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Detrimental Effects of Slate Pencil : A Review

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ABSTRACT

Slate pencil dust, often used in various cultures for its sensory properties, presents a concerning health hazard when inhaled or ingested. The possible harmful effects of slate pencil dust on human health are summed up in this article. The dust's tiny particles, which are mostly made of minerals like kaolinite and talc, can cause gastrointestinal disorders, respiratory ailments, and dangers to one's general health. The sources of exposure, the physiological effect of slate pencil dust, and the significance of increasing public awareness are all covered in this review. The result emphasize how important it is to promote safe alternatives and implement preventive measures in order to reduce the health risk related to exposure to slate pencil dust.

Keywords : Slate Pencil, Dust, Industries, Silicosis, Breathing, Pneumoconiosis.

I. INTRODUCTION

This article is a review of different adverse effects reported by different industries. Silicosis is a global occupational health issue, especially in low-income countries like india.{1} The study examine findings, and abnormalities in pulmonary function to examine sociodermographic characheristics and silicosis awareness among stone mine workers.{2} Ventilation is requires because dust with a high silica content suggests translocation.{3} With an emphasis on its possible effects on chronic silicosis, this study investigate the effects of silica exposure on peak expiratory flow (PEF), a spirometric test and correlation with FEV1.{4} In india, where quartz stone grinders are exposed to silica dust, pneumoconiosis is common occupational disease in developing nations is particularly common.{5} High respiratory morbidity and lung function impairment are the main areas of focus as we asswss the respiratory effects of occupational exposure to silica dust in india's unorganized stone quarry industry.{6} Slate pencil with a high percentage of free silica dust are produced in small factories using binoto shale. The exhaust system intake velocity is frequently less than 10 ms-1, and dust sizing indicates that all dust is to blame. Suggestions for better working conditions are offered.{7} Quarry workers, with a particular emphasis on the inadequate housing and educational opportunitirs for these workers, many of whom are

untrained professionals who frequently live in impoverished areas.{8} The study's goal is to conduct an epidemiologic evaluation of the impact of occupational silica exposure on pulmonary function using employee interviews, plant visits, data from company records, and industrial hygiene measurements.{9} pulmonary function in sub-radiological silicotic workers exposed to silica dust for eleven years, brought attention to the persistent health risks associated with some industries.{10} A study of 151 people in the Mandsaur district of Madhya Pradesh discovered dyspnea, cough, chest pain, cyanosis, rhonchi, and crepitations. In 85 of the cases, abnormal chest x-ray films were discovered.{11} Reductions in workplace dust levels are necessary for the health of employees and the reputation of the company because excessive dust emissions in the extraction plants of slate and granite blocks in Galicia lead to respiratory discomfort, itching, and pneumoconiosis.{12}An essential component of Alta, Norway's slate industry is slate, a sedimentary rock. Nevertheless, only 2 out of 62 employers wear protective masks, and 48 out of 54 are exposed to silica dust on a daily basis. The objectives of a study are to quantify the exposure of past workers, show the effects of indoor work, and ascertain exposure levels.{13} In India, silicosis resulting from secondary exposure to sandstone mining occurs infrequently and is not prevented. Despite making billions of dollars a year, the sector is poorly studied and linked to TB and malnourishment. Employers disobey laws protecting workers, and the state does not enforce them, which has a negative impact on the entire community in stone-mining areas.{14} This study looks into the prevalence of respiratory morbidities among sandstone mine workers in Jodhpur, Rajasthan, including silicosis, pulmonary tuberculosis, and chronic renal disease.{15} Due to the highly hemolytic qualities of silica and slate dust, pneumoconiosis poses a serious occupational risk in Mandsaur, India, necessitating extensive toxicological investigations and ongoing research.{16} industrial growth and globalization have brought about occupational health problems.{17} Large blocks of stone are broken up into smaller pieces called "chelli" by India's stone crushing units, especially in West Bengal, using powerful hammers. These workers get silicosis from breathing in dust that contains free silica. There are four different kinds of stone chips produced, and because stone is continuously poured, workers in Chalna are most exposed.{18} Exposure to silica dust in contemporary industries is contributing to lung disease outbreaks, accelerating the development of silicosis and necessitating lung transplantation for patients with respiratory failure who are close to death. Treatments available now are unclear.{19} The high rate of silicosis among small-scale agate industry workers in Gujarat, India's Khambhat region, and the factors influencing their non-compliance with dust-preventive measures.{20} After breathing in dust from talc-sharp slate pencils, a 53-year-old arc cutter was diagnosed with primary pericardial mesothelioma, a condition that indicates occupational asbestos exposure due to increased asbestos bodies in the lung.{21} In India, silica dust exposure from sand, rocks, and building materials can lead to silicosis, a disease that increases the risk of lung cancer, heart disease, and lung disease. This condition is common among stone quarry workers.{22} According to a study conducted in Mashhad, Iran, 170 agate grinders were found to be more susceptible to respiratory illnesses as a result of silica dust exposure, inadequate ventilation, and improper personal protection.{23} The most widespread and ancient occupational lung disease in the world is silicosis, which is brought on by excessive exposure to crystalline silica dust from various activities like road construction, tunneling, and mining. Only symptomatic treatment and lung transplantation are available for severe cases, and it is fatal and incurable. The goal of the ILO/WHO Global Program is to eradicate silicosis by 2030.{24} The most widespread and ancient occupational lung disease in the world is silicosis, which is brought on by excessive exposure to crystalline silica dust from various

