CHAPTER I: INTRODUCTION

1.1 Workplace Environment

1.1.1 Workplace Environment Hazards

1.1.2 Industrial Workplace Environment
   a) Global Scenario
   b) National Scenario

1.2 Cotton Production and Ginning Industries

1.2.1 World Cotton Production

1.2.2 National Cotton Production

1.2.3 Cotton Ginning Industries

1.2.4 Cotton Ginning Process

1.3 Cotton Ginning: Workplace Environmental Hazards

1.3.1 Cotton Dust

1.3.2 Noise Hazards

1.4 Management of Workplace Environmental Hazards

1.4.1 Emission Control

1.4.2 Particulate Matter Control

1.4.3 Workplace Noise Control

1.5 Objectives of the Present Study
1.1 Workplace Environment

The work environment is defined as the establishment and other locations where one or a group of employees are working or are present as a condition of their employment. In developing countries, most of the people spend maximum time at their workplace, so the boundary between their home and workplace environments is blurred. Important factors in the work environment that should be considered include building design and age, workplace layout, workstation set-up, furniture and equipment design and quality, space, temperature, ventilation, lighting, noise, vibration, radiation and air quality.

1.1.1 Workplace Environmental Hazards

Work is necessary for the economical growth of the person and country. However, many workers expose to the hazardous work environment which contribute to injuries, respiratory diseases, cancer, musculoskeletal disorders, reproductive disorders, cardiovascular diseases, mental and neurological illnesses, eye damage and hearing loss, as well as communicable diseases. Study conducted by Chandrasekar (2011) reported that the workplace environment in many industries is unhealthy and unsafe in India. It includes poorly designed workstations, unsuitable furniture, lack of ventilation, inappropriate lighting, excessive noise, insufficient safety measures in fire emergencies and inadequate personal protective equipments. People working in such environment are prone to occupational diseases and it influences employee’s performance. As per International Labour Organization report (April 2013), in 2010, China reported a total of 27,240 cases of occupational diseases, including 23,812 caused by exposure to workplace dusts. In the same year, 22,013 cases of occupational diseases were reported in Argentina, with musculoskeletal disorders (MSDs) and respiratory diseases among the most frequent conditions. In 2011, Japan reported a total of 7,779 cases of occupational diseases mainly related to low-back disorders and pneumoconiosis.
a. Indoor Environment Quality

Indoor environmental quality refers to the quality of a building’s environment in relation to the health and wellbeing of the workers. Indoor environment quality is determined by many factors, including lighting, air quality, and damp conditions. Occupational Safety and Health Administration (OSHA) has determined factors affecting on indoor air quality include poor ventilation (lack of outside air), problems controlling temperature, high or low humidity, and activities in or near a building that can affect the fresh air coming into the building. Workers are often concerned that they have symptoms or health effects from exposures to contaminants in the buildings where they work (NIOSH).

The air quality plays significant role in the health and well-being of the workers. The prevalence of chronic respiratory symptoms and ventilatory impairment are as a prime cause of indoor air pollution at workplace environment. Indoor air pollution is identified as major problem in developing countries (Hagling et al.; 1981). The impact of indoor air pollution has increased due to lack of public awareness. Exposure of workers to inferior air quality at workplace environment leads to ill health.

Ryan (2012) reported that identification of occupational and environmental causes of respiratory disease is important to control the exposures and overall management. Air contaminants are present at the workplace in the form of dusts, gases, vapors or fumes. The respiratory tract can be adversely affected by poor air quality, from nose to the alveoli. To improve the work efficiency maintaining proper indoor environment quality at workplace in the industries is important.
CHAPTER I: INTRODUCTION

Figure 1.1 Categories of occupational respiratory disease, their anatomical locations within the respiratory system, examples of common causative substances and their pathophysiologic effects (Ryan; 2012)

