

# Occupational health hazards in textiles industry

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■ **ABSTRACT** : Occupational health is an important concern of the working person. Industry is one of the occupation which affects health of workers, In fact the objective of an occupational health service is not only to keep the workers physically healthy but also mentally and psychologically stable. There is thus, a need to have a look on the occupational health of workers so that they can remain healthy and perform the task carefully. There are numerous health and safety issue associated the textile industry. They include is chemical exposure, exposure of cotton dust, organic dust and noise exposure.

■ **KEY WORDS**: Occupational health, Textile industry workers health

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Health has been defined as a state of complete physical, mental and social well being. Health care is the right of every individual and has been recognized in many countries attainment of the highest possible level of health is the important world wide social goal. Health of the people is really the foundation upon which all their happening and well being depends. Health is not only the start point of all welfare but also a significant yard stick to measure the progress of a country.

Health at work is consideration to deal with the health problems related to employment. Occupational health is concerned with the health safety issue of work. The hazards exposure in setting can adversely affect the human health.

## Occupation health:

The general health of the people is related with occupation in which they are engaged. Infact occupational health and safety are the integral components of the general concepts of health, which is a part of social economic development. Occupation health is everybody's business, everyone is affected by it directly or indirectly and has a specific role and responsibility to play and regards to occupational health. Industrial workers may be exposed to the following six types of hazards, depending upon their occupation:

## Physical hazards:

Heat, cold, lighting, noise, visible ultra violet radiation, temperature, humidity and ionizing.

## Chemical and mineral hazards:

Dust, vapours, fumes, gases, solvent, metal and their compounds.

## Biological hazards:

Various, blood borne disease, sharps/needle sticks, bacteria, moulds in health care and other works.

## Mechanical hazards:

Tripping hazards, traumatic injuries, house keeping injuries, steps and fault of moving equipments.

## Ergonomic hazards:

Posture force (pushing/pulling), repetition, vibration, pressure on the body, work organization (poorly designed work procedure and tasks) are work environment.

## Psycho-social hazards:

Low/high work load demand, pace /work, little and no control over what work to do, no social support, relations harassment and discrimination or physical or mental treats

of violence and no flexibility for time off.

### Occupational health in textiles industry:

India has a long and rich tradition of producing of producing variety textile. The textile industry is the second largest industry after agriculture in terms of number of person employed multi-directional contribution to the domestic economy. It employes around 38.11 million people or employing almost 25 per cent of the country's labour force. There are approximately more than 2500 textile units in India.

Broadly speaking any composite textile mill (can be divided into three departments namely, spinning, weaving and finishing).

There are numerous health and safety issues associated with textile industry, National Institute of occupational safety and health (NIOS -1999) reported a priority list of 10 leading work- relation illnesses and injuries. Three criteria were used to develop the list :

- The frequency of occurrence of the illness or injury,
- Its severity in individual cases and
- Its potential for prevention.

Occupational lung disease is first on the list. Occupational cancer to be the leading work related disease, followed by cardio-vision diseases, disorder of reproduction and neurotoxicity, noise in hearing loss, dermatological condition and psychological orders.

Sarkar *et al.* (2004) reported that textile industry is labour oriented industry and due to following reasons, accidents can take place frequently in this industry:

- Improper material handling
- Improper knowledge of the machine due to lack of training
- Improper mental condition of the workers
- Unsafe conditions.

### Health hazards in various units:

#### *Production and ginning unit:*

Harvesting- Ginning process- lint-seed separation- Lint cleaning- packaging are main processes in cotton production unit.

#### *Health hazards:*

The cotton ginning industry, like other processing industries, has many hazards. Information from workers' compensation claims indicates that the number of injuries is highest for the hand/fingers, followed by back/spine, eye, foot/toes, arm/shoulder, leg, trunk and head injuries. Total economic costs for gin injuries and health disorders include direct costs (medical and other compensation) and indirect costs (time lost from work, downtime, loss in earning power, higher insurance costs for workers' compensation, loss of productivity and many other loss factors). Direct costs are easier to determine and much less expensive than indirect

costs.