activities like road construction, tunneling, and mining. Only symptomatic treatment and lung transplantation are available for severe cases, and it is fatal and incurable. The goal of the ILO/WHO Global Program is to eradicate silicosis by 2030.{25} Interstitial lung diseases (ILD) are a group of related pulmonary disorders that affect different parts of the body. They involve diseases related to dust, pathogens, alveolar structures, and diffuse connective tissue disease.{26} Stone cutters and slate pencil makers are susceptible to silicosis, a fatal pneumoconiosis brought on by regular exposure to crystalline silicon dioxide dust in the workplace. Chronic cor pulmonale, persistent respiratory insufficiency, and tuberculosis are common complications.{27} In order to enhance the occupational health and safety of Kottigepalya's small-scale industry workers, this study intends to evaluate their current state of health and increase public awareness of ergonomics.{28} This study focuses on the industrial sector, specifically those in mines, construction, and stone crushing, which is particularly vulnerable, in order to evaluate the prevalence of tuberculosis (TB) and associated factors among slate pencil workers and quartz stone crushers.{29} Different industries have different minimum ages for employment; some have minimums as high as fifteen years old. The Child Act has limitations because different states have different definitions of "child," and some states do not have laws protecting the health of child workers.{30} Three million workers in India's mines and industries are afflicted by the deadly lung disease silicosis, with the slate pencil sector having the highest prevalence (54.5%). Unorganized sector workers are especially prone to high death rates. To find symptomatic patients in the unorganized agate industry, a program was started.{31} In order to determine whether home-based pulmonary rehabilitation (PR) is beneficial for individuals with interstitial lung disease (ILD), this study measures changes in depression, anxiety, dyspnea, fatigue, muscle strength, daily activities, and functional capacity.{32} Stone cutters and slate pencil makers are susceptible to silicosis, a fatal pneumoconiosis brought on by regular exposure to crystalline silicon dioxide dust in the workplace. Chronic cor pulmonale, persistent respiratory insufficiency, and tuberculosis are common complications.{33} The semiprecious stone agate contains a lot of silica, which can lead to lung cancer, silicosis, and tuberculosis. Agate and slate pencil industries have the highest prevalence of silica exposure among the nearly three million workers who are exposed to it, primarily in mines and other industries.{34} After processing, 83% of the slate deposit in Alta, the largest in Norway, is quartz. In order to assess improvements in the work environment, a study was conducted comparing slate workers and a control group in terms of silicosis, COPD, lung function, and respiratory symptoms.{35} Pneumoconiosis and other occupational hazards are caused by exposure to slate dust in Mandsaur, India; therefore, comprehensive toxicological studies are necessary to comprehend the solubility and hemolytic activity of slate dust under physiological conditions.{36} The purpose of the study was to look into peak expiratory flow (PEF) and the epidemiological factors that are related to it in 136 quartz stone grinders.{37} Silicosis is caused by the breaking down of large blocks of stone into smaller pieces known as "chelli" in India's stone crushing units, especially in West Bengal. The disease is brought on by the free silica dust that the workers in these units inhale. Chalna laborers, who are primarily tribal women, are most exposed to the dusty surroundings.{38} This study examines the prevalence of silicosis among agate workers in Gujarati small-scale household agate processing units, with an emphasis on the causes and variables that influence noncompliance with preventive measures.{39} The study examines the presence of pneumoconiosis in female workers who were exposed to silica versus healthy non-exposed groups. Significant variations in lung function are observed in the results, with the pneumoconiosis group exhibiting a larger decline in

MVV and FEV0.75 parameters.{40} The rise in the stone-crushing industry in India as a result of the industrial revolution has released silica dust into the workplace, which can lead to respiratory and non-respiratory health problems like silicosis. Nevertheless, not many epidemiological studies have been done, especially in the Marathwada area.{41} n quartz-rich environments, two stonemasons had different clinical outcomes: one died of silicosis, while the other developed fibrosis and hilar adenopathy.{42} Notwithstanding the fact that silicosis is common in mining and tunneling, this study attempts to identify the number of cases of the disease each year with an emphasis on worker awareness, protective measures, and health screening.{43}

