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Original Research Article

Role of vitamin D in patients with Potts spine

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ABSTRACT

Background: Potts spine is caused by Mycobacterium tuberculosis, a slow growing gram-positive, acid-fast bacillus which becomes lodged in the bone via Batson's venous plexus and lymphatic from primarily infected lung, lymph nodes, mediastinum and viscera, forming granulomatous inflammation and caseation necrosis. Pott's spine accounts for 2% of all cases of TB, 15% of extrapulmonary, and 50% of skeletal TB. The paradiscal, central, anterior subligamentous, and neural arch are the common vertebral lesions. Thoracic vertebrae are commonly affected followed by lumbar and cervical vertebrae. Vitamin D is known to play a role in regulating the immune system, and it has been suggested that a deficiency in vitamin D may contribute to the development of autoimmune disorders such as Potts spine. Studies have shown that individuals with Potts spine have lower levels of vitamin D compared to healthy controls. Additionally, vitamin D deficiency has been linked to an increased risk of spinal bone loss and an increased risk of spinal fractures in individuals with Potts spine.

Materials and Methods: Present study was prospective in nature conducted among 4f patients of Potts spine. All patients fulfilling inclusion criteria and exclusion criteria were taken up for the study. Study was carried out over a period of 2 years. Serum vitamin D was assessed.

Results: Majority of the patients was in the age group of 41-50 years and most of them were male. In this study, serum vitamin D level was optimal (>30 ng/ml) in 16 (36.36%) cases, deficient (<20 ng/ml) in 16 (36.36%) cases and insufficient (20-30 ng/ml) among 12 (27.28%) cases.

Conclusion: Reduced serum levels of vitamin D are associated with increased spinal cord compression & disease severity as suggested by the bowel bladder involvement & sensory involvement at levels <20 ng/ml, level 1 spinal cord compression at optimal (>30 ng/ml) vitamin D level, level 2 spinal cord compression at 20-30 ng/ml (insufficient) and level 3 spinal cord compression at deficient (<20 ng/ml) vitamin D level. So, there is an inverse relationship between the level of vitamin D & severity of disease in Pott's spine.

1. Introduction

Tuberculous spondylodiscitis (Pott spine) is caused by Mycobacterium tuberculosis, a slow growing gram-positive, acid-fast bacillus which becomes lodged in the

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bone via Batson's venous plexus and lymphatic from primarily infected lung, lymph nodes, mediastinum and viscera, forming granulomatous inflammation and caseation necrosis.[1] It is the most common gorm of skeletal tuberculosis. It is a serious form of extra pulmonary TB which if left untreated can be fatal.[2] The treatment of it can be chemotherapy alone or surgery in addition to chemotherapy.

Thoracolumbar region is the most commonly affected site while the cervical and sacrum regions are less commonly involved. Usually more than one vertebra is affected because of its segmental arterial distribution and subligamentous spread of the disease. The bacilli reach the disc space causing disc destruction, spreads to adjacent vertebral bodies leading to vertebral collapse, anterior wedging, characteristic kyphotic angulation (Gibbus deformity), which may compress the spinal cord and nerve roots producing functional impairment.[1,3,4]

Magnetic resonance imaging (MRI) makes the early diagnosis of spinal TB easier and a considerable number of patients with spinal TB are diagnosed earlier and treated more effectively before significant neurological deficits develop. However, patients can still present late with considerable spine deformity.[5] IL-1 plays many different roles, from mediating the immune response to infection[6] to regulating vascular permeability and angiogenesis.[7] Deregulated IL-1 responses have been associated with the development and progression of cancer[8] and also with autoimmune diseases such as rheumatoid arthritis.[9] But there is paucity of studies evaluating the relationship of pots spine and vitamin D, hence we have undertaken this study with the aim to assess the relationship between Vitamin D levels in patient with Potts spine.

2. Objectives

To estimate the serum vitamin D level in patients with Potts spine & determine its relationship with Pott's spine.

3. Materials and Methods

This was a facility based cross-sectional observational study, protocol of which was approved by the Institutional Ethical committee of the medical college and is consistent with all the ethical standards. Written informed consent was taken from all study subjects.

