DETERMINATION AND PREDICTION OF RESPIRABLE DUST CAUSING PNEUMOCONIOSIS AT TERTIARY CARE CENTER.

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ABSTRACT:

Background: Pneumoconiosis is reported to be an occupational lung disease, which is caused by the inhalation of respirable dust. Workers in occupations related to silica, coal, asbestoses dust exposure are characterized by increased foci of fibrogenesis which result in radiological and pathological findings in the lungs. In most circumstances, Pneumoconiosis only develops subsequent to substantial occupational exposures. **Material & Methods:** The present prospective study was conducted at the Department of Tuberculosis and Chest Disease of our tertiary care hospital. The study was an observational study conducted during a period of one year. The study was done at a 95% confidence interval at 10% of maximum allowable error. 100 patients who were diagnosed with Pneumoconiosis were enrolled in the study. **Results:** In the present study, the mean duration of exposure to silica, coal, asbestoses dust was 15.4 ± 5.3 years. Most of the patients belong to the economically productive age group (18-60 years) and none of the patients were above sixty years. The mean age of study participants was 45.4 ± 7.2 years. All patients had a cough at presentation out of which 73% patients had a dry cough and 27% patients with productive coughs, four patients experienced the loss of appetite. 81% of patients had a history of smoking. Chest X-rays of all patients revealed bilateral, widespread, reticulonodular, and nodular appearances. 63% of patients had worked on crusher machines and 37% patients as a manual stone cutters. One patient was put on bilateral tube thoracostomy and unilateral tube thoracostomy was done in two patients. **Conclusion:** We concluded from the present study that inhalation of coal, quartz, asbestoses, silica dust was commonly associated with adverse health effects and can cause serious morbidities like pneumoconiosis and mortalities. Hence, all preventive measures and the hazard assessment tool are necessary for all employers to evaluate the potential exposure of airborne respirable coal, quartz, asbestoses, silica dust particles at the workplace.

Keywords: Pneumoconiosis, occupational lung disease, clinical profile.

INTRODUCTION:

Pneumoconiosis is reported to be an occupational lung disease, which is caused by the inhalation of respirable dust. Workers in occupations related to silica, coal, asbestoses dust exposure are characterized by increased foci of fibrogenesis which result in radiological and pathological findings in the lungs. In most circumstances, Pneumoconiosis 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 Pneumoconiosis 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 coal mining and tunnel digging, pottery workers, and quarrying workers have a high risk for Pneumoconiosis. Pleural involvement, including pleural effusion, pleural thickening, or pneumothorax, is rarely seen in Pneumoconiosis. The most significant complication of Pneumoconiosis is pneumothorax which is associated with pleura. Pneumothorax among patients with chronic Pneumoconiosis is usually unilaterally and sometimes reported to be fatal. However, various studies reported that the incidence of pneumothorax is relatively uncommon in acute and accelerated cases of Pneumoconiosis **(3).**

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

MATERIALS & METHODS

The present prospective study was conducted at the Department of Tuberculosis and Chest Disease of our tertiary care hospital. The study was an observational study conducted during a period of one year. The study was done at a 95% confidence interval at 10% of maximum allowable error. 100 patients who were diagnosed with Pneumoconiosis were enrolled in the study. Patients were enrolled from the outdoor department and the ward by simple random sampling. Institutional Ethics Committee Clearance was obtained before the start of the study and written and informed consent for the procedure was obtained from all the patients. Strict confidentiality was maintained with patient identity and data and not revealed, at any point in time.

A 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. The standard diagnostic protocol was followed for all the study participants. All the study participants were followed up for 1 year to record recurrences. On follow-up visits, the same data were recorded and compared. All the data was recorded on a Microsoft Excel spreadsheet and data analysis was done at 10% alpha and 95% confidence interval using SPSS v22 software. Test of significance was applied on collected and organized data and a p-value less than 0.05 was considered as a statistically significant association between study variables.

