Occupational Diseases Associated with Building Construction Industry

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Abstract
Construction workers are those, who perceive more clearly the lack of job safety. It has been evidenced by a number of studies that construction industry is one of the most hazardous work place industries with high rates of fatalities, injuries and health problems. It has been observed that more deaths are caused via ill health of the worker rather than any safety breach. Health problems can cause many problems for a project in terms of time overrun, cost overrun, less quality and loss of production. Diseases common in construction industry are asbestosis, Respiratory Ailments such as silicosis, Asthma etc. Research has showed that "heat stroke, eye strain, lungs irritation and skin disease" are found to be the major type of health problems in the construction industry. "Poor management, human element and poor site conditions" are found to be the main direct causes of health problems in this industry. It is further observed that "shortage in the supply of the proper equipment, lack of responsibilities, negligence of the safety precautions, and workers resistance to safety practices" are the indirect causes for the health problems. The study provides the basic information regarding this important issue to the decision makers as remedial measures can be made to reduce health problems in this industry and avoid negative impacts on the project.

Key words: *Asbestos, silicosis construction industry, heat stroke, disease*

INTRODUCTION

Construction industry is one of the leading industry in development of economy, infrastructure and provides quality of life to the people. It also contributes at a large extent in the employment rate of any country. On the contrary, higher rate of work related accidents resulting in fatalities and injuries have made this industry as one of the hazardous work related industry in the world (Camino et al., 2008; Cheng, et al., 2010). Apart from occupational accidents, there is great concern for loss of work hours and compensation cost of the workers due to health problems in this industry (Schwatka et al., 2012). The workers of this industry perceive less job security specially working in the field (Sparks, et al., 2001). There are various types of accidents and health problems, which normally occur in construction industry. Occupational Health and Safety (OHS) shows their serious concern on this issue around the world (Sum, 2014). This industry is plagued by occupational risky situations and poor working conditions. Workers of this industry are exposed to hazards. These hazards are difficult to quantify and these are closely associated with the nature of the job because workers of this industry work at different job sites, where they face different procedures and different site conditions (Burkhart et al., 2019). Significant reduction has been observed in the numbers of occupational incidents over the last 20 years. Nevertheless, construction remains a high risk industry. Safety risks in construction have been recognized for some time. Health risks have received less attention even though absence due to work-related ill-health is far greater than absence due to injuries at work. The ill-health effects from

construction activities are not always immediately obvious and can take a long time, even years, to develop. The common health problems which have been observed are; back ach problems, musculoskeletal disorders, hearing loss, skin problems, breathing problems, eye strain and occupational lung diseases and cancer. (Monnery, 1998).

Asbestosis: is a process of diffuse interstitial fibrosis of the lung due to exposure to asbestos dust. Exposure to asbestos occurs through inhalation of fibres in air in the working environment, ambient air in the vicinity of factories handling asbestos, or indoor air in housing and buildings containing asbestos materials. Heavy exposures to asbestos can occur in the construction or shipping industries, particularly during the removal of asbestos materials for renovation, repairs, or demolition.
More than 40 years of evaluation have consistently confirmed the carcinogenicity of asbestos in all of its forms. This notwithstanding, according to recent figures, the annual world production of asbestos is approximately 2,000,000 tons. Currently, about 90% of world asbestos comes from four countries: Russia, China, Brazil and Kazakhstan; and the wide use of asbestos worldwide represent a global threat. [Dong et al. 2019].

Silicosis: is the most common occupational lung disease worldwide. It occurs everywhere, but is especially common in developing countries. From 1991 to 1995, China reported more than 24,000 deaths due to silicosis each year. It also affects developed nations. In the United States, it is estimated that between one and two million workers have had occupational exposure to crystalline silica dust and 59,000 of these workers will develop silicosis sometime in the course of their lives. (Reed, 2012).

Heat Stroke: Construction workers exposed to hot environments or extreme heat can be at risk of Heat-Related Illnesses (HRIs) and injuries. Heat stress is the combination of a worker's exposure to heat from physical activity, environmental factors, and their clothing which results in an increase in the body's heat storage, known as the net heat load [NIOSH 2016].

Occupational Diseases of Building Construction Industry includes:

- Asbestos-related injuries such as mesothelioma and other cancers
- Respiratory Ailments such as silicosis, Asthma.
- Heat stroke or strain related diseases.
- Back, neck and Knee injuries; e.t.c.