Patients with back pain with features of Pott's spine such as pain, numbness, loss of sensation, loss of power, loss of tone or bowel/bladder involvement & willing to participate in the study were included. All consecutive patients fulfilling inclusion and exclusion criteria were taken up for the study until the required sample size was fulfilled. Sampling method used was universal. Study was carried out over a period of 2 years from December 2020 to December 2022. Exclusion criteria were Patients with diagnosed neurological dysfunction such as stroke leading to monoparesis/monoplegia/paraparesis/paraplegia/quadriparesis /quadriplegia, peripheral neuropathies, Guillain-barre syndrome or ataxia. Patients with traumatic cervical spine injury, patients with congenital spine deformities, spinal tumours, patients with fractures in upper limb and known psychological dysfunction.

Detailed history regarding onset and progression of symptoms, history of trauma was taken. Detail neurological examination was done following which X-ray lumbar spine AP and

LATERAL view and MRI spine with whole spine screening was carried out. Degree of the spinal cord compression was classified into one off our groups:

Level 0 – no pressure on thecal sac

Level 1 – mild compression on thecal sac

Level 2 – the degree of thecal sac compression is <1/3
Level 3 – the degree of thecal sac compression is >1/3

Then all the patients were subjected to lab investigations such as vitamin D levels

[normal range: 30-100ng/mL], CBC, RFTs, LFTs, Sr. electrolytes. Results of vitamin D levels were compared statistically with severity of neurological impairment.

Pozo et al[10] in their study titled, the course of spinal tuberculosis (Pott disease): results of the multinational, multicentre Backbone-2 study, found that the most common presenting feature amongst spinal TB cases was paraspinal abscesses in 69%, considering this proportion, at 95% confidence interval and 15% allowable error, the sample size came out to be 37. Sample size was calculated with the formula n = [DEFF*Np(1-p)/ [(d2/Z21- α/2*(N-1 +p*(1-p)], using Epi info version 3.0.

Data was collected in pre-structured proforma which was pilot tested and after ensuring it's validity. Quantitative data was then tested by Mean and Standard Deviation, difference between more than two means tested by 'ANOVA' test. P value <0.05 was considered significant.

4. Results

In the present longitudinal observational study, we have initially planned to include 35 cases of degeneration of intervertebral disc leading to disc bulge /protrusion /extrusion. Total such 35 cases presented, included in the study, and we could analyse all of them giving the response rate of 100%, important observations and results of which are presented below.

In the present study, majority 14 (31.82%) of the cases were from the age group of 41-50 years followed by 07 (15.91%) from the age group of 21-30, 31-40 & 51-60 years age group each, 05 (11.36%) from <20 years and least i.e. 04 (9.09%) from the age group of >60 years. Mean age of the patients was 22.34 + 12.88 years.(Table 1)

In the present study, majority i.e. 24 (54.55%) of the cases were of male gender and only 20 (45.45%) were

Table 1: Distribution of cases according to age groups

Age group (years)	Cases	
	No.	Percentage (%)
<20	05	11.36
21-30	07	15.91
31-40	07	15.91
41-50	14	31.82
51-60	07	15.91
>60	04	9.09
Total	44	100
Mean + S.D.	41.8 + 13.9 years.	

Table 2: Distribution of cases according to gender

Gender	Cases	
	No.	Percentage (%)
Male	20	45.45
Female	24	54.55
Total	44	100

females.(Table 2)

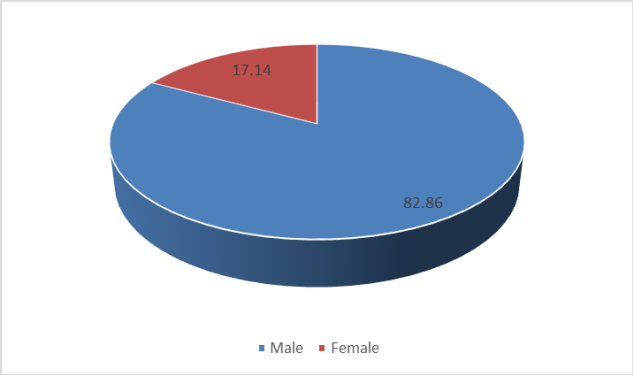

Figure 1: Gender wise distribution of cases

Table 3: Distribution of patients according to laterality

Laterality	Frequency	Percent
Left	06	13.64
Right	03	6.81
Bilateral	35	79.55
Total	44	100

In the present study, in most i.e. 35 (79.55%) of the cases affected side was bilateral followed by left side in 06 (13.64%) and right in 03 (6.81%).(Table 3)

Majority of the cases had side affected was bilateral.