The indoor air quality in industries is mainly regulated by ventilation. Ventilation is important for the control of dust, fumes, gases, aerosols, climate and thermal comfort factors. Exposure to different types of dust can result in fibrosis of the lung, allergic reactions and asthma attacks. Various vapours, gases and aerosols have the ability to cause respiratory and skin damage. Extremes of heat can reduce concentration and motivation and cause a number of heat-related illnesses. Extremes of heat can also reduce tolerance to chemical and noise exposure, and increase the risk of heart attacks.

b. Workplace Noise

Hearing loss is another hazard encountered by those who work in industries such as construction and manufacturing units. In fact, hearing loss ranks with mechanical hazards in terms of being one of the most common occupational health hazards in both developed and developing countries. Typically, hearing loss occurs over time from chronic exposure to noisy environment without the use of earmuffs, which are designed for protection.
of hearing system. Excessive exposure to loud noise can irreversibly damage the ear, resulting in noise-induced hearing loss. Long-term exposure to vibrations can also contribute to hearing loss. ‘Nuisance’ noise can be annoying and distracting and result in reduced job performance and satisfaction. Noise may also be unsafe if it impairs communication at the work environment.

The exposure of workers to noise for longer duration leads in following effects-

**Auditory Effects -**
- **Loss of hearing:** Long exposure of human being to high noise levels leads in damage to inner ear causing ‘Noise Induced Hearing Loss’ (NIHL). This is mostly unnoticed, but has an adverse impact on hearing function.

**Non-auditory Effects -**
- **Annoyance:** It creates annoyance to the receptors due to sound level fluctuations. A periodic sound due to its irregular occurrences causes displeasure to hearing and causes annoyance.
- **Physiological effects:** The physiological features like breathing amplitude, blood pressure, heart-beat rate, pulse rate, blood cholesterol are affected.
- **Human performance:** The performance of workers/human is affected as they lose their concentration. The studies on noise pollution effects have proved that both in laboratory subjects and in workers exposed to occupational noise affects on cognitive task performance and safety. Noise may produce more task impairment and increase the number of errors in the work. Noise at work can interfere with communications and make warnings harder to hear. It can also reduce people’s awareness of their surroundings. These issues can lead to safety risks – putting people at risk of injury or death
- **Nervous system:** It causes pain, ringing in the ears, feeling of tiredness, thereby affecting the functioning of human system.
- **Sleeplessness:** It affects the sleeping there by inducing the people to become restless and lose concentration and presence of mind during their activities.
Bhattacharya (1981) reported that worldwide, 16% of the disabling hearing loss in adults is attributed to the occupational noise. Small scale industries like textile, sawmills, printing and mining etc. are also responsible for excessive noise and exposure of workers to the hazardous noise levels (Mbuligwe; 2003). In India, there are large numbers of agro-based small scale industries. The workers in these industries are exposed to higher noise levels prevailing at the workplace environment during duty hours (Patel et al; 2008).

1.1.2 Industrial Workplace Environment.
   a) Global Scenario:

   As per the estimates of World Health Organization (WHO) the current global labor force stands at about 2,600 million and is growing continuously. Each year, another 40 million people join the labor force; most of them are in developing countries. Center for disease control and prevention, 1996 reported that in United States each day an average of 137 persons die from work-related diseases and an additional 17 die from injuries on the job. Further NIOSH (1999) has reported that each year 74,000 workers require treatment in hospital emergency departments for work-related injuries. Occupational asthma is probably the most common work-related respiratory disorder in industrialized countries. It is associated with a wide range of agents, including some inorganic and organic dusts, biological hazards (such as grains, flour, insects and animal parts) and chemicals (including chlorofluorocarbons, iso-cyanates, metals and welding fumes). The occupational groups where studies have reported an increased risk of asthma include sawmill and plywood mill workers, food processors, welders and farm workers (Amanda; 2011). In Egypt the total number of injuries and deaths were 246 during 1989, which represents a rate of 2.14 injuries per 100,000 workers (MMT; 1991). The continuous increase in occupational illness is also reported in India. The annual report of census and analysis of occupational illnesses in India reported that in the year 1985-1996, the total numbers of occupational illness ranged between 400 to 706 cases.
annually, these cases of occupational illness were increased to 2,026 in 1997 and 4,784 in 1998.