### Yarn manufacturing unit:

Opening, blending, mixing and cleaning- carding and combing- drawing and roving- spinning- winding and spooling- are main processes in yarn manufacturing unit.

#### *Health hazards:*

##### Accidents due to machinery:

Accidents may occur due to machinery on all types of cotton textile machinery. Effective guarding of the multiplicity of moving parts presents many problems and needs constant attention.

##### Cotton dust inhalation (byssinosis):

The workers engaged in the processing and spinning of cotton are exposed to significant amounts of cotton dust. They are also exposed to particles of pesticides and soil. Exposure to cotton dust and other particles leads to respiratory disorders among the textile workers. The fatal disease of byssinosis, commonly known as brown lung, is caused among people working in the textile industry on account of excessive exposure to cotton dust. The symptoms of this disease include tightening of the chest, coughing, wheezing and shortness of breath.

##### Hazards due to noise emission:

Noise can be a problem in some processes in yarn manufacturing. Noise emission rises non-linearly because of higher rotary and travelling speeds in machine parts. In the long run, exposure to high noise levels has been known to damage the eardrum and cause hearing loss. Other problems like fatigue, absenteeism, annoyance, anxiety, reduction in efficiency, changes in pulse rate and blood pressure as well as sleep disorders have also been noted on account of continuous exposure to noise. Lack of efficient maintenance of machinery is one of the major reasons behind the noise pollution in a majority of the units. Though it causes serious health effects, exposure to noise is often ignored by textile units because its effects are not immediately visible and there is an absence of pain.

##### Heat stress:

Spinning sometimes require high temperatures and artificial humidification of the air. Heat stress is characterized by symptoms involving either heat stroke or heat exhaustion. There will be symptoms of headache, dizziness, moist skin, and the inability of the body to cool itself down. In severe conditions, it can lead to nausea and vomiting.

### Synthetic fibre production unit:

Synthetic fibres are made from polymers that have been synthetically produced from chemical elements or compounds

developed by the petro chemical industry.

#### *Health hazards:*

The synthetic-fibres industry uses large amounts of toxic and flammable materials. As the filaments emerge from the spinnerets to be dried in air or by means of spinning, large amounts of solvent vapours are released. These constitute a considerable toxic and explosion hazard.

- A number of early studies indicate a high incidence of colorectal cancer among workers in synthetic textile mills.
- Exposure to azo dyes have been associated with bladder cancer in numerous industries.
- Carbon disulphide (CS<sub>2</sub>) is an organic compound used in the preparation of synthetic textiles which has been associated with increased mortality from ischemic heart disease.

#### **Weaving unit:**

Weaving is primary textile processes for manufacturing fabrics. Weaving presents only a moderate worker safety risk.

#### *Health hazards:*

##### Falls:

Objects on the floor that cause worker falls include machine parts and oil, grease and water spots. Good housekeeping is particularly important in weaving, since many of the process workers spend most of their workday patrolling the area with eyes directed to the production process rather than toward objects on the floor.

##### Injury from machinery:

Power transmission devices and most other pinch points are typically guarded. The machine lay, harnesses and other parts that must be frequently accessed by weavers, however, are only partially enclosed and it can be hazardous for workers. Repetitive-motion trauma is a recognized hazard in the textile industry related to high-speed manufacturing equipment.

##### Injury from materials handling:

Musculo-skeletal disorders like carpal tunnel syndrome, forearm tendinitis, bicipital tendinitis, lower back pain, epicondylitis, neck pain, shoulder pain, and osteoarthritis of the knees are some of the occupational diseases that have been observed due to heavy weight lifting and moving heavy cloth rolls, warp beams and so on.

##### Fires and ignition:

Weaving creates a fair amount of lint, dust and fibre flyings which can represent fire hazards if the fibres are combustible.