In the present study, most common presenting complaint was severe back pain in 43 (97.73%) of the cases followed by motor power loss/weakness in 36 (81.82%), sensory involvement in 17 (38.64%), bowel bladder involvement in 15 (34.09%) and shoulder pain, hip pain, neck spasm in one (2.27%) case each. (Table 4)

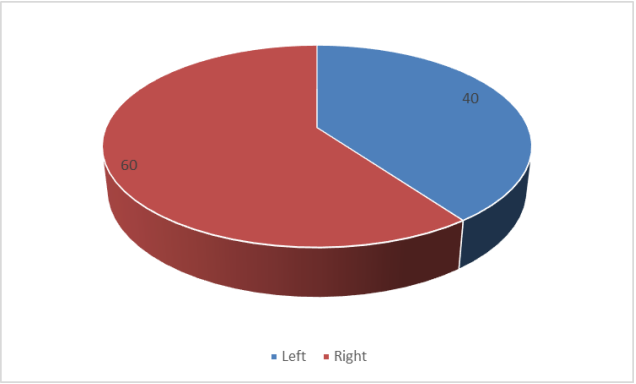

Figure 2: Laterality wise distribution of right cases

Table 4: Distribution of patients according to presenting complaints. (n=44)

Presenting complaints	Frequency	Percent
Bowel Bladder Involvement	15	34.09
Hip pain	01	2.27
Motor Power loss/weakness	36	81.82
Neck spasm	01	2.27
Sensory involvement	17	38.64
Severe back pain	43	97.73
Shoulder pain	01	2.27

Table 5: Distribution of patients according to duration of symptoms

Duration of symptoms (months)	Frequency	Percent
<6	27	61.36
>6	17	38.64
Total	44	100

In the present study, among most i.e. 27 (61.36%) of the cases duration of symptoms was <6 months and >6 months among 17 (38.64%).

Table 6: Distribution of patients according to MRI findings. (n=44)

MRI findings	Frequency	Percent
Cervical compression	02	4.55
Thoracic compression	29	65.91
Lumbar compression	23	52.27
Sacral compression	01	2.27
Psoas Abscess	11	25
Tuberculoma	01	2.27

In the present study, among majority i.e. 29 (65.91%) of the cases MRI finding was thoracic compression followed by 23 (52.27%) had lumbar compression, 11 (25%) had psoas abscess, 02 (4.55%) had cervical compression and 1 (2.27%) had sacral compression, tuberculoma each.(Table 6)

Table 7: Distribution of patients according to MRI findings indicating degree of spinal cord compression

Degree of spinal cord compression	Frequency	Percent
Level 1	20	45.46
Level 2	12	27.27
Level 3	12	27.27
Total	44	100

In the present study, majority i.e. 20 (45.46%) of the cases had level 1 spinal cord compression followed by 12 (27.27%) had level 2 & level 3 spinal cord compression.(Table 7)

Figure 3: MRI findings amongst cases.

Most common finding was extrusion of the disc followed by protrusion of the disc.

Table 8: Distribution of patients according to diagnosis

Diagnosis	Frequency	Percent
Cervical Pott's spine with disseminated TB	02	4.55
Thoracic Pott's spine	20	45.46
Thoracic Pott's spine with psoas abscess	04	9.09
Thoracic Pott's spine with tuberculoma	01	2.27
Thoracic Pott's spine with TB meningitis	01	2.27
Thoracic Pott's spine with paraplegia	03	6.82
Lumbar Pott's spine	15	34.09
Lumbar Pott's spine with psoas abscess	07	15.91
Lumbar Pott's spine TB meningitis	01	2.27
Sacral Pott's spine	01	2.27

In the present study, most common diagnosis was thoracic Pott's spine among 20 (45.46%) cases followed by lumbar Pott's spine in 15 (34.09%) cases, lumbar Pott's spine with psoas abscess in 07 (15.91%), thoracic Pott's spine with psoas abscess in 04 (9.09%), thoracic Pott's spine with paraplegia in 03 (6.82%), cervical Pott's spine with disseminated TB in 02 (4.55%) and thoracic Pott's spine with tuberculoma, meningitis, lumbar Pott'sspine TB meningitis, sacral Pott's spine in 1 (2.27%) case each.(Table 8)