Reporting of occupational illness is still far less than expected, based on the size of the population and the documented shortage of occupational health services coverage of the working population (OHD, 1998). Discoll et al (2004) reported 700-1,000 deaths every year in New Zealand from occupational diseases: particularly cancer, respiratory disease and ischemic heart disease.

Hazardous workplace environmental conditions are therefore a threat to a large proportion of world population. Occupational respiratory diseases are increased due to long term exposure to various organic dusts, microorganisms, bacteria, fungi and moulds, and several chemicals. The increased number of people who develop an allergic response, coupled with high numbers of occupational allergenic exposures. Jones (2008) reported that increasing exposures to occupational allergen has been associated with an increased risk of developing allergy and asthma.

b) National Scenario:

India is one of the most important developing countries in the world. According to census 2011, the total population of India is 1.21 billion. The majority of the working population belongs to the unorganized sector, which is not in the purview of current legislation in occupational health. As per Director General of Factory Advisory Services & Labour Institutes (DGFASLI) there are 3,00,000 registered industrial factories and more than 36,500 hazardous factories employing more than 2 million people. Approximately 10 million people were employed in various factories. The current burden of accumulated occupational diseases in India is estimated at around 18 million cases.

The major occupational diseases/morbidity of concern in India are: silicosis, musculoskeletal injuries, coal workers’ pneumoconiosis, chronic obstructive lung diseases, asbestosis, byssinosis, pesticide poisoning and
noise-induced hearing loss (Pingle shyam;2012). Study conducted by Padmini (2012) in garment industry revealed that the congested work area, un-ergonomic workstations, poor illumination, improper ventilation, excessive noise, dust and lack in use of personal protective equipments were the major problems associated with workers in these industries.

1.2 Cotton Production and Ginning Industries

1.2.1 World Cotton Production:

Approximately 35 countries of the world produces 22 million tones of cotton fiber annually (2009-10), cotton is among the most important commodities in international trade. The FAO estimates that nearly 100 million rural families directly depend on cotton production. Figure 1.2 shows major cotton in the world and their production in million bales.

![Major cotton producers](source: USDA, World Agricultural Supply and Demand Estimates)

**Figure 1.2 – Major Cotton producers in the world.**

1.2.2 National Cotton Production

India is the second largest producer of textile goods, which account for 20% of the national industrial output. Twenty million workers are employed
in 1175 cotton mills across the country, representing a major occupational
group (Jaiswal; 2011). The textile industry in India contributes to the national
economy in several ways and provides employment to the rural, poor and the
economically backward sections of the society.

Over the years, India has achieved significant quantitative increase in
cotton production. The area under cotton cultivation, the yield as well as total
production has significantly increased during the last 10 years. It was 8.58
million hectares with yield of 278 kg/hectare and 14.0 million bales per annum
in 2000-01. In year 2010-11, the area under cotton production has increased to
11.14 million hectares with yield of 496 kg/hectares and total production of
32.5 million bales per annum (Indian Cotton Growth; 2010). Presently, India
has sufficient surplus cotton to meet the requirements of importing countries.

In India, 20 million workers are involved in the textile manufacturing
industries (Mishra et al.; 2003). The textile production industry is one of the
oldest among the Indian industries. Cotton ginning and pressing have been
identified as a traditional industries under the unorganized sector which
functions on a seasonal basis (Siziya and Munalula; 2012).