##### Hazards due to noise emission:

Most weaving machines, operating in the numbers found in a typical production facility, produce noise levels that generally exceed 90 dBA. In some shuttle and high-speed shuttleless weaving, levels may even exceed 100 dBA which can induced hearing loss.

##### Fibre dust:

There are a number of hazardous effects from exposures to fibre-dust: Mechanical irritant effects of the eyes, nose and skin, Dermatitis (atopic eczma), Endotoxin induced effects, Obstructive lung disease (e.g. asthma, bronchitis), Other chronic effect (cough, dyspnoea, loss of lung function), Interstitial lung diseases (e.g. follicular bronchiolitis), Fibrosis of the lung (e.g. asbestosis), Cancers of the lung (e.g. lung cancer and mesothelioma) and Pulmonary disorders (byssinosis) have long been linked with dusts associated with the processing of raw cotton and flax fibres.

#### **Dyeing, printing and finishing unit:**

##### *Dyeing:*

Dyeing involves a chemical combination or a powerful physical affinity between the dye and the fibre of the fabric. An extensive variety of dyes and processes is used, depending on the type of fabric and the end-product desired.

##### *Hazards in dyeing:*

##### Fire and explosion:

The fire hazards found in a dye works are the flammable solvents used in the processes and certain flammable dyestuffs. Safe storage facilities should be provided.

##### Chemical hazards:

Many factories use hypochlorite solution for bleaching; in others, the bleaching agent is gaseous chlorine or bleaching powder which releases chlorine when it is charged into the tank. In either case, workers may be exposed to dangerous levels of chlorine, a skin and eye irritant and a dangerous pulmonary tissue irritant causing delayed lung oedema.

The use of corrosive alkalis and acids and the treatment of cloth with boiling liquor expose the workers to the risk of burns and scalds. Many dyestuffs are skin irritants that cause dermatitis; in addition, workers are tempted to use harmful mixtures of abrasive, alkali and bleaching agents to remove dye stains from their hands.

Organic solvents used in the processes and for the cleaning of machines may themselves cause dermatitis or render the skin vulnerable to the irritant action of the other harmful substances that are used.

In addition to the fibre materials and their contaminants, allergy may be caused by the sizing and even by the enzymes used to remove the sizing.

Allergic responses to reactive dyes including eczema,

urticaria and asthma have been reported in textile-dyeing workers.

#### Accidents:

Serious scalding accidents have occurred when hot liquor has been accidentally admitted to a kier in which a worker has been arranging the cloth to be treated.

#### Printing:

The dye or pigment is thickened with starch or made into emulsion which, in the case of pigment colours, is prepared with an organic solvent. This paste or emulsion is taken up by the engraved rollers which print the material.

#### Hazards in printing:

##### Flammability:

The thickening systems contain up to 40% solvents and are highly flammable.

##### Air emissions:

Solvents in this print system will be flashed off from the oven during drying and curing.

##### Sludge:

Can have environmental problems with ground and groundwater contamination.

Formaldehyde (apply to the aqueous-based printing systems) is a sensitizer and an irritant that may produce reactions, sometimes violent, in workers who are exposed to it either by inhaling the air around the printing machine as it is operating or by coming into contact with the printed fabric. These reactions may range from simple eye irritation to welts on the skin and severe difficulty with breathing.

#### Finishing:

Finishing is a term applied to a very broad range of treatments that are usually performed during the last manufacturing process before fabrication. Some finishings can also be performed after fabrication.

#### Mechanical finishing:

This type of finishing involves processes that change the texture or appearance of a fabric without the use of chemicals. They include Sanforizing, Calendering, Sanding, Embossing, Heat-setting, Brushing, Sueding.

#### Health hazards:

The principal hazards are the noise, presence of heat, the very high temperatures being applied and nip points in the moving machine parts.

#### Chemical finishing:

This type of finishing involves chemicals that change

the texture or appearance of a fabric.