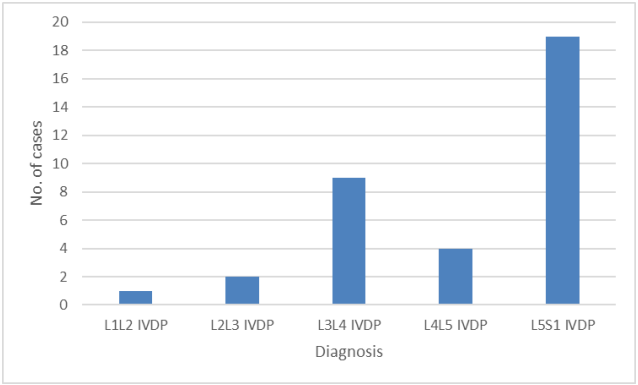

Figure 4: Diagnosis wise distribution of cases

Most of the cases had intervertebral disc prolapse at L5S1 followed by IVDP at L3L4 level.

Table 9: Distribution of patients according to serum level of vitamin D

Sr. Level of Vitamin D.	Frequency	Percent
>30 (optimal)	16	36.36
20-30 (insufficient)	12	27.28
<20 (Deficient)	16	36.36
Total	44	100
Mean + SD	25.31 + 11.82	

In the present study, serum vitamin D level was optimal (>30 ng/ml) in 16 (36.36%) cases, deficient (<20 ng/ml) in 16 (36.36%) cases and insufficient (20-30 ng/ml) among 12 (27.28%) of the cases.(Table 9)

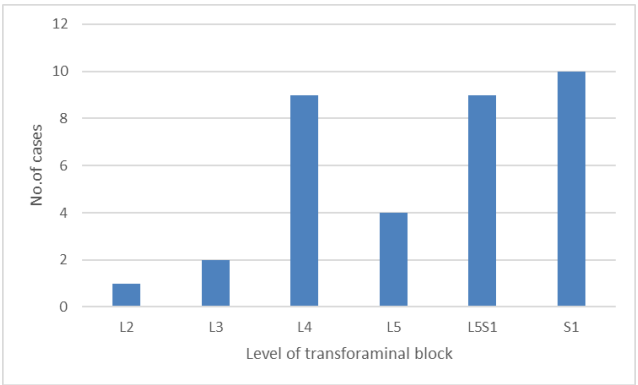

Figure 5: Level of transforaminal block among cases

Most of the cases were given transforaminal block at S1 level followed by L5S1 & L4 level.

Table 10: Association of age and serum level of vitamin D in patients with Pott's spine

Age	Sr. Level of Vitamin D.			P
	>30 (optimal) No. (%)	20-30 (insufficient) No. (%)	<20 (Deficient) No. (%)	
<20	01 (6.25)	02 (16.67)	02 (12.5)	0.8
21-30	03 (18.75)	02 (16.67)	02 (12.5)	1
31-40	04 (25)	02 (16.67)	01 (6.25)	0.3
41-50	05 (31.25)	01 (8.33)	08 (50)	0.05
51-60	02 (12.5)	04 (33.33)	01 (6.25)	0.19
>60	01 (6.25)	01 (8.33)	02 (12.5)	1
Total	16 (100)	12 (100)	16 (100)	–

In the present study, serum vitamin D level did not differ according to age. So, it was not associated with age group of cases (p>0.05).

In the present study, serum vitamin D level did not differ according to gender. Hence, it was not associated with gender of cases (p>0.05).(Table 11)

In the present study, serum vitamin D level of <20 (insufficient) was significantly associated with the presenting complaints of bowel bladder involvement & sensory involvement (p>0.05). It means severity of the disease increased as the deficiency of serum vitamin D developed. (Table 12)

In the present study, serum vitamin D level did not differ according to duration of symptoms. So, it was not associated with duration of the disease (p>0.05).(Table 13)

In the present study, serum vitamin D level of >30 (optimal) was significantly associated with level 1 spinal cord compression, 20-30 (insufficient) with level 2 spinal cord compression and <20 (insufficient) with the level 3 spinal cord compression (p<0.001). It means spinal cord compression & severity of the disease increased as the level of serum vitamin D decreased. (Table 14)

In the present study, serum vitamin D level did not differ according to diagnosis. Most of the vitamin D deficient i.e. <20 ng/ml cases had diagnosis of lumbar Pott's spine (43.75%) and thoracic Pott's spine (37.5%) but it did not reach significance (p>0.05). So, vitamin d deficiency was not associated with any particular diagnosis. (Table 15)

5. Discussion

Present study was prospective observational study, done on 44 cases of Pott's spine to assess relationship of serum levels of vitamin D, important findings of which are discussed below.

