

Clinical And Radiological Features In Immunocompromised Patients With Tuberculosis: A Prospective Observational Study

Dr. Dhanekula Gouri, Dr. A. Ayyappa, Dr. Vijayapriya Yenugupalli,
Dr. G.Ram Kumar Gupta

Abstract

Background: Tuberculosis (TB) remains a global burden, especially among immunocompromised individuals, due to their altered immune responses and atypical disease presentations.

Objectives: To analyze clinical and radiological patterns of TB in immunocompromised patients and correlate findings with immunosuppressive states.

Methods: A prospective observational study of 50 immunocompromised TB patients over 18 months. Data included demographics, clinical symptoms, imaging (CXR/CT), and comorbid conditions. Statistical associations were tested using SPSS v25.

Results: Mean age was 48.8 ± 18.02 years. Males predominated (66%). Common immunosuppressive states included diabetes (30%) and steroid use (24%). Pulmonary TB accounted for 76% and extrapulmonary TB 24%. Frequent symptoms were lymphadenopathy (62%), dyspnea (48%), and fever (46%). Radiological findings included fibrosis (52%), consolidation (46%), and pleural effusion (44%). Fibrosis and nodules were significant predictors of TB type ($p < 0.05$).

Conclusion: TB in immunocompromised hosts presents atypically, both clinically and radiologically. Fibrosis and nodules are reliable imaging markers. Integrated diagnostic approaches are crucial to reduce diagnostic delays and improve outcomes.

Keywords: Tuberculosis, Immunocompromised, Radiological features, Fibrosis, Clinical presentation, HIV, Diabetes mellitus

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I. Introduction

Tuberculosis remains a major public health concern worldwide. Immunocompromised individuals—due to HIV, malignancies, diabetes, CKD, or immunosuppressants—are at heightened risk. Their presentations often deviate from classical forms, making diagnosis challenging and leading to delayed management and worse outcomes^{1,2}.

II. Materials And Methods

Study Design: Prospective observational study

Study Setting: Department of Pulmonary Medicine, Maharajah's Institute of Medical Sciences

Duration: 18 months

Sample Size: 50 immunocompromised patients with confirmed or clinically suspected TB

Inclusion Criteria:

- AFB-positive sputum
- Known cases of DM, HIV, malignancy, or connective tissue disorders
- Radiologically suspected TB

Exclusion Criteria:

- Sputum-negative TB
- Patients in extremis or with recent MI
- Unwilling patients

Investigations:

- CBC, FBS/PPBS/HbA1c, CT profile, HIV ELISA
- Chest X-ray, CT Chest

Analysis: SPSS v25. Descriptive and inferential statistics (chi-square, multinomial regression).

III. Results

- **Mean Age:** 48.8±18.02 years
- **Gender Distribution:** 66% Male, 34% Female
- **Comorbidities:** Diabetes (30%), Steroid use (24%), CKD (20%), HIV (16%), Malignancy (10%)
- **TB Type:** Pulmonary TB (76%), Extrapulmonary TB (24%)
- **Sites of Extrapulmonary TB:** Genitourinary (6%), CNS (4%), Abdominal (4%), Miliary (4%)
- **Common Symptoms:** Lymphadenopathy (62%), Dyspnea (48%), Fever/Night Sweats (46%), Weight loss (44%)
- **Radiological Findings:**
 - Fibrosis (52%), Consolidation (46%)
 - Pleural Effusion (44%), Miliary Pattern (40%)
 - Cavitation (34%), Tree-in-bud (36%), Nodules (26%)
 - Lung Involvement: Right Upper Lobe (24%) most common

Significant Associations (p<0.05):

- TB Type with Age Group (p=0.04)
- Radiological features (Fibrosis and Nodules) with TB Type
- Chest Pain, Smoking, and Fibrosis as predictive variables in regression

IV. Discussion

The study underscores that TB in immunocompromised patients diverges from typical manifestations. Radiologically, fibrosis and nodules were key predictors, contrasting with classic upper lobe cavitation seen in immunocompetent hosts^{3,4}. HIV patients tended to show miliary or lymph node involvement, while diabetic patients showed multilobar and lower lobe disease^{5,6}.

Despite varied immune suppression, extrapulmonary TB did not differ significantly between immunocompromised subgroups, emphasizing a multifactorial pathogenesis. The need for combined radiological and clinical vigilance is essential.

V. Conclusion

TB in immunocompromised individuals exhibits diverse presentations. Radiological features like fibrosis and nodules have higher predictive value than some clinical symptoms. Routine imaging with CT should be considered early, especially in atypical presentations. Diagnosis should integrate immunological background, symptoms, and imaging to minimize delays.

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