International Journal of Gerontology 13 (2019) 354–357
https://doi.org/10.6890/IJGE.201912_13(4).0018

International Journal of Gerontology

journal homepage: http://www.sgecm.org.tw/ijge/

Original Article

# Abscess Formation is More Frequent in Elderly Individuals with Osteoarticular Tuberculosis

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ARTICLE INFO

Accepted 11 November 2019

*Keywords:*
osteoarticular tuberculosis,
aged,
elderly,
clinical presentation,
abscess

SUMMARY

*Background:* Early diagnosis and appropriate management of osteoarticular tuberculosis (TB) is challenging for clinicians. This study aimed at evaluating the clinical and diagnostic features of geriatric populations.
*Methods:* This retrospective study was conducted from January 2009 to December 2013. We retrospectively enrolled 39 patients older than 18 years who were diagnosed with osteoarticular TB. The clinical presentations, imaging findings, and laboratory data were analyzed.
*Results:* Of these patients, 18 were 65 years of age or older and assigned as elderly group, leaving 21 in the adult group. Pain was present in all patients, 10 patients had limb weakness (elderly 6, 33.3% vs. adult 4, 19%). The mean time from symptoms onset to diagnosis was 35.6 days in the elderly group and was 19.8 days in the adult group ($p = 0.03$). Microbiological data (acid fast stain, culture and polymerase chain reaction (PCR)) demonstrated similar sensitivities between the two groups. The thoracic and lumbar spine (elderly 7, 38.9% vs. adult 9, 42.8%) was the most common involved site. Abscess formation occurred more frequently in the elderly group than adult group (72.2% vs. 38.1%; $p = 0.033$). The mean treatment duration of the elderly and adult groups were 11.4 months and 12.6 months, respectively ($p = 0.129$).
*Conclusion:* For geriatric patients with osteoarticular TB, compared to non-geriatric adults, the time from symptoms onset to diagnosis is longer, and abscess formation is more frequently seen. However, the treatment course, including drug resistance and complications, is similar. Osteoarticular TB should be considered for differential diagnosis in geriatric people with joint pain and local abscess formation in order to make early diagnosis and start treatment.



## 1. Introduction

Tuberculosis is an ancient and emerging disease worldwide despite advances in the methods of diagnosis and therapy.[1] Pulmonary tuberculosis is still the most common form but extrapulmonary tuberculosis also contributes to significant morbidity and mortality. Osteoarticuar TB comprises 1–3% of all tuberculosis cases[2] and 10–15% of all extrapulmonary tuberculosis cases.[3]

The most common symptom of osteoarticuar TB is pain, and occasionally there is swelling of the joints.[4] Symptoms are usually not obvious and do not often have a fever, so the disease are usually very severe when diagnosed. It is important to note that when spinal tuberculosis is diagnosed too slowly, it can cause serious and irreversible nerve damage, such as paraplegia.

According to the guidelines for the diagnosis and treatment of tuberculosis in Taiwan, short-course TB chemotherapy is the most important treatment factor for the treatment of spinal tuberculosis.[5] It is not necessary to surgery, but surgery is required if (1) chemical treatment failure; 2) reduce spinal cord compression; and (3) when the spine is unstable.

Several studies have reported osteoarticuar TB in a significant number of cases,[1,6] but in Taiwan only few studies on spinal TB have been reported.[7,8] Hence, we conducted a retrospective study to collect information on the clinical presentation, mycobacteriology and outcomes of patients with osteoarticular TB.

## 2. Method

From MacKay Memorial Hospital, January 2009 through December 2013, consecutive patients who were older than 18 years of age and registered with the Centers for Disease Control (Taiwan, R.O.C.) with a tentative diagnosis of osteoarticular tuberculosis were screened for inclusion in this study. These patients are divided into two groups: 65 years or older (elderly group) and less than 65 years old (adult group). This study was approved by the Institutional Review Board of MacKay Memorial Hospital. (MMH-IRB-20191100001)

The diagnosis of osteoarticular tuberculosis was confirmed on the basis of previously published and generally accepted clinical criteria.[5,10] Briefly, diagnosis of osteoarticular tuberculosis was based on: (1) positive culture for M. tuberculosis from abscess, pus or tissue biopsy; (2) acid-fast bacilli smear in abscess, pus or tissue;

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(3) bone tissue histopathology compatible with TB (e.g., granulomatous inflammation, caseous necrosis with Langhans giant cells, epithelioid cells, and the presence of lymphocytes or acid-fast bacilli); (4) tissue specimens TB polymerase chain reaction (PCR) positive finding. Patients were excluded if they were younger than 18 years of age.