In the present study, majority 14 (31.82%) of the cases were from the advancing age group of 41-50 years with the mean age of the patients was 41.8 + 13.9 years. Most (54.55%) of the cases were of male gender. This is consistent with Weiwei Li et al[11] reported mean age of 32.0 ± 9.9 years with male majority (63.56%), Rohan R. Patil et al[12] noted mean age of 43 (±16.4) years with male majority (64.9%) & Ching-Yun Weng et al[13] who also noted male majority (60.52%).

In the current study, most common presenting complaint was severe back pain (97.73%) followed by motor power loss/weakness in 81.82%, sensory involvement in 38.64%, bowel bladder involvement in 34.09% and shoulder pain, hip pain, neck spasm in 2.27% each. 61.36% cases had duration of symptoms <6 months and 38.64% had >6 months. Most i.e. 79.55% of the cases affected side was bilateral. Similarly, Ching-Yun Weng et al[13] noted that back pain (100%) was the most common clinical symptom, followed by weakness (53%) and numbness (26%) with mean duration of symptoms 99 days (<6 months) and Rohan R. Patil et al[12] reported that back pain being the most common complaint in 102 (89.5%) Pott's spine cases, followed by weakness in 38 (34.3%), radicular pain in 26 (22.8%), fever with other constitutional in 10 (8.8%), and sinus/swelling over back/ abdominal pain was present in 4 (3.5%). After neurological evaluation, paraparesis/paraplegia was observed in 52 (45.6%) cases and tetraplegia in 2 (1.7%) cases. Sensory deficit was observed in 10 (10.5%) cases. Bowel/bladder involvement was present in 5 (4.4% cases) with the mean duration of symptoms till medical attention was sought was 4.8 (±6.2) months.

In our study, among majority (65.91%) of the cases MRI finding was thoracic compression followed by lumbar compression in 52.27%, psoas abscess in 25%, cervical compression in 4.55%, sacral compression & tuberculoma in 2.27% each. 45.46% of the cases had level 1 spinal cord compression followed by 27.27% had level 2 & level 3 spinal cord compression each. In this study, most common diagnosis was thoracic Pott's spine among 45.46% cases followed by lumbar Pott's spine in 34.09%, lumbar Pott's spine with psoas abscess in 15.91%, thoracic Pott's spine with psoas abscess in 9.09%, thoracic Pott'sspine with paraplegia in 6.82%, cervical Pott's spine with disseminated TB in 4.55% and thoracic Pott's spine with tuberculoma, meningitis, lumbar Pott's spine TB meningitis, sacral Pott's spine in 2.27%) each. Consistently, Ching-Yun Weng et al[13] reported that lumbar spine (39%) and the thoracic spine (37%) were the most commonly involved site in Pott's spine. Ching-Yun Weng et al[13] also noted that

Table 11: Association of gender and serum level of vitamin D in patients with Pott's spine

Gender	Sr. Level of Vitamin D			p
	>30 (optimal) (n=16)	20-30 (insufficient) (n=12)	<20 (Deficient) (n=16)	
Male	07 (43.75)	07 (58.33)	06 (37.5)	0.6
Female	09 (56.25)	05 (41.67)	10 (62.5)	
Total	16 (100)	12 (100)	16 (100)	

Table 12: Association of clinical features with the serum level of vitamin D in patients with Pott's spine