RESULTS

In the present study, the mean duration of exposure to silica, coal, asbestoses dust was 15.4 ± 5.3 years. Most of the patients belong to the economically productive age group (18-60 years) and none of the patients were above sixty years. The mean age of study participants was 45.4 ± 7.2 years. The diagnosis of Pneumoconiosis 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 a cough at presentation out of which 73% patients had a dry cough and 27% patients with productive coughs, four patients experienced the loss of appetite. 81% of patients had a history of smoking. Chest X-rays of all patients revealed bilateral, widespread, reticulonodular, and nodular appearances. 63% of patients had worked on crusher machines and 37% of patients as manual stone cutters. One patient was put on bilateral tube thoracostomy and unilateral tube thoracostomy was done in two patients. A table summarizes the age, duration of exposure, localization of pneumothorax, smoking habits, type of stone worker, nature of the stone, and treatment of the cases. The average duration of hospitalization was 11 days (range 8-20 days). Sputum examination and cultures for Mycobacterium tuberculosis (M. tuberculosis) were negative except in four patients. (Table 1)

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

Parameters	No. of patients
Mean age	45.4 ± 7.2 years
Mean duration of exposure	15.4 ± 5.3
Dry Cough	73%
Productive Cough	27%
Smokers	81%
Mean duration of hospital stay	11 days (range 8-20 days)
cultures for *Mycobacterium tuberculosis*	Positive in four patients.

DISCUSSION

In the present study, the mean duration of exposure to silica, coal, asbestoses dust was 15.4 ± 5.3 years. Most of the patients belong to the economically productive age group (18-60 years) and none of the patients were above sixty years. The mean age of study participants was 45.4 ± 7.2 years. The diagnosis of Pneumoconiosis 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 Pneumoconiosis and found similar results to the present study. They reported a relationship between airborne total respirable silica dust concentration and total respirable silica dust concentrations. They 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 workplace **(5).** Similar findings were reported in a study conducted by Yassin A et al among patients with chronic Pneumoconiosis and found similar results to the present study. They reported the size of airborne crystalline silica dust particles among workers and provide airborne silica dust exposure levels in different high-risk occupations **(6).**

All patients had a cough at presentation out of which 73% patients had a dry cough and 27% patients with productive coughs, four patients experienced the loss of appetite. 81% of patients had a history of smoking. Chest X-rays of all patients revealed bilateral, widespread,

reticulonodular, and nodular appearances. 63% of patients had worked on crusher machines and 37% patients as manual stone cutter. One patient was put on bilateral tube thoracostomy and unilateral tube thoracostomy was done in two patients. A table summarizes the age, duration of exposure, localization of pneumothorax, smoking habits, type of stone worker, nature of the stone, and treatment of the cases. Similar findings were reported in a study conducted by Williamson B et al among patients with chronic Pneumoconiosis and found similar results to the present study. They reported inhalation of quartz dust or silica dust 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 Pneumoconiosis and found similar results to the present study. They reported a significant association between acute Pneumoconiosis and accelerated Pneumoconiosis with secondary spontaneous pneumothorax (SSP) and bullae formation **(8)**.

The average duration of hospitalization was 11 days (range 8-20 days). Sputum examination and cultures for Mycobacterium tuberculosis (M. tuberculosis) were negative except in four patients. Similar findings were reported in a study conducted by Srivastava G et al among patients with chronic Pneumoconiosis and found similar results to the present study. They reported inhalation of quartz dust or silica dust was commonly associated with adverse health effects **(9).**

CONCLUSION

We concluded from the present study that inhalation of coal, quartz, asbestoses, silica dust was commonly associated with adverse health effects and can cause serious morbidities like pneumoconiosis and mortalities. Hence, all preventive measures and the hazard assessment tool are necessary for all employers to evaluate the potential exposure of airborne respirable coal, quartz, asbestoses, silica dust particles at the workplace.

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