We collected details of demographics, clinical features associated with medical illness, and past history of TB. We recorded data on laboratory tests, chest and bone imaging, histopathology, surgical record, acid-fast bacilli stain, culture, and PCR.

### *2.1. Statistical analysis*

Statistical analyses were performed using SPSS (version 17.0; SPSS Inc., Chicago, IL, USA) for Windows. Two groups (elderly and adult) were compared using $\chi^2$ tests for categorical data. All continuous data are expressed as mean ± standard deviation, normally distributed and analyzed using one-way analysis of variance. Categorical data are expressed as a percentage. A p value of < 0.05 was considered to be statistically significant.

## 3. Results

Between January 2009 and December 2013, a total of 39 patients older than 18 years of age and diagnosed with osteoarticular tuberculosis were included in this study. Of these patients, 18 belonged to elderly group and 21 belonged to adult group. The demographic data of these patients with osteoarticular tuberculous are summarized in Table 1.

The mean age of the elderly and adult groups were 76.8 ± 7.8 years and 44.5 ± 11.4 years, respectively. The most common comorbidities in the elderly group were heart failure (77.8%), followed by diabetes mellitus (50%), chronic kidney disease (44.4%) and old cerebrovascular accident (CVA) (33.3%). In contrast, in the adult group, heart failure (23.8%) is most common.

The main clinical presentations, microbiological, histological and PCR findings of two groups are summarized in Table 2. We found that there was a statistically significant difference of the period of time from symptom onset to diagnosis, 35.56 ± 25.3 days in the elderly group and 19.76 ± 17.4 days in the adult group (p = 0.03). In addition, mortality was higher in the elderly group (16.7% vs. 0%; p = 0.05).

Twelve of 39 patients (30.8%) were positive for acid fast stain, but no statistically significant difference was noted between the elderly and adult groups 22 of 39 patients (56.4%) were positive for acid fast bacillus culture, but no statistically significant difference was noted between the elderly and adult groups. Granuloma formation occurred in 27 (69.2%) patients, but no statistically significant difference was noted between the elderly and adult groups. There was no significant difference between the two groups in positive TB PCR rate.

Image finding and location of osteoarticular tuberculosis are summarized in Table 3. The spine was the most common site (16, 41%), and the percentage of affected lumbar, thoracic spine, knee and ankle was 23%; 18%, 23% and 13%, respectively. But there were no statistically differences between the elderly and adult groups. The majority of patients (90%) underwent surgery, however, there was no significance between the elderly and adult groups. The 21 patients (54%) had abscess formation. The elderly group had a

**Table 2**
Clinical presentation and diagnostic specimens among the elderly and adult groups

| | Elderly (%) (N = 18) | Adult (%) (N = 21) | p value |
|---|---|---|---|
| Fever | 4 (22.2%) | 7 (33.3%) | 0.442 |
| Bone pain | 18 (100%) | 21 (100%) | - |
| Limb weakness | 6 (33.3%) | 4 (19.0%) | 0.308 |
| Cough | 2 (11.1%) | 4 (19.0%) | 0.4936 |
| Body weight loss | 3 (16.7%) | 2 (9.5%) | 0.506 |
| Death | 3 (16.7%) | 0 (0) | 0.05 |
| Time to diagnosis (day, mean ± SD) | 35.56 ± 25.3 | 19.76 ± 17.4 | 0.03 |
| Positive AFS | 5 (27.8%) | 7 (33.3%) | 0.496 |
| Positive AFB culture | 10 (55.6%) | 12 (57.1%) | 0.921 |
| Positive TB PCR | 18 (100%) | 17 (81.0%) | 0.051 |
| Positive granuloma | 13 (72.2%) | 14 (66.7%) | 0.708 |

Body weight loss means 10% loss of previous body weight in 6 months.
AFS = acid-fast stain; AFB = acid-fast bacillus; TB = tuberculosis; PCR = polymerase chain reaction.

