE Patient.

**Table 16**: Radiological findings in carries spine

| Radiological finding | No. of cases | Percentage |
|----------------------|--------------|------------|
| Disc space narrowing | 29           | 96.66%     |
| Bony Destruction     | 30           | 100%       |
| Paravertebral abscess| 7            | 23.33%     |
| Kyphosis             | 15           | 50%        |

Discussion

The present study comprise of 30 patients of tuberculosis spine who have attended chest OPD or admitted to indoor of chest department during the period of Sept. 2016 to August 2018.

In the comparison of present series to all series it is found that there is male preponderance in all series except S.Bhojraj et al (2004). This reason of Orissa is less developed and population is mostly tribal, who are not health conscious and mostly the females are neglected, which probably may be the cause of low incidence in females.

**Table 17**: Kyphosis angle

| Degree of Kyphosis | Angle | No. of cases | Percentage |
|--------------------|-------|--------------|------------|
| Mild               | 10°–30° | 14           | 46.67%     |
| Moderate           | 30°–60° | 1            | 3.33%      |
| Severe             | >60°   | 0            | 0%         |

**Table 18**: Sex distribution (Comparative Study)

| Sex     | Tuli Series (1965-74) | Mohapatra Series (1987) | S.Bhojraj et al (2004) | Sinan et al (2004) | Present Series |
|---------|-----------------------|-------------------------|------------------------|-------------------|----------------|
| Male    | 52%                   | 59%                     | 34.84%                 | 60%               | 73.33%         |
| Female  | 48%                   | 41%                     | 66.16%                 | 40%               | 26.67%         |
In Tuli Series [4] (1965-74) 52% of cases are below 20 years of age. In above comparison it is found that mean age of tuberculosis of spine is between 39 years and 61 years in different studies. So there is recent trend of spinal tuberculosis among elderly age group in comparison to past. In my study the mean age is 57.45 years.

**Nativity and Occupation**
As regard to occupation higher incidence (50%) was marked in labourers and cultivators (farmers) with poor socio-economic status in the present series because of overcrowding in their living place which predisposes to tuberculosis. This was also the view of Shanmugasundaram [5] (1983).

In Tuli series [4] commonest region of spine affected is dorsal region (42%). In the present series the commonest region affected is Dorsolumbar region (43.33%). It is near to the result of previous study in this institution (1987) in which the commonest region of the spine involved by tuberculosis is dorsolumbar region 41.67%.

**Table 20: Level of lesion comparative study**

| Area                        | Tuli Series (1965-74) in Percentage | John Ebnazar | Hug G Watts (1996) | Previous study in this institution 1987 | Present Series |
|-----------------------------|------------------------------------|--------------|-------------------|----------------------------------------|----------------|
| Cervical & Cervicodorsal (C1-T1) | 14%                                | 17%          | 25%               | 5.95%                                  | 3.33%          |
| Dorsal (T2-T9)              | 42%                                | 42%          | 50%               | 8.57%                                  | 16.66%         |
| Dorsal lumbar (T10-L1)      | 12%                                | 12%          |                   | 41.67%                                 | 43.33%         |
| Lumbar (L2-L4)              | 26%                                | 26%          | 25%               | 22.62%                                 | 33.33%         |
| Lumbosacral (L5-S5)         | 3%                                 | 3%           |                   | 1.19%                                  | 3.33%          |

In comparing the above findings it is found that there is decrease in number of vertebra involved by tuberculosis comparing to past. In our present series the average number of vertebra involved is 2.06 which is near to the average number of vertebra involved (2.1) in the study of Lifeso et al [6] (1985). It may due to pain for which the patients reports early being afraid because it hamper their daily work.

**Table 22: Clinical features & complications**

| Feature                           | Tuli Series (1965-74) in Percentage | S.S. Desai (89-91) | Alothman Adel et al 2001 | Sinen et al (2004) | Present Series |
|-----------------------------------|------------------------------------|-------------------|-------------------------|-------------------|----------------|
| Pain over affected vertebra       | -                                  | 96%               | 84%                     | 73.3%             | 100%           |
| Kyphosis                          | 95%                                | 0%                | 17%                     | 50%               | 50%            |
| Clod Abscess & Paravertebral abscess | 20%                               | 4%                | 80%                     | 65.5%             | 23.33%         |
| Sinuses                           | 13%                                |                   |                         | 6.66%             |                |
| Neurological involvement          | 20%                                | 29.17%            | 28%                     |                   | 30%            |

In Table 23: Incidence of paraplegia

| Feature | Tuli Series (1965-74) | N.S. Martin (1971) | Alothman Adel et al, 2001 | Present Series |
|---------|-----------------------|--------------------|--------------------------|----------------|
| Incidence of paraplegia           | 20%                  | 20%                | 28%                      | 30%            |
In the present series all patients presents with pain in the back. In the study of 24 patients of spinal tuberculosis by S.S. Desai [7] between 1989-91. All patients except one presented with back pain. In Alothman Adel et al study 2001. Backache (84%) was the most common presenting features and in Sinen et al series pain is the presenting feature in 73.3% cases. In a study of Potts spine by Alothman Adel et al [6] (spice 2b (24) E 565 – E 570 Dec 15, 2001) 17% had kyphosis. In present series kyphosis is found in 50% of the cases and in Tuli series it is 955 case and in S.S.Desai series it is 0% cases. So there is a wide variation may be due to the time of the presentation of the patient to the physician patients coming early may not have kyphosis.