Asbestosis

Asbestosis is a process of diffuse interstitial fibrosis of the lung due to exposure to asbestos dust. Asbestos is the name given to a group of naturally occurring minerals that are resistant to heat and corrosion; these include mineral fibres such as chrysotile, Amorite, and crocidolite, among others. Chrysotile is by far the most common type of asbestos fibre produced in the world, and it accounts for virtually all commercial use of asbestos in the world.
Exposure to asbestos occurs through inhalation of fibres in air in the working environment, ambient air in the vicinity of factories handling asbestos, or indoor air in housing and buildings containing asbestos materials. Heavy exposures to asbestos can occur in the construction or shipping industries, particularly during the removal of asbestos materials for renovation, repairs, or demolition. [Dong et al. 2019].

Signs and Symptoms of Asbestosis

The signs and symptoms of asbestosis typically manifest after a significant amount of time has passed following asbestos exposure. The primary symptom of asbestosis is generally the slow onset of shortness of breath, especially with physical activity. Clinically advanced cases of asbestosis may lead to respiratory failure. When a physician listens with a stethoscope to the lungs of a person with asbestosis, they may hear aspiratory crackles.
Symptoms may include shortness of breath, cough, wheezing, and chest tightness.
The characteristic pulmonary function finding in asbestosis is a restrictive ventilator defect. This manifests as a reduction in lung volumes, particularly the Vital Capacity (VC) and Total Lung Capacity (TLC). Jump up (2017)

Causes of Asbestosis
The cause of asbestosis is the inhalation of microscopic asbestos mineral fibres suspended in the air, breathing in asbestos fibres; it requires a relatively large exposure over a long period of time, which typically only occurs in those who directly work with asbestos. ,

Complications of Asbestosis
Complications increases with the duration of exposure.

Respiratory Galore
Asbestosis is a restrictive lung disease characterized by the restricted filling of the lung. Fibrosis of interstitial causes impairment of filling due to dysfunction of bronchioles mainly on lower lobes of lungs. Br Med J (2000).

Malignancy
Patients with asbestosis have a high risk of developing pleural malignancy. Patients who have low exposure of asbestos fibres have squeal of asbestosis followed by malignancy, but those with intermediate or high-intensity exposure have high chances of lung cancer even in the absence of asbestosis.

Heart and Other Organs
It was found that heart weight is increased due to hypertrophy of right ventricle pumping against high pulmonary vascular resistance. More commonly, left auricle hypertrophy has been appreciated. Pulmonary and tricuspid valves are generally normal, but the mitral valve is fibroses and fused with thickening chordate tendineae. The liver is congested in the centrilobular pattern due to the right-sided damming of blood.

Cancer of Other Organs
Cohort's study has unveiled that asbestosis is related to cancers of the gastrointestinal tract, ovary, adrenals, larynx, and kidney. Gastrointestinal tract cancer is mainly due to exposure to asbestos is through asbestos-lined cement water pipes.

Prevention and Treatment of Asbestosis
Asbestosis has no specific treatment, so supportive care is the only available option. Therefore, prevention is the best management. Monitoring of the occupational environment and minimizing asbestos exposure has a significant role in asbestosis control.
Oxygen therapy at home is often necessary to relieve the shortness of breath and correct underlying low blood oxygen levels. Supportive treatment of symptoms includes respiratory physiotherapy to remove secretions from the lungs by postural drainage, chest percussion, and vibration. Nebulised medications may be prescribed in order to loosen secretions or treat underlying chronic obstructive pulmonary disease. Immunization

against pneumococcal pneumonia and annual influenza vaccination is administered due to increased sensitivity to the diseases. Those with asbestosis are at increased risk for certain cancers. If the person smokes, quitting the habit reduces further damage. Periodic pulmonary function tests, chest x-rays, and clinical evaluations, including cancer screening/evaluations, are given to detect additional hazards.

Silicosis

Silicosis is the most common occupational lung disease worldwide. It occurs everywhere, but is especially common in developing countries.

Because of work-exposure to silica dust, silicosis is an occupational hazard to construction, demolition, mining, sandblasting, quarry, tunnelling, ceramics and foundry workers, as well as grinders, stone cutters, stone countertops, refractory brick workers, tombstone workers, workers in the oil and gas industry, pottery workers, fibreglass manufacturing, glass manufacturing, flint snappers and others. Brief or casual exposure to low levels of crystalline silica dust are said to not produce clinically significant lung disease.

Silicosis is a form of occupational lung disease caused by inhalation of crystalline silica dust. It is marked by inflammation and scarring in the form of nodular lesions in the upper lobes of the lungs. It is a type of pneumoconiosis. Cassel SL, Eisenbarth SC, Iyer SS, et al. (2008).

Signs and Symptoms of silicosis

Dyspnoea (shortness of breath) exacerbated by exertion, Cough often persistent and sometimes severe, Fatigue, Tachypnea (rapid breathing) which is often laboured,

Loss of appetite and weight loss, Chest pain, Fever, Gradual darkening of skin (blue skin)

- Gradual dark shallow rifts in nails eventually leading to cracks as protein fibres within nail beds are destroyed.