**Table 1**
Demographic characteristics of 39 osteoarticular tuberculosis patients.

| | Elderly (%) (N = 18) | Adult (%) (N = 21) | p value |
|---|---|---|---|
| Age (y, mean ± SD) | 76.8 ± 7.8 | 44.5 ± 11.4 | < 0.01 |
| Male | 10 (55.6%) | 10 (47.6%) | 0.063 |
| Co-morbidities | | | |
| Malignancy | 4 (22.2%) | 1 (4.8%) | 0.104 |
| Diabetes | 9 (50%) | 2 (9.5%) | 0.005 |
| COPD | 4 (22.2%) | 0 (0) | 0.023 |
| Heart failure | 14 (77.8%) | 5 (23.8%) | 0.001 |
| Chronic kidney disease | 8 (44.4%) | 1 (4.8%) | 0.003 |
| PAOD | 3 (16.7%) | 0 (0) | 0.052 |
| Liver cirrhosis | 1 (5.6%) | 0 (0) | 0.274 |
| HIV/AIDS | 0 (0) | 2 (9.5%) | 0.179 |
| Old CVA | 6 (33.3%) | 1 (4.8%) | 0.020 |
| Old TB history | 3 (16.7%) | 2 (9.5%) | 0.506 |
| Hepatitis B/C | 1 (5.6%) | 4 (19.0%) | 0.209 |
| Steroid use | 2 (11.1%) | 5 (23.8%) | 0.303 |
| Labortary | | | |
| Leukocyte count (cells/μl, mean ± SD) | 7256 ± 2033 | 7567 ± 3203 | 0.506 |
| Hemoglobin (g/dl, mean ± SD) | 11.0 ± 1.6 | 11.7 ± 1.9 | 0.453 |
| C-reactive protein (mg/l, mean ± SD) | 6.0 ± 5.7 (N = 14) | 3.4 ± 3.1 (N = 11) | 0.057 |

COPD = chronic obstructive pulmonary disease; PAOD = peripheral artery occlusion disease; HIV = human immunodeficiency virus; AIDS = acquired immunodeficiency syndrome; CVA = cerebrovascular accident SD = standard deviation.

**Table 3**
Location and imaging characteristics among the elderly and adult groups.

| | Elderly (%) (N = 18) | Adult (%) (N = 21) | p value |
|---|---|---|---|
| Location | | | |
| Thoracic | 2 (11.1%) | 5 (23.8%) | 0.303 |
| Lumbar | 5 (27.8%) | 4 (19.0%) | 0.519 |
| Hip | 2 (11.1%) | 0 (0) | 0.117 |
| Knee | 4 (22.2%) | 5 (23.8%) | 0.907 |
| Ankle | 4 (22.2%) | 1 (4.8%) | 0.104 |
| Other | 1 (5.6%) | 6 (28.5%) | 0.016 |
| Operation | 17 (94.4%) | 18 (85.7%) | 0.424 |
| Imaging findings | | | |
| Abscess formation | 13 (72.2%) | 8 (38.1%) | 0.033 |
| Spine | 6 (33.3%) | 7 (33.3%) | 0.231 |
| Non-spine | 7 (38.9%) | 1 (4.8%) | 0.019 |
| Vertebra involved | 7 (38.8%) | 9 (42.8%) | 0.521 |
| $\leq$ 3 vertebra | 4 (22.2%) | 5 (23.8%) | 0.907 |
| 4–6 vertebra | 3 (16.6%) | 4 (19.0%) | 0.374 |
| Cord compression | 4 (22.2%) | 5 (23.8%) | 0.907 |

higher percentage of abscess formation than the adult group (p = 0.033).

Of the 39 patients with osteoarticular tuberculosis, five (12.8%) had concomitant pulmonary TB as indicated by AFS or AFB in the sputum. Two (5.1%) had concomitant lymph node TB. One (2.6%) had concomitant urogenital TB.

Treatment course are summarized in Table 4. There were no significant differences in mean treatment duration between the two groups (p = 0.129). Most patients completed the TB treatment course (83.3% elderly vs. 90.4% adult). The two groups of patients with a relative lower proportion of complications such as skin rash and hepatotoxicity caused by TB drugs.

## 4. Discussion

TB is one of most important infectious disease worldwide, especially in Asian and African coumtries.[9] Yoon HJ et al., found out that osteoarticular TB formed the third most common type of extrapulmonary TB, after pleural and lymph node TB.[10]

Similar to other studies,[12,13] back pain was the most commonly presented symptom, followed by weakness. Unlike pulmonary TB, osteoarticular TB is seldom accompanied by fever and body weight loss[14] and this was clearly observed in our study. Neurological involvement in spinal TB has been reported in 23–76% of patients, with differences in severity.[13,15] In the present study, ten of 39 patients (25.6%) have limbs weakness (33.3% elderly vs. 19.0% adult).

