EPIDEMIOLOGICAL STUDY OF SILICOSIS WITH BILATERAL SPONTANEOUS PNEUMOTHORAX IN RAJASTHAN

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Article Info: Received 25 August 2019; Accepted 12 September 2019

DOI: <https://doi.org/10.32553/ijmbs.v3i10.626>

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Conflict of interest: No conflict of interest.

Abstract

Background: Silicosis is reported to be an occupational lung disease, which is caused by the inhalation of silica dust. Workers in occupations related to silica dust exposure are characterized by increased foci of fibrogenesis which result in radiological and pathological findings in the lungs. In most circumstances silicosis only develops subsequent to substantial occupational exposures.

Material & Methods: The present prospective study was conducted at department of respiratory medicine of our tertiary care hospital. The study was an observational study conducted during a period of one year. The study done at 95% confidence interval at 10% of maximum allowable error. All patients who were diagnosed with silicosis were enrolled into the study.

Results: In the present study, all patient had cough at presentation out of which 7 (70%) patients had dry cough and 3 patients with productive coughs, four patients experienced loss of appetite. Eight (80%) patients had a history of smoking. Chest X-rays of all patients revealed bilateral, widespread, reticulonodular, and nodular appearances. Six patients had work on crusher machine and four patients as manual stone cutter. Pneumothorax was located bilaterally in all cases.

Conclusion: We concluded from the present study that inhalation of quartz dust or silica dusts was commonly associated with adverse health effects and it can cause serious morbidity like secondary spontaneous pneumothorax and mortalities.

Keywords: Silicosis, occupational lung disease, secondary spontaneous pneumothorax.

Introduction:

Silicosis is reported to be an occupational lung disease, which is caused by the inhalation of silica dust. Workers in occupations related to silica dust exposure are characterised by increased foci of fibrogenesis which result in radiological and pathological findings in the lungs. In most circumstances silicosis only develops subsequent to substantial occupational exposures (1). The disease has a long latency period and may clinically present as an acute, accelerated, or chronic disease. Although silicosis is a preventable disease, it continues to be an important health problem, especially in low-income communities (2).

Workers engaged in certain occupations, such as mining and tunnel digging, pottery workers and quarrying workers have a high risk for silicosis. Pleural involvement, including pleural effusion, pleural thickening, or pneumothorax, is rarely seen in silicosis. The most significant complications of silicosis is pneumothorax which is associated with pleura.

Pneumothorax among patients with chronic silicosis is usually unilaterally and sometimes reported to be fatal. However, various studies reported that incidence of pneumothorax is relatively uncommon in acute and accelerated cases of silicosis (3).

However, various studies reported that pleural involvement in silicosis is relatively rare and the commonly associated pleural complication with silicosis is secondary spontaneous pneumothorax. Some studies reported the fatal outcomes among patients with silicosis who were diagnosed with secondary spontaneous pneumothorax, although it occurs late and associated with grossly compromised pulmonary function. Secondary spontaneous pneumothorax is usually unilateral and only on rare presentation it is bilateral (4). We conducted present study to assess Silicosis with bilateral spontaneous pneumothorax.

Materials & Methods

The present prospective study was conducted at department of respiratory medicine of our tertiary

care hospital. The study was an observational study conducted during a period of one year. The study done at 95% confidence interval at 10% of maximum allowable error. All patients who were diagnosed with silicosis were enrolled into the study. Clearance from hospital ethics committee was taken before start of study. Written informed consent was taken from each study participant.

Detailed history was taken from all the study participants along with complete otologic, nasal and throat examinations. All study participants were undergone for routine blood investigation, chest radiographs and pulmonary function tests. Standard diagnostic protocol was followed for all the study participants. All the study participants were followed up for 1 year to record for recurrences. Data analysis was carried out using SPSS v22. All tests were done at alpha (level significance) of 5%; means a significant association present if p value was less than 0.05.

Results

In the present study, the mean duration of exposure to silica particles was 14.3 year. Most of the patient belongs to economically productive age group (20-45 year) and one patient above sixty years. The diagnosis of silicosis was recorded and conducted by typical occupational history, clinical signs and symptoms, routine blood investigation and chest radiographs. All of the patients had various degrees of dyspnea (SOB) and bilateral (b/l) chest pain.

