

Occupational Health and Safety in Cement Industry

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Abstract: In the 21st century, most of people are working daily in a dusty environment. They are exposed to different types of health hazards such as fume, gases and dust, which are risk factors in developing occupational disease. The research concentrate with the occupational health hazards among the cement plant workers of Chhattisgarh district. The health status data of 100 workers were obtained from cement plants. During process, the results obtained indicated that the workers who have been working continuously for more than five years in this environment were suffering from respiratory, skin, eye and heart diseases with chest and stomach pain. Cement dust causes lung function impairment, chronic obstructive lung disease, restrictive lung disease, pneumoconiosis and carcinoma of the lungs, stomach and colon. Other studies have shown that cement dust may enter into the systemic circulation and thereby reach the essentially all the organs of body and affects the different tissues including heart, liver, spleen, bone, muscles and hairs and ultimately affecting their micro-structure and physiological performance. It was also noticed that the percentage frequency of affected persons depend upon their age, work experience and sensitivity. It was also noticed that cement plants act as an aging factor for the workers. A few suggestions have been given for protection of health by these workers. , the aim of this review is to gather the potential toxic effects of cement dust and to minimize the health risks in cement mill workers by providing them with information regarding the hazards of cement dust Poor housekeeping, Non availability of personal protective equipment's (PPE's), use of defective personal protective equipment's (PPE's) or not using personal protective equipment's (PPE's) due to unawareness, so workers do not adequately protect themselves through personal protective device.

Keywords: Cement, Construction Industry, Occupational Health problems

1. Introduction

Cement dust is one of the major air pollutants. It consists of hazardous materials such as: alkaline compound (lime) that are corrosive to human tissue, silica that is abrasive to skin and causing damage to lung (silicosis), and chromium that can cause allergic reaction (pulmonary as well as skin). Cement dust affects three main organs, in general, like eyes, lungs and skin causing different types of respiratory, skin and eye diseases. Keeping in view of above facts, it was decided to investigate the occupational diseases in the cement plant workers exposed to cement dust. Cement factories represent one of the most important strategic basic elements in the

economic development of any country. The invention of Portland cement is usually attributed to Joseph Aspdin, who took out a patent in 1824 for a material that was produced from a mixture of limestone and clay. It is called "Portland" because the concrete made from it looks like natural stone from the Isle of Portland. alkaline compound (lime) that are corrosive to human tissue, silica that is abrasive to skin and causing damage to lung (silicosis), and Chromium that can cause allergic reaction (pulmonary as well as skin). Cement dust affects three main organs, in general, like eyes, lungs and skin causing different types of respiratory, skin and eye diseases. Keeping in view of above facts, it was decided to investigate the occupational diseases in the cement plant workers exposed to cement dust. In the cement factory sector, workers exposed themselves to many occupational hazards that might contribute to diseases and injuries at the cement factory but a considerable interactive effort with exchange of ideas in many organizations within and outside the cement industry have been trying the need of stressing on how to improve occupational health and safety performance for workers.

2. Methodology

A combined cross-sectional and cross-shift study was conducted in 100 exposed production workers from the crusher and packing sections and 20 controls from the guards were included. "Total" dust was measured in the workers' breathing zone and peak expiratory flow (PEF) was measured for all selected workers before and after the shift. When the day shift ended, the acute respiratory symptoms experienced were scored and recorded on a five-point scale using a modified respiratory symptom score questionnaire

- Studies have shown that adverse respiratory health effects seen in the people exposed to cement dust, example in increased frequency of respiratory symptoms and decreased ventilator function, observed among cement workers
- Cement dust contains heavy metals like nickel, cobalt, lead, chromium, pollutants hazardous to the biotic environment, with adverse impact for vegetation, human and animal health and ecosystems
- The workers and family living in staff houses of factories, and other neighborhood habitations are most

exposed to cement dust pollution. Children studying in the schools situated in near to factories are particularly prone to cement dust exposure.

