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OCCUPATIONAL HEALTH AND SAFETY IN CEMENT INDUSTRY

MAHENDRA KUMAR PATEL[1], MANISH KUMAR MISHRA[2]

[1]MTECH STUDENT, MECHANICAL ENGINEERING -BHILAI INSTITUTE OF TECHNOLOGY RAIPUR, INDIA
[2]ASSISTANT PROFESSOR- MECHANICAL ENGINEERING -BHILAI INSTITUTE OF TECHNOLOGY RAIPUR

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 main aim of this study was to find out the health risks associated with the employee working in the cement factories In order to study the health hazards of cement factory on workers . Few numbers employees in cement factories were considered for the studies. The workers were administered with the standard format questionnaire which was followed by personal interviews. The results indicate a visible impact on health of workers and during summers the health related problems increases. 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.

Key words: **cement factory; health hazard; Risk assessment, Questionnaire; workers 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 organisations within and outside the cement industry have been trying the need of stressing on how to improve occupational health and safety performance for workers. Safety At JSPL safety and health are accorded the highest importance and are integral to the manner in which we conduct our business**.** The company has put in place a robust system for safety management with an Occupational Health and Safety Policy that incorporates standard operating procedures, instructions, safe methods of work and work permit system

1. 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. Personal "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 were recorded . Inhalable 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 Few employee were served with a questionnaire and posed with interviews based on work of various organizations .The workers working in the cement industry were administered with the questionnaire and total of 10% workers were recorded and result is made. Later interviews were conducted. The questionnaire and interview questions are given below in a wide format.

Interview Questions asked to workers

Name;

- Age
- Working as
- Do you smoke? If yes, how many packs?
- For how many years have you been working in the

cement factory?

- Do you think cement industry is causing any health problem?
- Are you suffering from any health problem?
- If, yes what?
- Have you ever consulted a doctor for your problems?
- Which specialist do you visit most frequently?
- Which medicines do you take most frequently?
- Do you use any safety devices such as masks, respirator etc.

  If, yes what?
- If, no why?
- Does the owner provide you with safety devices?
- Do you think cement industry is causing any kind of pollution or problem in area?
- Are there any pollution control devices installed?
- If yes, are they functional?
- Do you have any family history for any diseases?

WORKERS HEALTH QUESTIONNAIRE

To be completed by employee;

Name _____

Employee ID# _____

No. of years since working in the factory ----------

Age---------- Marital status----------

1. Do you smoke tobacco?	
If yes, how many packs per day? ___ Number of years ___	Yes No
2. Have you ever had any of the following conditions?	Yes No
i. Diabetes (sugar disease)	
ii. Allergic reactions that interfere with your breathing	
3. Have you ever had any of the following pulmonary or lung problems?	YES /NO
i. Asbestosis	
ii. Chronic bronchitis more than 3 episodes in the last year	
iii. Emphysema	
iv. Lung cancer	
v. Silicosis	
vi. Chest injuries or surgeries	
vii. Asthma as an adult	
viii. Pneumonia in the last month	
ix. Tuberculosis (active disease)	
4. Do you currently have any of these symptoms of pulmonary or Lung illness?	YES/ NO
i. Shortness of breath	
ii. Shortness of breath with light activity	
iii. Shortness of breath with strenuous activity	
iv. Cough that produces thick sputum or blood	
5. Cough lasting longer than 3 weeks	
6. Wheezing	
7. Any other symptoms that may be related to lung problems:	
5. Have you ever had any of the following cardiovascular or heart problems?	YES /NO
i. Heart Attack	
ii. Stroke	
iii. Angina (chest pain)	
iv. Heart failure	
v. Irregular heart beat	
vi. Swelling in your legs or feet (not caused by walking)	
vii. High blood pressure	
6. Have you ever had any of the following cardiovascular or heart symptoms?	YES /NO
i. Frequent pain or tightness in your chest	

ii. In the past two years, have you noticed your heart skipping or missing a beat?	
iii. Heartburn or indigestion that is not related to eating	
iv. Any other symptoms that may be related to heart or circulation problems	
8. Do you use respirator during work.	Yes/no
9. If you've used a respirator, have you ever had any kind of problem?	YES/ NO
i. Eye irritation	
ii. Skin allergies or rashes	
iii. Anxiety	
iv. General weakness or fatigue	
10. Which health specialist do you visit most frequently?	
i) What kind of medicine do you use mostly?	

