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Frequency of Spinal Tuberculosis in Diabetics With Highly Suspected Clinical Features of Tuberculous Spine

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ABSTRACT

Objective: Spinal tuberculosis is a health condition that cause neurological issue & impacts quality of life. This becomes more challenging when occurred in the diabetic patients. Frequency of spinal tuberculosis among the diabetic cases presenting with the highly suspected clinical features of the tuberculosis spine.

Methodology: This was cross sectional study conducted on 300 patients in department of interventional radiology of Ittefaq Trust Hospital situated in Lahore, Pakistan. The inclusion criteria was either gender with age of 30-70 years & strong clinical suspicion of spinal TB. Patients' blood sugar level of fasting greater then 126mg/dl. Patients were subjected to the MRI for identification of clinical features of the strongly suspected cases. Data entry and analysis was done by using SPSS 25inc. descriptive statistics was calculated along with the application of the chi square test to find out the impact of other variables on of the spinal TB. A p-value s 0.05 as significant,

Results: 300 patients when evaluated, it was noted that mean age of the patients was 53.47±9.93 years at the time of presentation. Majority of the patients with tuberculosis was male 178(59.7%). Mean duration of the disease was found to be 14.7±9.4 months. Radiological scan was done, and it was clarified that lumbar spine was involved in 240(80%) cases and 2 vertebrae was involved in 170(56.7%) cases. 159(53.4%) patients were having spinal tuberculosis along with diabetes mellitus.

Conclusion: It is important to check the diabetic cases with back pain for spinal tuberculosis for early management accordingly.

Key Words: Spinal tuberculosis, Diabetes Mellitus, Thoracic involvement, spondylitis

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Introduction

Historically, tuberculosis commonly known as 'TB' has its roots from the prehistoric times started from 9000BC to 600BC as their traces are found not only in mummified peoples also names as Yakshama in the oldest Indian medical treatment books of Charaka Samhilla and Sushrula Samhilla.[1]

Firstly in 1779, it was the Sir Percival Pott evaluated the patient with the kyphotic deformities among European people and highlighted his observations in pertinent to the clinical findings of the tuberculosis spondylitis.[2, 3]

World health organization (WHO) revealed after a survey in 2016 that 10.4 million people suffers from the TB annually. Of all the global burden of the tuberculosis, the East Asia bears 46.5% share and European has 3% of it. Irrespective of the decline in the TB cause of mortality from 2000 to 2015, TB is still one of the leading cause of the mortality.[4]

A huge migration of the low socio-economic countries to the developed countries is a serious concern that cause the wide scale spread of the TB. ln addition, the ever increasing incidence of chronic debilitating medical diseases and HIV-affected individuals further portend to the resurgence of TB. [5]

Socio-economic complications of the spinal tuberculosis are worth mentioning here as it is the most common form of extra pulmonary TB and causes significant reduction in the quality of life of the patients due to irreversible neurological changes and even paralysis in severe cases.[(6)]

Clinicians find it difficult to diagnose the spinal TB due to its very slow progression so it could be years passed when a patient has been embraced this disease. It remains silent till it becomes severe or the painful complaints from cases or any significant complications like abscess or deformity. Broadly TB cases are categorised into complicated and non-complicated TB group depending on the presentation of the cases. Backache that is most ignored, is a significant alarm for presence of this condition.(7)

Due to complexity of the spinal TB, plain radiography could be unjudgmental to screen this disease. Plain radiography could only identify the spinal TB when it has caused significant damage to the spinal cord by narrowing the spaces between vertebra and rarefaction of vertebral end plates. CT has shown somewhat superiority over the identification of the spinal TB over plain radiographs as it has shown the bony destruction, posterior column involvement and junctional pathologies. But the radiologist has made the MRI as modality of choice for the timely identification of the spinal TB as it has found to be able to detect the spinal changes at the earliest stages. As it was able to check the extent to soft tissue involvement, spread of abscess and more in-depth visualization of the spinal structure. Additionally, MRI can further used for the evaluation of the impact of spinal TB treatment. [8]

Spinal TB could play devastating in the people who have been suffering from the diabetes mellitus. Hence the various researchers worked on it using MRI and found 13% cases have this condition of which majority is involved of the lumbar spine and vertebra involvement.[8] But the debate started when the other research has showed that only 4.60% cases of diabetes have the spinal TB and similarly, there other features were also noted in lower frequencies.(9) This has a significant thinking among the healthcare providers and radiologists.