In India, cotton is most important commercial crop, which is grown at
large scale in nine states of the country. Mishra et al (2003) reported that
Punjab, Haryana, Rajasthan, Maharashtra, Andhra Pradesh, Karnataka and
Tamilnadu are the major cotton growing states of India. Maharashtra is also
one of the leading cotton growers in India. The textile industry is important
small-scale industry in Maharashtra state of India. In 2009-2010, the area under
cultivation of cotton in the state was 3.50 million hectares with total
production of 6.57 million bales and the yield was 319 kg/hectare. The area
under cotton cultivation in Maharashtra has increased to 39.87 lakh hectares
with total production of 82 lakh bales in the year 2010-2011. Jalgaon in
Maharashtra state is one of the cotton growing districts. The existence of
favorable factors like availability of raw cotton, cheap labor and means of
transport in Jalgaon district gave impetus to the development of the cotton
ginning, pressing, spinning and weaving activities. Approximately 15,000 workers are involved in the cotton processing industries in the district.

1.2.3 Cotton Ginning Industries

Ginning is the process of separating the cotton fibers adhering to the seed for the conversion of the cotton into a continuous thread. In short, the purpose of ginning is to separate cotton fibers from the seed. Ginning industries are mostly small units and located in semi-rural and small towns of the Jalgaon district. During the ginning process, dust fibers and lint are generated which causes air pollution. The ginning process is the most important mechanical treatment that cotton undergoes before it is converted into yarns and fabrics. There are over 3,500 factories in India dispersed in nine major cotton-growing states. Maharashtra and Gujarat states are having largest ginning and pressing units out of top 10 cotton growing states viz. Panjab, Haryana, Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh, Orisa and Tamilnadu.

Cotton ginning industry involves simple operations, which may be done mechanically or manually. In Jalgaon district area mostly manual process is used for ginning operations. Mechanical process is used only in few units located in the area.

1.2.4 Cotton Ginning Process -

The main aim of ginning operations is processing of raw cotton to convert it into bales for use in the textile industries for manufacturing of clothes. These operations includes the following activities -

1. Transport of kapas from the field to the ginning mill: -

Kapas is transported to the ginning industry by means of bullock carts, tractors and trucks.

2. Storage of kapas in the mill: -

In ginning industries of the study area kapas stored on the elevated flat platform having overhead roof. Whereas, in some industries kapas is stored in
closed godowns to maintain the good quality of cotton reaching to spinning mills.

3. Pre-cleaning of kapas: -

In this process kapas is cleaned to remove the impurities prior to the actual ginning. In most of the ginning industry in the study area this process is conducted manually.

4. Conveyance of kapas to the gins: -

In this step kapas is conveyed to gins either mechanically or manually.

5. The ginning (separation of cotton seed): -

Ginning is simple process of separating cotton fibres from seed. Roller gins are widely used in Maharashtra state for ginning of cotton.

6. Pressing and formation of bales: -

Ginned cotton is sent to pressing unit for ease of transport. Generally electronic and hydraulic press is used for pressing operation.

7. Transportation of bales/cotton seed:-

Pressed cotton bales are transported to spinning mills by loading manually to the trucks. Cotton seeds are transported to oil extraction mills.

1.3 Workplace Environmental Hazards of Cotton Ginning

1.3.1 Cotton Dust

In the ginning process the organic dust is generated due to handling and processing of cotton. Cotton dust is defined as dust generated in the atmosphere as a result of the processing of cotton fibers combined with any naturally occurring materials such as stems, leaves, bracts and inorganic material which may have accumulated on the cotton fibres during the growing or harvesting period. Cotton dust may contain many substances including ground-up plant matter, fiber, bacteria, fungi, soil, pesticides, non-cotton matter, and other contaminants that may have accumulated during growing, harvesting, and subsequent processing or storage periods.

The dust levels are high at workplace environment of ginning factory. Jannet and Jeyanthi (2006) reported decrease in the pulmonary capacity in the
workers exposed to cotton ginning environment. Christani et al (2001) reported the higher prevalence of respiratory symptoms in the cotton processing workers as compared to the silk mill workers.

Poor indoor air quality at workplace environment is characterized by many sources. Such inferior air quality can lead to suffering from lung diseases such as asthma among the workers. It can also cause headaches, dry eyes, nasal mucus, nausea and tiredness. Workers suffering from lung problems have a greater chance of aggregating the symptoms of asthma. Duration of consistent exposure of cotton dust is an important factor in the causation and development of respiratory symptoms (Ghasekhani et al; 2006).