II. METHODS AND MATERIAL

193 slate pencil cutters in Multanpura village, India, participated in the study and were evaluated for silica-related respiratory morbidities through surveys, interviews, and assessments.{4} In the study, 136 quartz stone grinders from the western Indian village of Chhotaudepur were screened for silica and silico-tuberculosis, had their ages, smoking habits, and respiratory morbidity recorded, and were also given interview.{5} Eighty stone quarry workers in Pachgaon, Nagpur participated in a cross-sectional study where they were subjected to radiograph readings, pulmonary function testing, acid fast bacilli screening, and health assessments.{6} Using a computerized spirometer and pulmonary functions assessment, 75 quarry workers in Nellore, Andhra Pradesh, India were the subjects of a study on clinical abnormalities, respiratory diseases, and age-matched controls. The controls were age-matched normal people.{8} 1,072 hourly wage workers from a Midwest foundry, including 549 active workers, 497 retired workers, and 26 salaried workers, were involved in the study. There were 36 people with radiographic evidence of either silicosis or asbestosis.{9} in order to determine the participants' exposure to silica dust, the study included 381 exposed and 254 non-exposed workers. Data were gathered via questionnaires, interviews, and medical records.{10} Despite the dusty atmosphere during cutting and sharpening, Mandsaur, a township in India with 75,000 residents, is renowned for its unique geophysical conditions that produce soft Binota shale deposits that are used to manufacture slate pencils.{11} The production of granite and slate for commercial roofing in Galicia involves a number of procedures that pollute the air with dust and noise. Plant and machinery design has been altered to enhance productivity and working conditions; practical solutions include physical separation and water use.{12} Eight sampling locations within the factory as well as four halls and one outdoor workplace in quarries were included in the study. Samples of respirable and total dust were taken from sites that were comparable, taking seasonal variations into account. To determine the percentage of time spent on each task, employees kept time sheets. In winter, a total of 120 working hours were recorded, and in summer, 126. Utilizing exposure measurement data and individual exposure history, cumulative exposure was computed. Using task-specific tables of oxygen exchange during work, lung ventilation was estimated. {13} 193 slate pencil cutters in Multanpura village, India, participated in the study and were evaluated for silica-related respiratory morbidities through surveys, interviews, and assessments. {14} It was a cross-sectional study carried out in Jodhpur's sandstone mines. Fifteen mines in all were chosen. A fixed sample size of 174 mine workers was determined. The t-test and chi-square were used to make conclusions.{16} Samples of slate dust were collected from Mandsaur, India, for the study, and blood samples were analyzed. Silica, magnesium, and protein were determined by spectrophotometric micro modification of the molybdate method, along with hemolytic and solubility studies.{17} A study focusing on occupational histories, radiological findings, and pulmonary function test results, taking