Current study could be opinion builder for development of guidelines for those cases who has TB at the time of presentation of diabetes along with the backache, to be screen for both conditions. Previously various studies had in different parts of world has noted various levels of burden, but no consensus was established regarding burden of diseases. Hence this study is planned to not only generate the current burden of disease also to create a comparison with the international literature.

Methodology

300 patients were carefully enrolled in this study from department of interventional radiology of Ittefaq Trust Hospital situated in Lahore, Pakistan in a duration of six months. By design, this study was cross sectional, and the sampling method opted for the selection of the patients was nonprobability consecutive sampling. Consecutive sampling was done as the fewer number of cases were noted by reviewing the previous records of the hospital. Ethical IHT/Adm/30 was taken from the hospital ethical committee before the commencement of the study. Sample selection was done through the defined inclusion and exclusion criteria. The inclusion criteria were the patients of either gender with age of 30-70 years. Patients who have been diagnosed with the diabetes mellitus on the criteria of blood sugar level of fasting greater then 126mg/dl and on medication from last 6 months. It was made sure that patients have clinical indications of the spinal TB which included lumbar pain, difficulty in maintaining upright position and discreet trunk forward leaning. Exclusion criteria were hypertensive cases (BP>140/90mmHg), renal issue (creatinine>1.2mg/dl) or liver problem (AST>40IU), ALTU >40IU. Additionally, patients who have been subjected to the spinal surgery were also excluded along with those who have vertebral tumours on clinical evaluation. Patients who have contraindication to MRI like implants etc were also excluded.

Cases were subjected to the MRI procedure using open MRI Machine 0.4, made by Hitachi aperto. General MRI was performed using 3T superconducting whole body MRI scanners, and the scanning sequences included transverse T2Wl, sagittal T2Wl, sagittal TlWl and falsuppressed T2Wl Transverse, coronal and sagittal axial helical scans was performed. To control any error, the diagnosis was further confirmed by histopathological examination or bacterial culture as an additional procedure. Spinal tuberculosis was marked present when there was low signal on T1 weighted images, bright signal on T2-weighted images and presence of a paravertebral / intra-osseous smooth walled abscess with a subligamentous extension and breaching of the epidural space evaluated through MRI.

Data entry and analysis was done by using SPSS 25inc. Quantitative data like age and duration of the lumbar pain was presented by using mean and SD. Qualitative data like gender, MRI features and spinal tuberculosis was presented by using frequency and percentages. Data was stratified accordingly for age, gender, MRI feature and duration of lumbar pain. Post stratification chi square test was applied. A p-value s 0.05 as significant,

Results

300 patients when evaluated, it was noted that mean age of the patients was 53.47±9.93 years at the time of presentation. Majority of the patients with tuberculosis was male 178(59.7%) with lesser females' cases 121(40.3%). Mean duration of the disease was found to be 14.7±9.4 months.

Radiological scan was done, and it was clarified that lumbar spine was involved in 240(80%) cases, thoracic spine involves in 52(17.3%) cases and 2 vertebrae was involved in 170(56.7%) cases of the suspected cases of tuberculosis among diabetic population. Spinal tuberculosis was noted in 159 patients out of 300 and 141 were not having this condition (Figure 1).