Clinical features	Sr. Level of Vitamin D.			P
	>30 (optimal) (n=16) No. (%)	20-30 (insufficient) (n=12) No. (%)	<20 (Deficient) (n=16) No. (%)	
Bowel Bladder Involvement	02 (12.5)	04 (33.33)	09 (56.25)	**0.03**
Hip pain	00 (00)	01 (8.33)	00 (00)	0.2
Motor Power loss/weakness	13 (81.25)	10 (83.33)	13 (81.25)	1
Neck spasm	00 (00)	00 (00)	01 (6.25)	1
Sensory involvement	03 (18.75)	04 (33.33)	10 (62.5)	0.04
Severe Back pain	16 (100)	12 (100)	15 (93.75)	1
Shoulder pain	00 (00)	00 (00)	01 (6.25)	1

Table 13: Association of duration of symptoms with serum level of vitamin D in patients with Pott's spine

Duration of symptoms	Sr. Level of Vitamin D.			P
	>30 (optimal) No. (%)	20-30 (insufficient) No. (%)	<20 (Deficient) No. (%)	
<6	10 (62.5)	07 (58.33)	10 (62.5)	1
>6	06 (37.5)	05 (41.67)	06 (37.5)	
Total	16 (100)	12 (100)	16 (100)	

Table 14: Association of degree of spinal cord compression with the serum level of vitamin D in patients with Pott's spine

Degree of spinal cord compression	Sr. Level of Vitamin D.			P
	>30 (optimal)	20-30 (insufficient)	<20 (Deficient)	
Level 1	14 (87.5)	02 (16.67)	04 (25)	<0.001
Level 2	01 (6.25)	08 (66.66)	03 (18.75)	<0.001
Level 3	01 (6.25)	02 (16.67)	09 (56.25)	<0.001
Total	16 (100)	12 (100)	16 (100)	

Table 15: Association of diagnosis with the serum level of vitamin D in patients with Pott's spine

Diagnosis	Sr. Level of Vitamin D.			P
	>30 (n=16)	20-30 (n=12)	<20 (n=16)	
Cervical Pott's spine with disseminated TB	00 (00)	00 (00)	02 (12.5)	0.3
Thoracic Pott's spine	08 (50)	06 (50)	06 (37.5)	0.7
Thoracic Pott's spine with psoas abscess	02 (12.5)	01 (8.33)	01 (6.25)	1
Thoracic Pott's spine with tuberculoma	00 (00)	01 (8.33)	00 (00)	0.2
Thoracic Pott's spine with TB meningitis	00 (00)	01 (8.33)	00 (00)	0.2
Thoracic Pott's spine with paraplegia	02 (12.5)	01 (8.33)	00 (00)	0.4
Lumbar Pott's spine	06 (37.5)	02 (16.67)	07 (43.75)	0.3
Lumbar Pott's spine with psoas abscess	02 (12.5)	02 (16.67)	02 (12.5)	1
Lumbar Pott's spine TB meningitis	00 (00)	01 (8.33)	00 (00)	0.2
Sacral Pott's spine	00 (00)	00 (00)	01 (6.25)	1

common imaging findings were disc space involvement, paraspinal abscess & epidural compression. Rohan R. Patil et al[12] also reported thoracic spine (39.1%) and the lumbar spine (38.1%) were the most commonly involved site in Pott's spine and observed psoas abscess, lytic lesions and granulation tissue as common pathology.

In this study, serum vitamin D level was optimal (>30 ng/ml) in 36.36% cases while reduced in 63.64% of which 27.28% cases had insufficient (20-30 ng/ml) level & 16 36.36%) cases had deficient (<20 ng/ml) level. Further, reduced serum vitamin D level was not associated with age, gender, duration of symptoms and diagnosis (p>0.05). Serum vitamin D level of <20 (insufficient) was significantly associated with the presenting complaints of bowel bladder involvement & sensory involvement (p>0.05) i.e. increased in neurological severity. Also, serum vitamin D level of >30 (optimal) was significantly associated with level 1 spinal cord compression, 20-30 (insufficient) with level 2 spinal cord compression and <20 (insufficient) with the level 3 spinal cord compression (p<0.001). It means spinal cord compression & severity of the disease increased as the level of serum vitamin D decreased. This finding is in line with the following authors.

Samah Sidahmed M.S Elsafi et al[14] while evaluating relationship of vitamin D in pulmonary TB found that vitamin D levels were significantly reduced among TB cases than controls. Likewise, it's much lower in females, individuals of 21–40 years old, and patients with high bacillary levels or those infected by Rifampicin resistance strain.