into account variables like sex, smoking habits, work status, age, and duration, examined 172 stone crushing workers and 123 nonexposed workers.{19} Eighty-two Khambhat agate workers were surveyed as part of the study to assess their knowledge of silicosis, current health problems, attitudes toward health, and use of preventive measures.{21} At the Fathima Institute of Medical Sciences in Andhra Pradesh, data from a subset of subjects was gathered for the study. Using the "super Spiro SPL-95," pulmonary function tests were performed on stone quarry workers and controls. Co-relation analysis and the student's test were used to analyze the data. Forced Expired Volume, Forced Vital Capacity, Forced Vital Capacity %, and Peak Expiratory Flow Capacity were among the lung function parameters.{23} In a cross-sectional study, respiratory questionnaires, lung exams, spirometry, and chest radiography were used to evaluate respiratory illnesses in 170 agate grinding workers in Mashhad, Iran.{24} A Minakhan Rural Hospital study examined 156 patients who had symptoms and were thought to have silicosis. The 14-year-old patients had a history of chronic cough, dyspnea, and exposure to silica. If the results of the chest X-ray were positive, 123 people were diagnosed with silicosis, which was a clinical suspicion.{25} Ninety-six ILD patients will be randomized at random to either the intervention or control group. At baseline, one month, and three months after the intervention, physical activity, quality of life, and endurance will be measured by assessors. {26} A structured questionnaire and physical examination were part of a study that included 375 workers. Data on health status were analyzed statistically.{28} Using interviews, clinical histories, chest radiographs, and measurements of pulmonary functions, data from 253 quartz and 102 slate pencil workers in the Godhara and Mandsaur industries were gathered for the study.{29} the study compared the physical findings and results of the pulmonary function test (PFI) between smokers and nonsmokers. Restrictive impairment was diagnosed based on VC values below 80.0% and obstructive impairment was diagnosed based on FEV values below 75.0% after the percentage of predicted VC value was computed.{30} 123 patients with a clinical suspicion of silicosis had their chest X-rays evaluated independently by a radiologist and a chest physician. If either of them determined that the X-ray was positive, silicosis was confirmed. {31} A control group and an intervention group will be randomly assigned to comprise ninety-six ILD patients. At baseline, one month, and three months after the intervention, physical activity, quality of life, and endurance will be measured by assessors. {32} This cross-sectional study looked at 170 agate grinders in northeastern Iran, specifically in Mashhad. The national program of silicosis control's respiratory questionnaire, lung exams, spirometry, and chest radiography were used to gather medical and occupational histories for respiratory disorders. Using the International Labor Office (ILO) 2000 classification system, chest x-rays were interpreted.{34} In a cross-sectional study, lung function tests, a self-administered questionnaire, and a chest X-ray were used to assess respiratory health.{35} 75 male and 61 female silica-exposed workers participated in the study; their mean age was 31.77 ± 9.99 years, their mean exposure time was 2.74 ± 1.65 years, and their mean PEF was 5.16 ± 2.1 L/min. {37} A study focusing on occupational histories, radiological findings, and pulmonary function test results, taking into account variables like sex, smoking habits, work status, age, and duration, examined 172 stone crushing workers and 123 nonexposed workers.{38} Eighty-two Khambhat agate workers were surveyed as part of the study to assess their knowledge of silicosis, current health problems, attitudes toward health, and use of preventive measures. {39} 20 male stone crusher workers, ages 25 to 55, who had been exposed to stone dust for more than five years were surveyed for a Maharashtra study. A computerized 'MEDSPIROR' pneumotachometer was utilized in the study to perform pulmonary function tests, which included forced vital capacity

and ventilation volume measurement.{41} Semiquantitative exposure modeling, comprehensive lifetime occupational histories, and previously collected personal dust samples were used to estimate exposure.{42} This study, which is passive surveillance, is based on silicosis patients who were treated in our outpatient clinic for a year, from January 1, 2012, to December 31, 2012. {43}

III. RESULTS AND DISCUSSION

A national health program in India could improve monitoring, notification, and management of workers exposed to silica dust. Males in the stone mining industry, with low literacy, long hours, limited resources, and little knowledge of workplace safety and silicosis disease, are more susceptible to harmful aerosolized particles. Dust suppression should be used in power tool manipulation processes for artificial stone countertops, and aggressive engineering controls should be developed for each operation. A study found that pulmonary function significantly decreased in people over 40, women, those exposed for more than 10 years, and those with respiratory morbidity. High exposure to silica dust can impair lung function and may be a sign of sub-radiological silicosis. India could enhance worker monitoring, notification, and management of silica dust exposure through a national health program. Men who work as stone miners are particularly vulnerable to dangerous aerosolized particles because they have lower levels of literacy, put in longer hours, have fewer resources, and are less knowledgeable about workplace safety and silicosis. When using power tools to manipulate artificial stone countertops, dust suppression should be used, and each operation should have aggressive engineering controls developed for it. According to a study, those over 40, women, those exposed for more than ten years, and those with respiratory morbidity all saw a significant decline in pulmonary function. Excessive exposure to silica dust may indicate sub-radiological silicosis and impede lung function.Businesses must determine the levels of respirable silica, eliminate exposure, implement controls, and provide effective treatments. For those with ILD, home-based PR programs can help bridge the rehabilitation gap. Occupational health problems can be significantly resolved with the help of the National Institute of Unani Medicine.Unexpected results indicate that agricultural workers' working environments contain undetectable silica concentrations in stone dust and climate-related variables, necessitating additional protective measures to prevent lung damage in both groups. The higher prevalence of silicosis and health morbidity among agate workers may be due to noncompliance with dust-preventive measures, with education likely playing a significant role. The study found that the duration of stone dust exposure had a significant effect on the pulmonary function tests of stone crusher workers, with values decreasing with increased exposure. Men exposed to high quartz concentrations may develop massive fibrosis and rapidly progressive silicosis due to fibrosis of the hilar nodes, which impedes lung clearance. The study highlights the frequency of silica-related illnesses in unorganized industries and highlights the need for continued field-level surveillance to ascertain the disease's actual prevalence.

IV. CONCLUSION

A study found that pulmonary function significantly decreased in people over 40, women, those exposed for more than 10 years, and those with respiratory morbidity. High exposure to silica dust can impair lung function and may be a sign of subradiological silicosis.

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