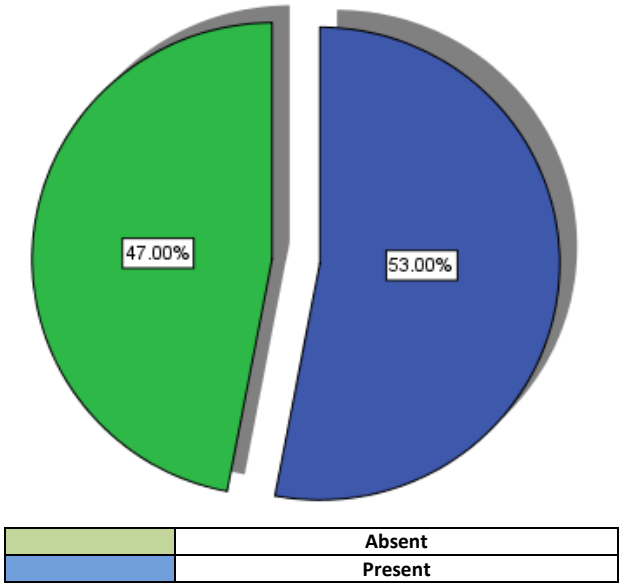

Figure 1. Presentation of the patients with the Spinal Tuberculosis

To find impact of other demographic and codominant condition, the data was stratified. It was noted that there was no significant difference for the age groups for the onset of the tuberculosis as 58% in age group of 50 years and 86% in age group of >51 was having the spinal tuberculosis (p-value>0.05). Spinal tuberculosis was similar in distribution in the male and females as the 94% among males and 51% females were having the disease. There frequency of the males was high, but the difference was not statistically significant. No significant difference for the duration of disease was noted p-value>0.05. All the MRI clinical features were noted in almost in same frequency, but the 2 vertebrae involvement was significantly different. (p-value<0.05). (Table I)

Discussion

Mycobacterium tuberculosis, a causative agent of the tuberculosis did not rely only on the pulmonary system, as thought by the common healthcare providers and population, also effects the non-pulmonary system of the humans. Now a day, it is becoming common in the orthopaedic clinics that people present with the backache when screened for diagnosis got to be compromised with spinal tuberculosis. This disease leads to the further deterioration of the spinal vertebrae and then called as spondylitis.[10]

Initially, the patients of spinal TB complaints about the weakness and the backache which did not settles even at the time of rest. Various researchers have evaluated this condition at various directions. In the rarely stages, Laurence Le Page stated that 95% of his study population complaint about the back pain but among patients who have chronic backpain the neurological symptoms were found in 74% patients. [(11)] Fever that is an alarming sign for any inflammation is usually found absent among patients with the spondylitis as reported by the suzaan.[12]

Table I: Impact of Confounder variables on the Spinal Tuberculosis.

		Spinal Tuberculosis		p-value
		Present	**Absent**	
Age	30-50 year	73(58.4%)	52(41.6%)	0.07
	51-70 year	86(49.1%)	89(50.9%)	
Gender	Male	97(94.2%)	82(45.8%)	0.35
	Female	62(51.2%)	59(48.8%)	
Duration of disease	1-12 month	78(51.7%)	73(48.3%)	0.36
	>12 month	81(54.4%)	68(45.6%)	
MRI Features				
Lumbar spine involvement	Yes	125(52.1%)	115(47.9%)	0.31
	No	34(56.7%)	26(43.3%)	
Thoracic spine involvement	Yes	32(61.5%)	30(38.5%)	0.11
	No	127(51.2%)	121(48.8%)	
2 vertebrae involvement	Yes	148(87.1%)	22(12.9%)	0.00
	No	11(8.5%)	119(91.5%)	

But the real matter of concern it non availability of the therapeutic guidelines to treat spondylitis TB, particularly with type 2 DM (T2DM). this chapter remains ignored as the TB is most thought to be a disease of only pulmonary system of the human body. Later, the research has found out new areas which could be impacted by the TB.