In advanced cases, the following may also occur: Cyanosis, pallor along upper parts of body (blue skin), Cor pulmonale (right ventricle heart disease), Respiratory insufficiency

Patients with silicosis are particularly susceptible to tuberculosis (TB) infection—known as silicon tuberculosis. Pathol. July (2007).

Classification of Silicosis

Classification of silicosis is made according to the disease's severity (including radiographic pattern), onset, and rapidity of progression. These include:

Chronic simple silicosis

Usually resulting from long-term exposure (10 years or more) to relatively low concentrations of silica dust and usually appearing 10–30 years after first exposure. This is the most common type of silicosis. Patients with this type of silicosis, especially early on, may not have obvious signs or symptoms of disease, but abnormalities may be detected by x-ray. Chronic cough and exertion dyspnoea (shortness of breath) are common findings.

Accelerated silicosis

Silicosis that develops 5–10 years after first exposure to higher concentrations of silica dust. Symptoms and x-ray findings are similar to chronic simple silicosis, but occur earlier and tend to progress more rapidly.

Complicated silicosis

Silicosis can become "complicated" by the development of severe scarring (progressive massive fibrosis, or also known as conglomerate silicosis), where the small nodules gradually become confluent, reaching a size of 1 cm or greater. PMF is associated with more severe

symptoms and respiratory impairment than simple disease. Silicosis can also be complicated by other lung disease, such as tuberculosis, non-tuberculosis mycobacterium infection, and fungal infection, certain autoimmune diseases, and lung cancer, etc

Acute Silicosis

Silicosis that develops a few weeks to 5 years after exposure to high concentrations of reparable silica dust. This is also known as silica proteinios. Symptoms of acute silicosis include more rapid onset of severe disabling shortness of breath, cough, weakness, and weight loss, often leading to death.

Prevention of silicosis

The best way to prevent silicosis is to avoid worker exposure to dust.

The next best preventive measure is to control the dust. Water spray is often used where dust emanates to control the kick up of silica dust.

To avoid dust accumulating on clothing and skin, place clothes in a seal-able bag and, if possible, shower once returning home. When dust starts accumulating around a workplace, utilize an industrial vacuum to contain and transport dust to a safe location. Dust can also be controlled through personal dry air filtering.

Preventing silicosis may require specific measures. One example is during tunnel construction where purpose-designed cabins are used in addition to air scrubbers to filter the air during construction. World Health Organization (2007).

Treatment of Silicosis

Silicosis is a permanent disease with no cure. Treatment options currently available focus on alleviating the symptoms and preventing any further progress of the condition. These include:

- Stopping further exposure to airborne silica, silica dust and other lung irritants, including tobacco smoking.
- Cough suppressants.
- Antibiotics for bacterial lung infection.
- Tuberculosis (TB) prophylaxis for those with positive tuberculin skin test or IGRA blood test.
- Prolonged anti-tuberculosis (multi-drug regimen) for those with active TB.
- Chest physiotherapy to help the bronchial drainage of mucus.
- Oxygen administration to treat hypoxemia, if present.
- Bronchodilators to facilitate breathing.
- Lung transplantation to replace the damaged lung tissue is the most effective treatment, but is associated with severe risks of its own from the lung transplant surgery as well as from consequences of long-term immunosuppressant (e.g., opportunistic infections).
- For acute silicosis, bronchoalveolar larvae may alleviate symptoms, but does not decrease overall mortality. [NIOSH 2016]

Heat Stress/Stroke in Construction industry

Construction workers exposed to hot environments or extreme heat can be at risk of Heat-Related Illnesses (HRIs) and injuries. Heat stress is the combination of a worker's exposure to heat from physical activity, environmental factors, and their clothing which results in an increase in the body's heat storage, known as the net heat load [NIOSH 2016]. Heat strain is the physiological response to heat stress when the body tries to increase heat loss to the environment in order to maintain a stable body temperature [NIOSH 2016]. Core body temperature must be maintained within 1°C (1.8°F) of normal (about 37°C or 98.6°F) in order to continue to function normally. Factors that influence our ability to maintain a normal

core body temperature include air temperature, humidity, skin temperature, the speed and temperature of air moving over the body, radiant temperature (e.g., working in direct sunlight), clothing type and amount, hydration, and other individual physical and medical characteristic. Heat stress can lead to unrelieved heat strain, which in turn can increase the risk for HRIs. HRIs include heat stroke, heat exhaustion, fainting, heat cramps, and heat rash. Heat stroke can occur in two forms, classic and exertion. While both can occur in hot environments, exertional heat stroke can happen in the absence of a hot environment, such as when working hard in the winter while wearing protective clothing that doesn't allow the body's heat to dissipate adequately. Sweating, while usually absent in classic heat stroke, is often present in exertion heat stroke [NIOSH 2016].