All patients had cough at presentation out which 7 (70%) patients had dry cough and 3 patients with productive coughs, four patients experienced loss of appetite. Eight (80%) patients had a history of smoking. Chest X-rays of all patients revealed bilateral, widespread, reticulonodular, and nodular appearances. Six patients had work on crusher machine and four patients as manual stone cutter. Pneumothorax was located bilaterally in all cases. One patient put on conservative treatment (refused consent for ICDT) while bilateral tube thoracostomy was done in two patient and unilateral tube thoracostomy done in rest of the patients. Table summarizes the age, duration of exposure, localization of pneumothorax, smoking habits, type of stone worker, nature of stone and treatment of the cases.

The average duration of hospitalization was 11 days (range 6-17 days). Sputum examination and cultures for *Mycobacterium tuberculosis* (*M. tuberculosis*)

were negative except in three. On follow-up, none of the patients had complete expansion of lung on follow up. Most of them refused for an operative intervention. One of the cases had died in- hospital and one other died a month after discharge from hospital. Others were extubated but with some degree of residual pneumothorax. (Table 1)

Table 1: Distribution of study participants according to study parameters.

Parameters	No. of patients
Mean age	39.1±6.3 years
Mean duration of exposure	14.3 years
Dry Cough	70%
Productive Cough	30%
Smokers	80%
Mean duration of hospital stay	11 days (range 6-17 days)
cultures for <i>Mycobacterium tuberculosis</i>	Positive in 70%

Discussion

In the present study, the mean duration of exposure to silica particles was 14.3 year. Most of the (5)patient belong to economically productive age group (20-45 year) and one patient above sixty years. The diagnosis of silicosis was recorded and conducted by typical occupational history, clinical signs and symptoms, routine blood investigation and chest radiographs. All of the patients had various degrees of dyspnea (SOB) and bilateral (b/l) chest pain. Similar findings were reported in a study conducted by Radnoff D et al among patients with chronic silicosis and found similar results to present study. They reported relationship between airborne total respirable silica dust concentration and total respirable silica dust concentrations. The also reported that the hazard assessment tool is necessary for all employers to evaluate the potential exposure of airborne respirable silica dust particles at the work place (5). Similar findings were reported in a study conducted by Yassin A et al among patients with chronic silicosis and found similar results to present study. They reported the size of airborne crystalline silica dust particles among workers and provide an airborne silica dust exposure levels in different high-risk occupations (6).

In the present study, all patient had cough at presentation out which 7 (70%) patients had dry cough and 3 patients with productive coughs, four patients experienced loss of appetite. Eight (80%) patients had a history of smoking. Chest X-rays of all

patients revealed bilateral, widespread, reticulonodular, and nodular appearances. Six patients had work on crusher machine and four patients as manual stone cutter. Pneumothorax was located bilaterally in all cases. One patient put on conservative treatment (refused consent for ICDT) while bilateral tube thoracostomy was done in two patient and unilateral tube thoracostomy done in rest of the patients. Table summarizes the age, duration of exposure, localization of pneumothorax, smoking habits, type of stone worker, nature of stone and treatment of the cases. Similar findings were reported in a study conducted by Williamson B et al among patients with chronic silicosis and found similar results to present study. They reported inhalation of quartz dust or silica dusts was commonly associated with adverse health effects (7). Similar findings were reported in a study conducted by Mohebbi I et al among patients with chronic silicosis and found similar results to present study. They reported significant association between acute silicosis and accelerated silicosis with secondary spontaneous pneumothorax (SSP) and bullae formation (8).

In the present study, the average duration of hospitalization was 11 days (range 6-17 days). Sputum examination and cultures for *Mycobacterium tuberculosis* (*M. tuberculosis*) were negative except in three. On follow-up, none of the patients had complete expansion of lung on follow up. Most of them refused for an operative intervention. One of the cases had died in-hospital and one other died a month after discharge from hospital. Others were extubated but with some degree of residual pneumothorax. Similar findings were reported in a study conducted by Srivastava G et al among patients with chronic silicosis and found similar results to present study. They reported inhalation of quartz dust or silica dusts was commonly associated with adverse health effects (9).

Conclusion

We concluded from the present study that inhalation of quartz dust or silica dusts was commonly associated with adverse health effects and it can cause serious morbidity like secondary spontaneous pneumothorax and mortalities. Hence, all preventive measures and the hazard assessment tool is necessary for all employers to evaluate the potential

exposure of airborne respirable silica dust particles at the work place.

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