- Several studies have shows linkages between cement dust exposure, chronic impairment of lung function and respiratory symptoms in human population. Cement dust irritates the skin, the mucous membrane of the eyes and the respiratory system. Its deposition in the respiratory tract causes a basic reaction leading to 3 increased pH values that irritates the exposed mucous membrane.

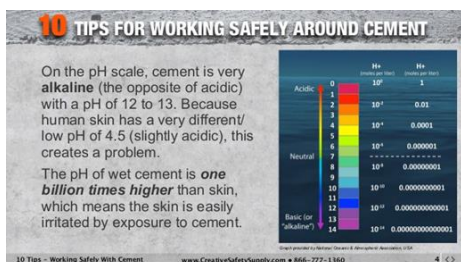


Fig. 1. P^H level of skin irritation

- Chronic exposure to cement dust has been reported to lead to a greater prevalence of chronic respiratory symptoms and a reduction of ventilatory capacity
- Inhale dust concentrations in cement production plants, especially during cleaning tasks, are usually considerably higher than at the construction site
- People of cement dust zone area badly affected by respiratory problems, gastrointestinal diseases etc.

3. Hazards and effects

Cement can cause ill health by skin contact, eye contact, or inhalation. Risk of injury depends on duration and level of exposure and individual sensitivity. alkaline compounds such as lime (calcium oxide) that are corrosive to human tissue trace amounts of crystalline silica which is abrasive to the skin and can damage lungs.

A. Skin contact

The hazards of wet cement are due to its caustic, abrasive, and drying properties. Wet concrete contacting the skin for a short period and then thoroughly washed off causes little irritation. But continuous contact between skin and wet concrete allows alkaline compounds to penetrate and burn the skin. When wet concrete get attached against the skin—for instance, by falling inside a worker’s boots or gloves or by soaking through protective clothing—the result may be first, second, or third degree burns or skin ulcers. These injuries can take several months to heal and may involve hospitalization and skin grafts.

- First degree burn - outer skin layer
- Second degree burn - middle skin layer
- Third degree burn - deep skin layer

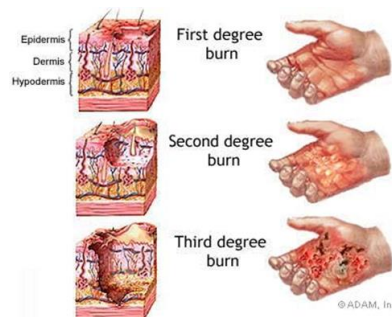


Fig. 2. Skin burn

Cement is one of the most widely used materials in construction. Applications include concrete floors, walls, and pavement; concrete blocks; and different mixtures of mortar and grout. Thousands of construction workers are exposed to concrete every day without harm. But anyone who uses or supervises the use of cement should know its health hazards and the safe working procedures necessary to minimize exposure. This article outlines those hazards and makes recommendations on how to use cement safely.



Fig. 3. Water proof rubber boots

Concrete finishers kneeling on fresh concrete have had their knees severely burned. Corrosive bleed water from the concrete is absorbed by the worker’s pants and held against the skin for prolonged periods. Without waterproof knee pads, kneeling on wet concrete can irritate or burn the skin.



Fig. 4. knee burn

Dust released during bag dumping or mortar cutting can also irritate the skin. Moisture from sweat or wet clothing reacts with the cement dust to form a caustic solution.

B. Allergic skin reaction

Some workers become allergic to the Hexavalent chromium

in cement. hexavalent chromium can cause a respiratory allergy called occupational asthma. Symptoms include wheezing and difficulty breathing. Workers may develop both skin and respiratory allergies to hexavalent chromium.



Fig. 5. Skin infection

It's possible to work with cement for years without any allergic skin reaction and then to suddenly develop such a reaction. The allergy usually lasts a lifetime and prevents any future work with wet concrete or powder cement.

C. Eye contact

Exposure to airborne dust may cause immediate or delayed irritation of the eyes. Depending on the level of exposure, effects may range from redness to chemical burns and blindness.