Percentages of patient presented with cold abscess and paravertebral abscess varies from 4% to 80%. The Present series the percentage of patients having cold abscess and paravertebral abscess is 23.33%, almost equal to the percentage of patients having same presentation in Tuli Series [4] i.e. 20%

13% patients had sinus in Tuli series. In our study 6.66% patients has developed sinus. Neurological involvement is seen 28% in Alothman [6] series and 29.17% in SS Desai [7] series, in present study it is 30%. In my study 2 cases out of total 30 cases had balder and bowel involvement, in S.S.Desai series 2 cases out of total 24 cases had bowel and bladder involvement.

Incidence of paraplegia varies from 10-30% in different studies. It is 28% in Alothman Abdel et al [6] series & in our present study in is 30%.

Table 24: Associated pulmonary lesion with spinal tuberculosis

| Tuli series   | 12%  |
|--------------|------|
| Hodgson & Stock (1960) | 32%  |
| S.S.Desai (1989-91) | 8.33% |
| Mohaptra Series (1987) | 10.09% |
| Present series | 16.66% |

The association of pulmonary tuberculosis with spinal tuberculosis varies from 8.33% to 32% in different study. Pulmonary tuberculosis associated spinal tuberculosis is 12% in Tuli series [4] and is 16.66% in the present series.

Table 25: Associated lymph node lesion with spinal tuberculosis

| Tuli series   | 12%  |
|--------------|------|
| S.S. Desai (1989-91) | 8.33% |
| Present series | 6.66% |

Lymph node in involvement occur in 12% of the cases in Tuli series and in the present series it is 6.66% cases and it is 8.33% in the study by S.S. Desai. [7] From the above involvement it is concluded that the bone involvement occur by haematogeneous spread from other site also.

ESR
Robert Lifeso noted rise in the ESR in patients of tuberculosis of spine. Alothman [6] et al (2001) study found that there is raised ESR level in 94.5% of his cases of spinal tuberculosis. In my study 93.2% patients has raised ESR. It is done on a parameter without having any diagnostic value as a routine.

Mantoux test (comparative study)
In this study it is found that 80% of cases of spinal tuberculosis are mantoux positive and 20% cases are negative in present series. Michael Marqe [8] (1973) found 82% of patients of TB spine were mantoux positive and 18% mantoux negative. At least 20% cases of debilitated or malnourished patients who have extensive disease have a false negative skin test (Hugh G Watts et al, 1996) [9]. Therefore negative Mantoux test does not rule out the tuberculosis of spine.

Skip Lesion
In the present study skip lesion in found in 6.66% cases. Tuli [4] series average incidence of skip lesion in 7% and 5-10% cases according to Mercer.

Conclusion
Present study is based on clinic-radiological manifestation and complication of TB spine. 30 patients of pott’s spine are taken up for study. It was found that tuberculosis of spine is more among male (73.33%) than females (26.67%). It is common among farmers and daily labourers. The highest incidence of disease is among people belonging to age group 41-50 years. Majority of the patients are from rural area having low socio-economic status. This is probably social stigma present in this area till date.

Dorsolumbar region (43.33%) is the most common region of the spine and L3 is the vertebra most commonly involved.

Back pain (100% and bony tenderness the most common presenting feature. Fever and weight loss occur in 60% cases. Other presenting symptoms are paravertebral abscess, cold abscess, paraparesis and paraplegia etc. Only 2 cases had incontinence of urine and 1 case had incontinence of stool.

Five cases (16.66%) had pulmonary tuberculosis associated with spinal tuberculosis. Other associated lesion with TB spine are tubercular lymphadenitis and pleural effusion 2 cases (6.66%) in each. 2 cases (6.66%) had diabetes mellitus, one had sickle cell disease and one case had SLE out of these 30 cases studied.

Diagnosis in all cases mostly made by clinical presentation and radiological examination. Other investigation helped to support the diagnosis. In all cases there was bone destruction and narrowing of disc space. Sinogram comes positive in one case.

Two cases (6.66%) of pulmonary tuberculosis associated with potts spine had sputum for AFB smear positive. In one case aspirate of paravertebral abscess was smear positive for AFB and in another one case, sinus discharge was positive for AFB in smear examination.

There is moderate degree of anemia in all cases. ESR raised in 93.20% cases. 80% of cases were tuberculin
positive. Bony destruction and joint space reduction (100%, 96.66%) respectively was common findings.

Conservative treatment was given to all patients as per RNTCP guidelines

In pre chemotherapeutic era the mortality rate was high, where as there is a dramatic improvement in post chemotherapy era.

So Patients having pain in back, fever and weight loss should be investigated in line of tuberculosis of spine, so that early diagnosis can be done and complications could be prevented.

Conflicts of Interest: None declared.

Acknowledgement: None.

References
1. Tuli Tuberculosis of Skeletal System, 3rd Edn. P-5
2. Bergey’s manual of determination bacteriology 7th Edn. William and Wilkins Co. Baltimore’1957.
3. S. Bhojraj, Nene A. Lumbar and lumbosacral tuberculous spondylodiscitis in adults. Redefining the indications for surgery. J Bone Joint Surg Br. 2002;84(4):530-4.
4. Tuli SM. Results of treatment of spinal tuberculosis by “middle-path” regime. J Bone Joint Surg Br 1975;57(1):13-23.
5. Shamuggam Sundaram. TK-TB spine. IJT 1993;29:213-21.
6. Alothem Adel. Spine 2b 2001;,(24)E565-70.
7. Desai SS. Early diagnosis of spinal tuberculosis by MRI. J Bone Joint Surg Br 1994;76(6):863-9.
8. Michel Marcq: Chest. 63No3, March 1973 p 406.
9. Hugh G Watts JBJS. 1996;78(2):289.