Kiran Belur et al[15] in their study observed vitamin D deficiency, vitamin D insufficiency, and optimum vitamin D among 55%, 41%, and 3.89% tuberculosis cases, respectively.

Vijay Jaimni et al[16] noted in their study that serum vitamin D levels were significantly lower (P = 0:012) in the tuberculosis group (19 (7.75, 27.25) ng/dl) as compared to the control group (25 (19.75, 32.00) ng/dl). Out of 50 TB patients, 27 (54%) had vitamin D deficiency, while among healthy controls, only 13 (26%) had vitamin D deficiency. Among vitamin D deficient PTB patients, 44% had 3+/hpf AFB in sputum smear examination. S0, the prevalence of vitamin D deficiency in pulmonary tuberculosis cases is very high. Hypovitaminosis D was associated with more severe clinical symptoms, higher sputum smear positivity, and extensive lesions in chest radiograph among pulmonary tuberculosis patients.

Guohua Wang et al[17] in their study found that vitamin D receptor gene (VDR-FokI) polymorphism is the susceptible factor of spinal TB and indicators of the clinical severity.

Manish Pareek et al[18] reported that individuals with extrapulmonary TB had lower mean serum 25(OH)D concentration than those with pulmonary TB (11.4 vs 15.2 nmol/L, respectively, p=0.0001). On multivariable analysis, vitamin D deficiency was strongly associated with extrapulmonary TB independently of ethnicity, gender and other factors. Doubling in serum 25(OH)D concentration conferred substantially reduced risk of extrapulmonary disease (OR 0.55, 95% CI 0.41 to 0.73).

David A. Jolliffe et al[19] in a meta-analysis of adjunctive vitamin D in tuberculosis treatment analysed 1850 participants in eight studies and found that vitamin D did not influence time to sputum culture conversion overall (adjusted HR 1.06, 95% CI 0.91–1.23), but it had accelerated sputum culture conversion in participants with multidrug-resistant pulmonary TB (adjusted HR 13.44, 95% CI 2.96–60.90); no such effect was seen in those whose isolate was sensitive to rifampicin and/or isoniazid (adjusted HR 1.02, 95% CI 0.88–1.19; p-value for interaction=0.02). Vitamin D accelerated sputum smear conversion overall (adjusted HR 1.15, 95% CI 1.01–1.31), but did not influence other secondary outcomes. But Gurpreet Kaur Randhawa et al[20] in randomized control study from Punjab, India found that vitamin D as adjuvant to ATT does not confer additional benefit to newly diagnosed pulmonary tuberculosis patients and concluded that large multi-centric trials are required to find any benefit of vitamin D supplementation with ATT.

6. Conclusion

Advancing age (41-50 years) male patients most at risk of Pott's spine with the mean age of 41.8 + 13.9 years.

1. Thoracic spine was most commonly involved in Pott's spine followed by lumbar spine with majority having level 1 compression followed by level 2 and level 3 compression.
2. Most common diagnosis in our study was thoracic Pott's spine followed by lumbar Pott's spine & lumbar Pott's spine with psoas abscess etc.
3. In this study, we have found reduced serum vitamin D level in 63.64% cases. Reduced serum levels of vitamin D are associated with increased spinal cord compression & disease severity as suggested by the bowel bladder involvement & sensory involvement at levels <20 ng/ml, level 1 spinal cord compression at optimal (>30 ng/ml) vitamin D level, level 2 spinal cord compression at 20-30 ng/ml (insufficient) and level 3 spinal cord compression at deficient (<20 ng/ml) vitamin D level. So, there is an inverse relationship between the level of vitamin D & severity of disease in Pott's spine.

7. Source of Funding

There was no source of funding in our study.

8. Conflict of Interest

None.