Early diagnosis of osteoarticular TB, especial spinal TB, in the elderly is difficult.[14,17] Because the elderly usually suffer from some degree of back pain due to degenerative joint disease or spine (or weight-bearing joint) osteoporosis, even leading to compression fracture, and the back pain may persist for months or even years. It often leads to delayed diagnosis of osteoarticular TB.[15,16] Therefore, in our study, we found that the average diagnosis time in the elderly group was longer than in the adult group (35.56 days vs. 19.76 days; p = 0.03). This may explain the significant difference of abscess formation between elderly group (thirteen patients (72.2%) and adult group (38.1%; p = 0.033) seen in the present study.

Osteoarticular TB often seed to marrow cavity occurring via hematogenous route. History of pulmonary disease was available in one third of cases reviewed by Watts and Lifeso.[1] Jutte et al., found a concurrent pulmonary TB in 15% of cases.[11,18] In our study, concurrent rate of pulmonary TB is 12.8% (5/39).

According to the Taiwan guidelines for TB diagnosis and treatment (third Edition, 2008) (fourth Edition, 2011), the duration of treatment for osteoarticular TB is at least 9 months and the treatment time for severe infections can be extended. According to the medical records, the clinician determines the entire treatment schedule based on the clinician's personal experience, the patient's clinical symptoms, side effects and related blood or imaging examinations.

The TB drugs treatment duration of average time is 11.7 months (6–18 months) in elderly group and 12.2 months (9–21 months) in adult group. Although the mean duration of treatment did not differ statistically between the two groups, it seemed that clinicians tended to have longer TB medications, particularly those with abscesses, which were treated for more than 9 months. Most clinicians choose a treatment period of 9 to 12 months. In the elderly group, a patient treated for 18 months because of rifampicin allergy. In the adult group, two patients were treated for 20 months and 21 months, respectively, because these patients had RA and SLE, respectively, and the immunosuppressive agents were used. The rheumatologist extended the TB treatment time.

Except for two patients who lost track of patients who did not complete treatment and 3 death patients, no recurrence or treatment failure or other complications occurred in the remaining patients.

All patients completed the TB treatment course (83.3% elderly vs. 90.4% adult), except three elderly patients who die and two adult patients lose clinical follow up. In all patients who completed TB treatment, regardless of the length of treatment, no recurrence of tuberculosis or treatment failure or other complications occurred.

Though most patients suffered varying degree of gastrointestinal discomfort, most of which can endure or improved after use symptomatic drugs. There are a few complications. In elderly group, one had rifampin allergy (received other anti-TB drugs 18 months); one suffered paradoxical tuberculosis reaction, need steroid and NSAID for symptomatic control. In addition, four patients in both groups developed hepatotoxicity caused by TB drugs of liver toxicity. (1 elderly vs. 3 adult; p value = 0.614).

Both groups were initially treated with standard treatment TB regimen (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol or fixed-dose formulations, rifampin 120 mg/isoniazid 50 mg/pyrazinamide 300 mg (Rifater; sanofi-aventis). When the TB drug sensitivity test

**Table 4**
Treatment results and complications.

| | Elderly (%) (N = 18) | Adult (%) (N = 21) | p value |
|---|---|---|---|
| Mean duration (month, mean $\pm$ SD) | 11.4 $\pm$ 2.8 (6–14) | 12.6 $\pm$ 3.4 (9–20.5) | 0.129 |
| Complete drugs course | 15 (83.3%) | 19 (90.4%) | 0.652 |
| Death | 3 (16.7%) | 0 (0) | 0.094 |
| Drugs resistant | 0 | 2 (9.5%) | 0.491 |
| Complication | | | |
| Skin rash | 1 (5.6%) | 0 | 0.463 |
| Hepatotoxicity | 1 (5.6%) | 3 (14.2%) | 0.614 |

for INH/RIF is positive, EMB (5, 27.8% vs. 8, 38.1%; p = 0.73) can be stop immediately and discontinuation of pyrazinamide is recommended after two months of treatment. This shows that most clinicians like to use EMB to increase the therapeutic effect, even though susceptibility to all TB drug is sensitive.

Most patients (35, 89.7%) underwent surgery in two group for abscess drainage and pain relief.