#### Health hazards:

One type of chemical finishing does not involve a chemical reaction: the application of a softener or a hand builder to modify the feel and texture of the fabric, or to improve its sewability. This presents no significant hazards except for the possibility of irritation from skin and eye contact. The other type of chemical finishing involves a chemical reaction: resin finishing of cotton fabric to produce desired physical properties in the fabric such as low shrinkage and a good smoothness appearance. The primary hazard associated with this type of finishing is that most resins release formaldehyde as part of their reaction.

Studies have revealed links between exposure to formaldehyde and nasal and lung cancer as well as to brain cancer and leukemia, which can be fatal. In the long run, exposure to formaldehyde could lead to respiratory difficulty and eczema. Contact of the chemicals with skin as well as inhalation of the chemicals can lead to several serious health effects.

Hepatic toxicity in textile workers has been reported by Redlich *et al.* (1988) as a result of exposure to the solvent dimethylformamide in a fabric-coating factory. This toxicity was recognized in the context of an "outbreak" of liver disease in a New Haven, Connecticut, factory that produces polyurethane-coated fabrics.

#### Preventive measure used in textile mill:

Tippah (1992) opined that proper medical facilities and safety measure were not provided to the work who are in contact with hazardous material as chemical in dyeing or cement dust in construction work. As a reason many of the workers suffered from ill health and physical disabilities.

U.S. department of labour, occupational safe and health organization (OSHA, 1995) emphases that follows measure must included in every factory to reduces the dust level:

- Cleaning floors with a vacuum cleaner or method that cut down the spreading of dust.
- Disposing of dust away that as little scatters as possible.
- Using mechanical method to stack dump or otherwise handle cotton or cotton waste.
- Checking, cleaning and repairing dust control equipment and ventilation systems.

U.S. Department of labour, occupational safety and health organization (OSHA, 1995) emphases that:

- Employers must provide free annual medical check including breathing test to workers employed in due area. If workers show significant physical change more frequent check up must be available to them.
- Employers are required to conduct a training programme for employees at least annually to create awareness of the hazards of cotton dust.

- Employees must provide respirators, necessary to be wearing it and also instruct to use clean and main it.
- The seats of the workers and the tables should be well aligned in height so that there is no musculoskeletal strain.
- There should be proper lighting at the place of work so that eye strain can be avoided.
- Machinery should be well maintained in order to reduce the level of noise. If necessary, certain parts of machines can be replaced.
- As equipment is replaced or repaired, appropriate noise-reduction steps should be taken. In case the noise level cannot be controlled, workers should be provided with earplugs so that exposure to noise can be reduced.
- Workers can be rotated within jobs so that they are not faced with continuous noise exposure for a long period of time.
- There should be proper ventilation at the place of work.
- In order to reduce the exposure to dust, workers should be provided with masks.
- Trained medical personnel and first aid facilities as well as safety equipments such as fire extinguishers and fire alarms should be available at the place of work.
- In units where there is heavy exposure to dangerous chemicals, workers should be provided with safety gloves and respiratory (dust mask) PPE.
- Proper dust control equipment should be set up and maintained to reduce the workers exposure to cotton dust.
- Where flammable solvents are used, smoking should be prohibited and open lights, flames and sparks eliminated. Electrical equipment should be of certified flameproof construction, and machines should be earthed (grounded) to prevent the build-up of static electricity, which might lead to catastrophic sparks.
- Exposures to potentially toxic solvents and chemicals should be maintained below the relevant maximum

allowable concentrations by adequate LEV.

- Safe storage facilities should be provided for flammable solvents used in the processes and certain flammable dyestuffs.
- Sanitary facilities for washing, bathing and changing should be provided, and the workers should be encouraged to use them; personal hygiene is particularly important for dye workers.

### Conclusion:

Safety and health measures play an important role in any industry. It is essential that the workers be aware of the various occupational hazards in the industry. At the same time, it is necessary that the management take the necessary steps to protect workers from potential hazardous situations.

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