References

1. Holick MF. Vitamin D deficiency. *N Engl J Med*. 2007;6(3):266–81.
2. Prietl B, Treiber G, Pieber TR, Amrein K. Vitamin D and immune function. *Nutrients*. 2013;5(7):2502–21.
3. Battault S, Whiting SJ, Peltier SL, Sadrin S, Gerber G, Maixent JM. Vitamin D metabolism, functions and needs: From science to health claims. *Eur J Nutr*. 2013;52(2):429–41.
4. Liu PT, Stenger S, Li H, Wenzel L, Tan BH, Krutzik SR, et al. Toll-like receptor triggering of a vitamin D-mediated human antimicrobial response. *Science*. 2006;311(5768):1770–3.
5. Chun RF, Adams JS, Hewison M. Immunomodulation by vitamin D: implications for TB. *Expert Rev Clin Pharmacol*. 2011;4(5):583–91.
6. Kreutz M, Andreesen R, Krause SW, Szabo A, Ritz E, Reichel H. 1, 25-dihydroxyvitamin D3 production and vitamin D3 receptor expression are developmentally regulated during differentiation of human monocytes into macrophages. *Blood*. 1993;82(4):1300–7.
7. Gombart AF, Saito T, Koeffler HP. Exaptation of an ancient Alu short interspersed element provides a highly conserved vitamin D-mediated innate immune response in humans and primates. *BMC Genomics*. 2009;10(1):321.
8. Rajasekaran S, Kanna RM, Shetty AP. Pathophysiology and Treatment of Spinal Tuberculosis. *JBJS Rev*. 2014;2(9):4.
9. Colmenero JD, Ruiz-Mesa JD, Sanjuan-Jimenez R, Sobrino B, Morata P. Establishing the diagnosis of tuberculous vertebral osteomyelitis. *Eur Spine J*. 2013;22(Suppl 4):579–86.
10. Pozo J, Soto MV, Solera J. Vertebral osteomyelitis: Long-term disability assessment and prognostic factors. *J Infect*. 2007;54(2):129–34.
11. Li W, Liu Z, Xiao X, Xu Z, Sun Z, Zhang Z. Early surgical intervention for active thoracic spinal tuberculosis patients with paraparesis and paraplegia. *BMC Musculoskelet Disord*. 2021;22:213.
12. Patil RR, Mote GB, Wankhede AK, Wandile KN, Badole CM, Weng C, et al. Spinal Tuberculosis and Neurological Deficit : A 10 - Year Study in Rural Tertiary Care Center of Central India. *J Orthop Traumatol Rehabil*. 2020;14(1):55–8.
13. Weng CY, Chi CY, Shih PJ, Ho CM, Lin PC, Chou CH, et al. Spinal Tuberculosis in Non-HIV-Infected Patients : 10 Year Experience of a Medical Center in Central Taiwan. *J Microbiol Immunol Infect*. 2010;43(6):464–9.
14. Elsafi S, Nou BM, Abakar AD, Omer H, Almugadam BS. Vitamin D level and it is association with the severity of pulmonary tuberculosis in patients attended to Kosti Teaching Hospital, Sudan. *AIMS Microbiol*. 2020;6(1):64–74.
15. Belur K, Arunachalam P, Raveendran JR. The Association Between Serum Vitamin D Levels and Serum Cathelicidin Antimicrobial Peptide (CAMP) Levels Among Tuberculosis Patients in Comparison with Control Subjects. *J Pharmacol Pharmacother*. 2022;13(2):175–81.
16. Jaimni V, Shasty BA, Madhyastha SP, Shetty GV, Acharya RV, Bekur R, et al. Association of Vitamin D Deficiency and Newly Diagnosed Pulmonary Tuberculosis. *Pulm Med*. 2014;2021:5285841. doi:10.1155/2021/5285841.
17. Wanga G, Xie L, Hu J, Lu H, Liu X, Cao Y, et al. Osteopontin, Bone Morphogenetic Protein-4, and Vitamin D Receptor Gene Polymorphisms in the Susceptibility and Clinical Severity of Spinal Tuberculosis. *Cell Physiol Biochem*. 2017;41(5):1881–93.
18. Pareek M, Innes J, Sridhar S, Grass L, Connell D, Woltmann G. Vitamin D deficiency and TB disease phenotype. *Thorax*. 2015;70(12):1171–80.
19. Jolliffe DA, Ganmaa D, Wejse C, Raqib R, Haq MA, Salahuddin N, et al. Adjunctive vitamin D in tuberculosis treatment: meta-analysis of individual participant data. *Eur Respir J*. 2019;53(3):1802003.
20. Randhawa GK, Jindal S, Rai J, Kajal NC. A study of vitamin D supplementation with directly observed treatment short course for Pulmonary Tuberculosis. *Int J Basic Clin Pharmacol*. 2017;6(6):1377–85.

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