The air containing cotton dust when breathed irritates the lungs and the exposed workers experience chest tightness, difficulty in breathing, coughing and wheezing. The relation between duration of exposure and appearance of respiratory symptoms has been analyzed by several authors. Wang et al. (2005) reported the longitudinal changes in pulmonary function test as annual decline in the lung capacity. This study has shown that the cotton gin workers had higher frequent symptoms of chest tightness, chronic bronchitis and chronic cough. Wang et al. (2005) were also reported long term exposures to the cotton dust results in excessive chronic annual loss in forced expiratory volume in one second, and in higher proportions of persistent symptoms of respiratory diseases.

Study conducted by Chattopadhyay (2007) among the grain dust exposed workers observed elevated blood eosinophil level and observed lowered PFT values obstructive in nature compared to the low eosinophil level workers. Ulrik (1998) reported that increased number of blood eosinophils reflects an inflammatory reaction in the airways, which might lead to development of obstructive airflow limitation. Ulrik also observed subjects with eosinophilia had significantly reduced FEV₁% predicted compared with those without eosinophilia (95 +/− 13 %predicted and 102 +/− 16 %predicted, respectively, P = .001). Canöz et al (2008) reported increase in
erythrocyte sedimentation rate (ESR) in asthma patients as compared to healthy controls.

Cotton dust generated at the ginning, pressing units and high noise levels by ginning machineries are the main workplace health hazards associated with the ginning industries. U. S. department of public health reported symptoms of cotton dust exposure as follow-

i. **Short-term exposure (Acute):** Exposure to cotton dust can produce feeling of chest tightness, coughing, wheezing, phlegm, weakness, fever and breathing difficulty. These are the symptoms observed during exposure period and disappear with discontinuation of the exposure of the workers.

ii. **Long-term exposure (Chronic):** Prolonged exposure to cotton dust can cause permanent and disabling breathing difficulties that include chronic bronchitis with emphysema.

Other impacts includes skin and nose itching and irritation due to continuous handling of cotton.

**Byssinosis** -

Many investigations have shown that textile mill workers around the world are affected by their work environment. These workers has been associated with many symptoms involving the respiratory tract, but by far the most prevalent and the most characteristic are those of byssinosis. Byssinosis is a breathing disorder that occurs in some individuals with exposure to the cotton dust. In the early stages of the disease the victim suffers from cough, tightness in the chest and shortness in the breath when he returns to work on the first day of the week. Later the symptoms extend to other days of the week and become more severe and continuous resulting in total and permanent disability. In the studies conducted by Kumar *et al.* (2003) reported that India has large number of ginning and textile mill employing 48% of all factory workers. About 55% of these mill workers suffer from byssinosis. It is known that prevalence of byssinosis is decreased in industrialized countries while it remains highly in developing countries (Tunay *et al*; 2008). Memon *et
al (2003) reported cases of byssinosis among cotton, flex, jute, and hemp mill workers.

1.3.2 Noise Hazards

Industrial noise is one of the major sources of noise pollution. The effects of noise can be considered from both physiological and behavioral perspectives. In medical literature view, noise has come to refer as an excessive sound capable of producing damage to inner ear. Noise is also considered as a very important “stress factor” (Park 1997, Moore 2003). Continuous exposure to high noise may lead into accidents in the industrial workers, drivers etc. Picard et al (2008) reported association of work-related accidents with noise exposure in the workplace and noise-induced hearing loss. A recent meta-analysis reviewed the effects of occupational and environmental noise on a variety of cardiovascular risks, including hypertension, use of anti-hypertension drugs, consultation with a general practitioner or specialist, use of cardiovascular medicines, angina pectoris, myocardial infarction and prevalence of ischaemic heart disease (Van Kempen et al., 2002). Structural presentation of impacts of high noise exposure at workplace is shown in Figure 1.3.