In addition, two are AIDS patients, both of whom use Rifatubin and do not use Rifampicin. Considering that patients have been received highly active antiretroviral therapy, TB drugs (especially Rifampicin) have a considerable potential for drug-drug interactions.

There are several limitations in this study. First, it was a retrospective study, diminishing their evidence level. Although the case number was small, it may serve as a substantial reference value for further clinical practice and investigations.

In conclusion, the diagnosis of osteoarticular TB with abscess in the elderly is more difficult and often delayed, compared to non-elderly adults. Taiwan is a high prevalence areas of TB. Suspected clinical symptoms and follow-up radiology, microbiology and biopsy results are important for the diagnosis of TB. Early suspicion of osteoarticular TB in elderly who had abscess formation should be listed in the differential diagnosis, and should be kept in mind for management of these patients.

## References


1. Watts HG, Lifeso RM. Tuberculosis of bones and joints. *J Bone Joint Surg Am.* 1996;78(2):288–298.
2. Tuli SM. General principles of osteoarticular tuberculosis. *Clin Orthop Relat Res.* 2002;398:11–19.
3. Sharma SK, Mohan A. Extrapulmonary tuberculosis. *Indian J Med Res.* 2004;120(4):316–353.
4. Arathi N, Faiyaz A, Najmul H. Osteoarticular tuberculosis-a three years' retrospective study. *J Clin Diagn Res.* 2013;7(10):2189–2192.
5. Centers for Disease Control, Ministry of Health and Welfare, R.O.C. (Taiwan). *Taiwan Guidelines for TB Diagnosis & Treatment*. 6th ed. Taipei City, Taiwan: Centers for Disease Control; 2017. Available at https://www.cdc.gov.tw/En/InfectionReport/Info/9YUAXbFsmorP5T10V8qvMA?infoId=_4WqQoF5dXs4xvRcCJbkMw. Accessed November 11, 2019.
6. Talbot JC, Bismil Q, Saralaya D, et al. Musculoskeletal tuberculosis in Bradford — A 6-year review. *Ann R Coll Surg Engl.* 2007;89(4):405–409.
7. Chang MC, Wu HT, Lee CH, et al. Tuberculous spondylitis and pyogenic spondylitis: Comparative magnetic resonance imaging features. *Spine (Phila Pa 1976)* 2006;31(7):782–788.
8. Weng CY, Chi CY, Shih PJ, 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):464–469.
9. Held MFG, Hoppe S, Laubscher M, et al. Epidemiology of musculoskeletal tuberculosis in an area with high disease prevalence. *Asian Spine J.* 2017;11(3):405–411.
10. Yoon HJ, Song YG, Park WI, et al. Clinical manifestations and diagnosis of extrapulmonary tuberculosis. *Yonsei Med J.* 2004;45(3):453–461.
11. Jutte PC, van Loenhout-Rooyackers JH, Borgdorff MW, et al. Increase of bone and joint tuberculosis in The Netherlands. *J Bone Joint Surg Br.* 2004;86(6):901–904.
12. N A, Ahmad F, Huda N. Osteoarticular tuberculosis a three years retrospective study. *J Clin Diagn Res.* 2013;7(10):2189–2192.
13. Procopie I, Popescu EL, Huplea V, et al. Osteoraticular tuberculosis-brief review of clinical morphological and therapeutic profiles. *Curr Health Sci J.* 2017;43(3):171–190.
14. Broderick C, Hopkins S, Mack DJF, et al. Delays in the diagnosis and treatment of bone and joint tuberculosis in the United Kingdom. *Bone Joint J* 2018;100-B(1):119–124.
15. Su SH, Tsai WC, Lin CY, et al. Clinical features and outcomes of spinal tuberculosis in southern Taiwan. *J Microbiol Immunol Infect.* 2010; 43(4):291–300.
16. Weng CY, Chi CY, Shih PJ, 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):464–469.
17. Dunn RN, Ben Husien M. Spinal tuberculosis review of current management. *Bone Joint J.* 2018;100-B(4):425–431.
18. Maeda Y, Izawa K, Nabeshima T, et al. Tuberculous spondylitis in elderly Japanese patients. *J Orthop Sci.* 2008;13(1):16–20.
19. Pigrau-Serrallach C, Rodríguez-Pardo D. Bone and joint tuberculosis. *Eur Spine J.* 2013;22(Suppl 4):S556–S566.