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

1.cement dust Exposure to cement dust can irritate eyes, nose, throat and the upper respiratory system. Skin contact may result in moderate irritation to thickening/cracking of skin to severe skin damage from chemical burns. Silica exposure can lead to lung injuries including **silicosis** and lung cancer.

fig 1; cement dust

Solutions

• Rinse eyes with water if they come into contact with cement dust and consult a physician.

• Use soap and water to wash off dust to avoid skin damage.

• Wear a P-, N- or R-95 respirator to minimize inhalation of cement dust.

• Eat and drink only in dust-free areas to DUST

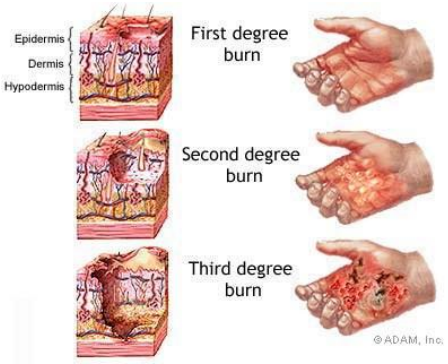
2. Wet mixture; Exposure to wet concrete can result in skin irritation or even first-, second- or third-degree chemical burns. Compounds such as hexavalent chromium may also be harmful.

Solutions:

• Wear alkali-resistant gloves, coveralls with long sleeves and full-length pants, waterproof boots and eye protection.

• Wash contaminated skin areas with cold, running water as soon as possible.

• Rinse eyes splashed with wet concrete with water for at least 15 minutes and then go to the hospital



3 .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. 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 3 : knee burn

3. Heat Burns ;Incidents and injuries resulting in burns arise from contact with hot clinker or cement powder. Hazards are particularly associated with hot cement kiln dust (CKD), and dust on preheater systems. Chemical (alkali) burns may also result from contact with CKD. A study in the cement industry over the period 1991-1995 showed that 155 burns injuries occurred in a population of 3200 workers . This study emphasizes the need to ensure effective controls are put in place

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

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 4:Waterproof 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 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

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.

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.

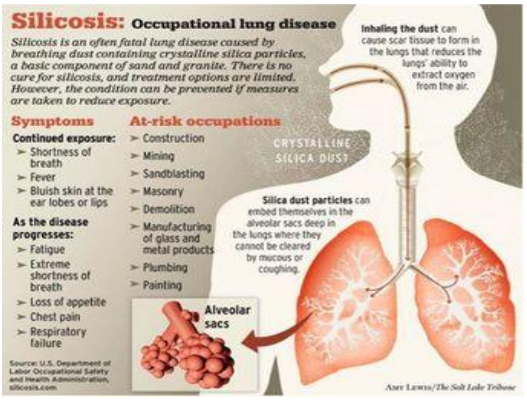
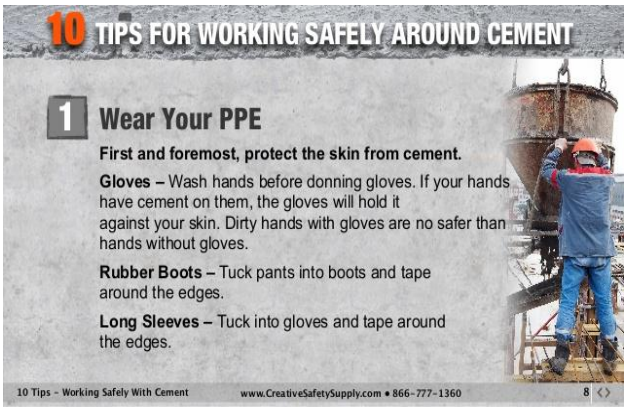


fig 6; disease

Fig 7: dust inhalation by Dry cutting

Controls

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



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

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

RESULTS AND DISCUSSION;

After data collection of the health status of cement workers, it was noticed that risk of injuries depend 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 othersuch 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 (56%) in the present study. Such types of eye diseases were also reported among quarry

Conclusions ; 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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