Cotton ginning is an important group of small scale industry in India playing an important role in the national economic growth. Bedi (2006) reported that in developing countries, people working in industries are still not aware about the ill effects of exposure to high levels of noise due to insufficient knowledge and literacy. Generally, high noise levels are prevalent at industrial workplaces in these countries. Exposure of the workers to such high noise leads to noise-induced hearing loss (NIHL) (Ologe et al; 2006). NIHL can be caused by regular exposure to moderately loud noise over a long period of time, or by a single moment of exposure to a very loud noise. The cotton processing workers in the study area are also not well aware of the health risks of exposure to the higher noise levels. Hearing ability can greatly be reduced by repeated or long-term exposure to high noise, and this
permanent effect is known as NIHL. The damage to the human ear depends on the intensity and duration of noise exposure. Previous studies showed that people who were exposed to noise levels higher than 85dB suffer from NIHL (Sataloff; 1984). Studies conducted by Patel et al. (2005) on industrial noise have reported higher levels of hearing loss among the workers exposed to high levels of workplace noise, and shown alarming signals of NIHL among dal processing workers. If hearing loss remains undetected, it may lead to impairment of an individual’s ability to function. Audiometric tests are useful to detect the hearing impairment among the workers. The purpose of this study is to determine the noise levels in the cotton ginning and to identify the prevalence of hearing impairment among the workers.
Figure 1.3 – Structural presentation of impacts of high noise at workplace
1.4 Management of Workplace Environmental Hazards

1.4.1 Emission Control

The air we breathe at work should be non-contaminated because it affects on health in several ways. Healthy air quality is an important element of any safe work environment. Some of the symptoms of indoor air pollution include throat and eye irritation, dizziness headache, coughing, trouble in breathing and fatigue. These symptoms may result in to asthma, byssinosis, heart diseases and cancer etc.

**Fumes and Gases**

Fumes are airborne solid particles that are formed when the material from volatalized solid, usually molten metal, condenses in cool air. A number of polycyclic aromatic hydrocarbons (PAHs) have been identified in foundry dust associated with pyrolysis of coke, carbon and organic substances. Gases are formless fluids that expand to occupy the space for enclosure in which they are confined. Gases exist in vapour phase at normal temperature and pressure. Many gases are stored under pressure in a liquefied nature before use. If such gases are not controlled due to leakage, the workplace air may be contaminated. Most of the gases are invisible, however some may have strong and characteristic odor that may give warning of their presence in the foundry. Alternatively, some gases may have no warning order and cause harmful health effects at extremely low concentrations. Other gases may indicate their presence by various irritating effects such as respiratory irritation, coughing, asthma, acidic taste and watering of eyes.

1.4.2 Particulates

Particulate matter (PM) is the term used for a wide range of particles that are small enough to be carried by the air and therefore finds entry in the exposed population. Particulate appears a solid or liquid, or in a mixture form. The size of these particles may range from 0.005 µm to 100 µm in diameter. Rylander and Jacobs (1997) reported that particles with diameter between 1 to 8 µm may enter the lung aveoli.
The best control measures for workplace air pollution includes increased ventilation, source isolation, source control, dehumidification and use of suitable filters etc. Providing personal protective equipments (PPE) could be an efficient measures for protection of workers from the workplace environment hazards, when it is difficult to execute above technologies.

1.4.3 Workplace Noise Control

High levels of occupational noise are identified as a worldwide problem especially in the industries (WHO). Exposure to higher noise has various adverse effects on human being as given in previous section. Noise control measures can be included in the design of the installation or design and construction of a new workplace. In plant design the measures to eliminate and control noise levels to minimize the risk involved needs to be suggested. Proper noise control techniques need to be adopted at workplace environment to avoid exposure of the workers to high noise.

