Exploring Silico-tuberculosis: A Detailed Investigation of 45 Cases in Occupational Settings

Fatima-Ezzahra Haouassia1*, Khadija Chaanoun1, Nahid Zaghba1, Hanane Benjelloun1, Najiba Yassine1

1 Pulmonology Department, Ibn Rochd University Hospital, Casablanca, Morocco

* Corresponding Author: Fatima-Ezzahra Haouassia E-mail: fhaouassia@gmail.com

ABSTRACT

Objective: Silicosis is a lung disease caused by inhaling crystalline silica dust, leading to inflammation and scarring of lung tissue. This retrospective study investigates the association between silicosis and tuberculosis (TB) in occupational settings, analyzing 45 male silicosis patients at Ibn Rochd University Hospital in Casablanca from June 2003 to December 2023.

Cases: The average duration of occupational exposure was 18 years, primarily in well-digging, stone crushing, mining, and masonry. Clinical symptoms included dyspnea (89%), persistent bronchial syndrome (83%), and hemoptysis (54%). Imaging typically revealed pseudo-tumoral opacities, often with associated mediastinal lymphadenopathy and micronodular or excavated opacities. TB diagnosis was confirmed by GeneXpert (23% in sputum, 70% in bronchial aspirate fluid) and culture (7%).

Conclusion: Anti-tuberculous treatment led to clinical improvement in most cases, but there were two deaths from acute respiratory failure and one case of TB relapse. The findings underscore the importance of screening and chemoprophylaxis for TB in managing silicosis. Preventive measures and worker health protections are crucial to reduce the incidence of silicosis and its complications.

Keywords: Silicosis, Tuberculosis, Occupational exposure, Crystalline silica, Lung disease

INTRODUCTION

Silicosis is a recognized occupational disease caused by prolonged inhalation of crystalline silica dust, which leads to lung fibrosis (1,2).

The most frequently implicated professions are mining, stone processing, well drilling, sandblasting, ceramic and glass production, and iron smelting (1,3). Silicosis increases the risk of developing various pulmonary and systemic comorbidities, including pulmonary tuberculosis, infections with atypical mycobacteria, fungal or bacterial infections, lung cancer, COPD, autoimmune diseases (e.g., scleroderma, rheumatoid arthritis), and chronic kidney diseases (4,5).

Tuberculosis represents the leading complication. Among silicosis patients hospitalized in our facility during the study period, 21% had silico-tuberculosis. Pulmonary tuberculosis remains a major public health concern, especially among individuals with silicosis, frequently leading to a notable mortality rate. This study aims to describe the epidemiological, clinical, and radiological profiles, as well as the outcomes of the association between these two pathologies.
CASE

This retrospective study analyzed 45 cases of silico-tuberculosis collected from the respiratory diseases department of Ibn Rochd University Hospital in Casablanca, spanning from June 2003 to December 2023. All patients were male, with an average exposure duration to crystalline silica of 18 years. The primary occupations included well-diggers (20 patients), stone crushers (10 patients), miners (8 patients), and masons (7 patients). Patient data were obtained from hospital records.

RESULTS

Clinical symptoms were dominated by dyspnea in 89% of cases, persistent bronchial syndrome in 83%, hemoptysis in 54%, and general deterioration of health in almost all patients. Thoracic imaging revealed pseudo-tumoral opacities in all cases, with calcified mediastinal lymphadenopathy in 15 cases, micronodular opacities in 19 cases, and excavated opacities in 6 cases. Tuberculosis diagnosis was confirmed by GeneXpert in sputum in 23% of cases and in bronchial aspirate fluid in 70% of cases, and by culture in post-bronchoscopy sputum in 7% of cases. Bronchial biopsies revealed epithelioid granulomas with caseous necrosis in 12 cases. All patients were treated with the RHZE/4RH regimen recommended by the National Tuberculosis Control Program. Most patients showed significant clinical improvement, although there were two deaths due to acute respiratory failure, and one case experienced a relapse of pulmonary tuberculosis.

Picture 1: Thoracic CT scan revealing pseudo-tumoral masses with calcifications within them, highly pathognomonic of silicosis.

Picture 2: A thoracic CT scan (parenchymal window) depicting pseudo-tumoral masses (silicosis) with some areas of ground-glass opacities and reticulations. Notably, GeneXpert testing on sputum samples was positive.

Picture 3: Frontal chest x-ray reveals bilateral heterogeneous opacities with multiple...
DISCUSSION

The literature indicates that individuals with silicosis are significantly more likely to develop pulmonary tuberculosis, with risk estimates ranging from 2.8 to 39 times higher than in healthy individuals. The risk of developing extrapulmonary tuberculosis is also higher, at 3.7 times that of healthy controls (5,6). Recent studies suggest that exposure to silica, even without developing silicosis, increases susceptibility to tuberculosis. This is due to silica’s impact on lung immune response, alteration of pulmonary macrophage metabolism and function, and apoptosis of these cells with frequent exposure (7,8,9). In Morocco, no specific anti-tuberculosis chemoprophylaxis is currently indicated for workers with silicosis or those exposed to silica, pending validated international guidelines. Preventive measures, such as reducing silica dust exposure through engineering controls, personal protective equipment (PPE), and regular health monitoring, are essential to mitigate the risk of silicosis and its complications. Silicosis is a notifiable occupational disease, compensable under Moroccan regulations since April 2000. Its association with tuberculosis increases compensation eligibility, although only 5 of our patients had received such benefits, with the rest being self-employed.

CONCLUSION

Silicosis predisposes individuals to tuberculosis, highlighting the importance of comprehensive tuberculosis screening and the use of anti-tuberculous chemoprophylaxis in managing silicosis patients. Implementing preventive measures and ensuring strict adherence to worker health protection standards are crucial to reducing the incidence of silicosis and its associated complications.

Acknowledgements: None

Conflict of interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Authors’ Contribution
Conceptualization: FEH
Data curation: FEH
Formal analysis: FEH
Funding acquisition: FEH
Investigation: FEH
Methodology: FEH
Project administration: FEH
Resources: FEH
Software: FEH
Supervision: FEH
Validation: FEH
Visualization: FEH
Writing—original draft: FEH
Writing—review & editing: FEH

REFERENCES


Ethical approval: The present study was conducted in strict accordance with the principles outlined in the Declaration of Helsinki. Informed consent was obtained from the participant of this study.

Copyright © 2024 The Author(s); This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. International Journal of Medical Science and Discovery.