Construction work can be very labour intensive which can cause the body to generate excessive heat within the body. Construction workers often work outdoors during the hottest times of the year. Some construction work occurs in non-climate-controlled spaces, such as attics and crawlspaces, or in direct sunlight on roofs, roadways, and runways. Other construction jobs may expose workers to heat sources that are part of the work process, such as welding and cutting torches or hot asphalt contained in roofing kettles and paving machines. All of these factors can place construction workers at an increased risk for HRIs.

The following should be considered by employers and safety and health professionals when taking steps to protect construction workers from the adverse health effects of working in the heat:

Engineering and work practice controls, training and acclimatization (allowing the body to gradually adjust to the heat), measuring and assessing heat stress, medical monitoring and heat-protective clothing and personal protective equipment (PPE). [Arbury et al. 2014.

Symptoms of Heat Related Illnesses and the Steps to take when they occur:

- **Heat stroke** is a Medical Emergency! It can be fatal or cause permanent disability. Signs and symptoms of heat stroke include high body temperature; confusion; loss of coordination; hot, dry skin or profuse sweating; throbbing headache; and seizures or coma. Move the worker to a cool, shaded area. Cool the worker quickly with a cold water or ice bath if possible. Remove their outer clothing and apply iced bed sheets or cooling packs to their chest, armpits, and groin.
- **Heat exhaustion** is the body's response to excessive dehydration and loss of electrolytes and can quickly progress to heat stroke. Signs and symptoms include a rapid heart rate; excessive sweating; extreme weakness or fatigue; dizziness; nausea, vomiting; irritability; rapid, shallow breathing; and a slightly elevated body temperature. Move the worker to rest in a cool area. Loosen their clothing. Encourage them to drink plenty of water or other cool beverages. If facilities are available, allow them to take a cool shower, bath.
- **Heat cramps** affect workers who sweat a lot during strenuous activity. Symptoms of heat cramps include muscle cramps, pain, or spasms in the abdomen, arms or legs. Have the affected worker stop all activity and sit in a cool place. Encourage them to drink clear juice or a sports beverage, or drink water with food. Avoid salt tablets. Do not allow the worker to engage in strenuous work for a few hours after the cramps subsides. [Hesketh et al. 2020].

Prevention

- Use the Wet Bulb Globe Temperature Index (WBGT) and occupational exposure limits to protect workers..
- Screen workers for heat intolerance:
  - Identify previous HRIs, low fitness and other factors that can reduce workers' ability to tolerate physical activity in hot environments.

Limit exposure –by

- Providing a cool shaded or air-conditioned areas for rest and recover.
- Add extra workers to the crew to reduce heat exposure to each crew member and allow the job to continue while some crewmembers rest.
- Require a worker to stop working when they feel heat-related discomfort

Create a heat alert program –

Have procedures in place to deal with a heat alert such as postponing non-urgent work, increasing crew size at each site; increasing rest times; reminding workers to hydrate; monitoring heat at each site, including work and rest areas; monitoring workers' core temperatures; taking additional precautions on the first day of a shift change to account for loss of acclimatization; sending workers who show signs of HRIs for medical evaluation and requiring written permission to return to work; restricting overtime; and eliminating piecework incentives. [NASA 2020].

Conclusion

In conclusion, occupational health diseases are found to be in almost all profession and the construction workers has its fair share.. Asbestosis, silicosis, heat stroke are occupational diseases associated with construction workers which if studied and understood properly by applying preventing an control measures will go along way mitigating the diseases..

Recommendation

In view of the study, the following recommendations were made;

1. The building construction companies should provide safety measures for employees who work with or around silica, asbestos dust in order to prevent silicosis, lung cancer, asbestosis and other silica-related diseases.
2. The management should use engineering control method (such as water or ventilation) in order to limit workers exposure to dust;
3. The workers should be educated on the importance of the use of PPE,s in order to minimise exposure to either dust or heat.
4. Construction Companies should provide means of reducing the permissible exposure limit (PEL) for reparable crystalline silica to 50 micrograms per cubic meter of air, averaged over an 8-hour shift.
5. The management of the company should offer medical examination to highly exposed workers, and train them on how to limit exposures. .
6. Company's healthcare systems in collaborations with other organizations and government bodies should work together to control the occupational diseases for the workers safety
7. The management should encourage workers to wear light-colour, loose fitting, breathable clothing to ensure safety of the workers

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