a. Engineering Controls at Workplaces

- Noisy operations should be reduced or isolated from the workers.
- Timely repairing of loose and rotating parts, replacing worn bearings and gears and regular maintenance.
- Metal to metal contact should be avoided by using plastic or rubber bumpers.
- Adding noise barriers, noise enclosures, vibration isolation mountings, laggings, mufflers and silencers where appropriate to reduce noise at source.
- Absorbing acoustic shock by providing wear resistant rubber or plastic coatings.
- Use of conveyor belts rather than rollers.
- Stiffening and fixing damping materials to panels and other surfaces to reduce vibration and noise impact of items during processing.
- Using a sound-reducing enclosure that fully encloses the machine(s).
- Using sound-absorbing material on floors, ceiling and/or walls to reduce the sound level due to reverberation.
- Using sound-absorbing baffles between workers and the noise source.
• Using acoustical silencers in intake and exhaust systems associated with gaseous flow activity, for example, internal combustion exhaust systems or air conditioning systems.

b. **Administrative control**

When it is not possible to reduce noise exposure through engineering control measures, administrative controls should be used; these include:

• Organizing schedules so that noisy work is done during a particular part of the shift or when as few people as possible are present.
• Notifying people in advance when noisy work is to be carried out so they can limit their exposure to it.
• Keeping people out of noisy areas if their job does not require them to be there.
• Display of noise levels and posters for awareness of workers.
• Frequent rotations of workers from noisy area to avoid continue exposure to noise.
• Maintaining machines and equipment in good condition to reduce noise, including the addition of noise mufflers, vibration isolators, or duct silencers.
• Job rotation (changing tasks carried out by workers to prevent exposure to excessive noise).
• Purchasing new plant and equipment that produces noise levels that can reduce excessive exposure to noise.

c. **Information and training for workers**

• Making workers aware about workplace noise and its possible health effects through periodic training programmes.
• The noise exposures at a particular workplace and control measures used to protect the workers.
• Correct use of personal hearing protectors.
The various steps involved in noise management are shown in the figure 1.4.

Figure 1.4 - Steps involved in noise management
1.5 Objectives of Present Study

Present study is conducted at 12 different ginning industries located at Chopda, Dharangaon and Yawal Tahsils of Jalgaon District of Maharashtra. The study is based on workforce questionnaire survey to assess occupational exposure and health in random sample of working population of ginning industries. District hosts a population of about 4 million in an area of about 11,700 sq km. Detail information of districts is shown in Figure 1.5. More than 100 cotton ginning factories are located in this district.

Figure – 1.5 Jalgaon District Map

All the ginning industries under the study are comes under the category of small scale industries (SSI). The workforce in these industries mostly are coming from remote areas and generally illiterate. Most of the industries have facility of quarters for the workers at the border side of the factory premises. As a result workers routinely spend their most of the time in these premises only. The most rising problem of the ginning workplace
environment is the high noise and cotton dust generated through different operations.

1. The objective of the study is to monitor the workplace environmental conditions prevailing at ginning industries.
2. To study the effects of workplace environment on the workers health of the ginning industries.
3. To identify the risk factors contributing to respiratory and hearing impairment among the workers.
4. Risk assessment of air and noise exposure among the ginning industrial workers.
5. Development of strategic model to reduce noise dose and Time Weighted Average (TWA) noise levels for ginning industries to protect workers hearing and improve their efficiency.
6. This study aims to examine the prevalence of respiratory symptoms and hearing loss among the workers in cotton processing units located in Jalgaon District.

The study deals with presence of degree of self reported hearing loss and hearing impairment at binaural low, mid and high frequencies among the workers with respect to their period of exposure. The measures of agreement between presence of hearing impairment are also determined by audiometric threshold average among the subjects.

The respiratory impairment is determined by spirometric test of the workers and compared with the control subjects. In spirometry the parameter used are forced expiratory volume in one second (FEV1), peak expiratory flow rate (PEFR), forced vital capacity (FVC) etc. The self administered questionnaire was used to determine the psychological and physiological effects. These are widely used, relatively inexpensive and feasible methods for epidemiological studies conducted for mass surveys (Torgen et. al., 1997).