D. Inhalation

Inhaling of dust may occur when workers empty bags of cement. such exposure irritates the nose and throat and causes choking and difficult breathing. Sanding, grinding, or cutting concrete can also release large amounts of dust containing of crystalline silica. Prolonged or repeated exposure can lead to a disabling and often fatal lung disease called silicosis.

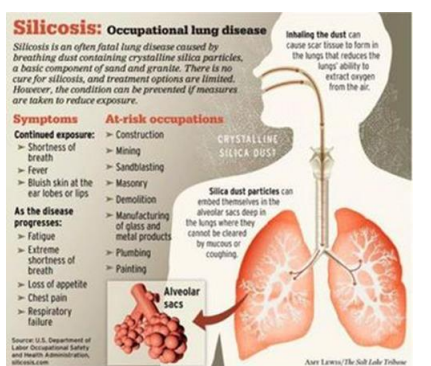


Fig. 6. Dust inhalation by Dry cutting

E. Controls

The following are some basic recommendations for handling and using cement safely.

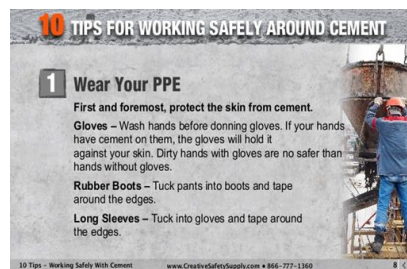


Fig. 7. Working safety

F. Personal protection

To protect skin from cement and cement mixtures, workers should wear:



Fig. 8. Proper personal equipment

G. First aid

Skin contaminated with wet or dry cement should be washed with cold running water as soon as possible. Open sores or cuts should be thoroughly flushed and covered with suitable dressings. Get medical attention if discomfort persists. Contaminated eyes should be washed with cold tap water for at least 15 minutes before the affected person is taken to hospital

4. Results and discussion

After data collection of the health status of cement workers, it was noticed that risk of injuries depends on the duration, level of exposure, individual age and sensitivity as also reported by earlier workers. During investigations many diseases like skin, respiratory, eye, nose and throat irritation, rising blood pressure, cardiac disease, and chest and stomach pain were identified among workers. The percentage of total affected people in cement plants was found 80%. Some diseases like rashes and dryness of skin, eyes reddening, nail hardening and dry cough were identified as common among workers having five years work experience. The common respiratory diseases like dry cough, wheezing troubles, bronchitis, asthma and skin allergy in the form of rashes and irritation were reported in high percentage. The similar results were also found among workers of lime stone crusher. It was also observed that workers having long term work experience were affected from more than one occupational diseases (double, triple or multidisease affected)

in combined form depending upon their age and sensitivity. Ambient air pollution near cement plants and other such type of plants is commonly associated with occupational diseases like chronic bronchitis, dry cough, eye diseases and skin allergy. disease like high blood pressure and blood clot were marked 6% during the investigation, but no report of lung cancer Air pollution is known to affect lungs, especially for asthmatics and it can raise blood pressure and also lead to formation of blood clots and increase the risk of heart disease and stroke. The common eye diseases like tearing, reddening, irritation and myopia were found in high percentage (65%) in the present study. Such types of eye diseases were also reported among quarry.

5. Conclusion

From the above study it is found that total dust or suspended particulate matter form the main source of emission which may create severe health issues to the employees. Hazards exposure was related to acute respiratory symptoms and acute ventilatory effects. Implementing measures to control dust and providing adequate personal respiratory protective equipment for the production workers are highly recommended to control the

exposure level personal protective equipment like mask, respirators etc., must be provided to the employees. To control the noise exposure levels earplugs, muffs etc., can be provided to employees who are subjected to high sound level. Appropriate engineering and administrative control must be ensured to have improved ergonomics in the factory. Though the company have ISO 14001/2004 certifications in the above mentioned suggestions will help the management to mitigate serious occupational health hazards and also reduce the compensation for workers through occurrence of accidents or health.

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