Spinal TB is initially apparent in the anterior inferior portion of the vertebral body. In the early stage of spondylitis TB, the disc space is preserved because of the lack of proteolytic enzyme. Later, it spreads into the central part of the body or disc. The infection causes pain and bone destruction, making the vertebral bodies collapsed, leading to kyphosis deformity. The kyphosis deformity could manifest as various types, such as knuckle deformity (single vertebra collapse), gibbus deformity (collapse of two or three vertebrae), or global rounded kyphosis (involvement of multiple adjacent vertebrae. The infection can spread to anterior and posterior longitudinal ligaments to the adjacent levels.[13, 14]

The real challenge being faced by the clinicians is to manage such cases who have neurological complications due to TB and additionally the patient has diabetes mellitus. The ability to control glycaemic level hinders the fast recovery of the patients and may cause in the fast progression of the disease. High glucose level oppresses the immune response against the M. Tuberculosis, through impairment of phagocytosis. Chronic hyperglycaemia causes enhanced production of sorbitol and fructose and activation of the polyol pathway and increases the formation of AGEs and production of reactive oxygen species. Due to less productivity of the interferon γ and interleukin (IL)-12 in the diabetic cases, the killing of the bacteria is further reduced so the medical management slows down to a newer level and need some more additive therapies. [15, 16]

In a study it was noted that among tuberculosis patient's diabetes was 12.39%. [17] a study in Ethiopia found an alarmingly high prevalence of the spinal TB in 87% of the cases.[(18)] in an Indian study on cases with spinal TB the prevalence of the diabetic mellitus was only 6.66% with a lumbar involvement in 96% of cases.[19] in another study the prevalence of diabetes among spinal TB cases was 6^ and the thoracic involvement was noted in 26% cases and lumbar involvement in 37% cases.[(20)] in a Chinese study on the cases of spinal TB the thoracic involvement was noted in 28% and lumbar involvement in 42% of the cases. But this study did not evaluate the diabetes.[21] almost similar findings were noted in another study.[22] But in another study, the thoracic was involved in 71% cases and lumbar in 51% cases with the prevalence of diabetes 24%.[(23)] one study noted that at least 2 vertebrae were involved in 72.66% cases of which 13% were having diabetes mellitus.[8]

Both TB and diabetes mellitus are prevalent in Pakistan. 16–98% of people have type 2 diabetes. According to various studies, Pakistan has a high rate of TB and DM co-morbidity. In one study, 211 TB patients were screened, and it was discovered that 11.4 percent had diabetes and 21.3% had PDM. 18% of TB patients had diabetes, according to a prospective cohort study on the prevalence of DM in pulmonary TB patients. These patients were more likely to experience adverse outcomes than TB patients without diabetes. A total of 39.6% of TB patients had DM, according to bi-directional screening, which also revealed that 26.1% of TB cases had previously diagnosed TB-DM and 13.5% of TB cases had recently diagnosed DM. Multi-drug resistant tuberculosis (MDR-TB) was also found to be more common in Pakistani people with diabetes than in those without the disease.[24] Similarly, in our study we have noted that high frequency of the DM mellitus noted in this study. This may be due to high frequency of the DM in overall population. But the regions involved are already in line of the already published international studies. A lower frequency in the previous studies is due to smaller sample size and the lesser percentages of the patients who have been reported having DM.

Considering the above, it is recommended that more such studies need to be conducted on a multi centred approach so that a true reflection could be obtained. In most of the studies, the patients who have spinal TB were evaluated for the status of DM but not studies are needed to be done on the patients who have DM and pressing with the back pain. This will reveal the true picture and may be baseline for the initiation of the development of the guidelines to manage such cases before they get some neurological deformities.

This study has limitation of sample size and being unicentric in type. Moreover, the time to treat such cases is also not studies in this study. So new studies can be planned to check the mean duration of the treatment of the spinal TB in the cases who have DM versus those who did not have DM. it is also recommended that patients who have DM and complaining about the back pains should be advised MRI for evaluation of the spinal changes.

Conclusion

It is concluded that all those cases who have the back pain at the time of presentation along with diabetes should be subjected to the MRI scan for determination of the health of the spine. A high frequency of the DM among the spinal TB cases demands to develop the guidelines to develop such patients and to screen all such cases with strong suspicion of the spinal TB for both parameters.

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