

# Textile Cotton Mill Industry Causing Health Hazards

**Dr. Gagan B Khanna**

BBD Govt. College, Chimanpura, Shahpura, Jaipur, Rajasthan, India

**ABSTRACT:** Manufacturing of textile comprises of a long multistep chain including countless heterogeneous mixes and it additionally one of the best customers of water per kg of created material. Synthetic substances are essentially adds to natural contamination by releasing wastewater wealthy in dangerous synthetic substances, for example, dyes, fire retardants, formaldehyde, dioxins, biocides and substantial metals, which in various ways present dangers to Human health. Safe or perilous synthetic concoctions are leaving the textile factory during various steps of the manufacturing procedure . The textile industry of different units involved with dyeing, weaving, printing, spinning, finishing and a number of other processes that are required to change over fiber into a completed texture or garment. The major health and safety problems are, Exposure to chemical, Exposure to cotton dust, Exposure to noise, Exposure to UV rays, Biological hazard, Psychosocial hazard and Ergonomic issues.

**KEYWORDS:** textile, cotton, chemicals, health, hazards, pollution, issues, synthetic, printing, fiber, ergonomic

## I.INTRODUCTION

The textile industry consists of a number of units engaged in spinning, weaving, dyeing, printing, finishing and a number of other processes that are required to convert fibre into a finished fabric or garment. There are several safety and health issues associated with the textile industry. This article aims at studying each of these issues in relation to the Indian textile industries in detail, along with the possible solutions for these problems<sup>1</sup>. The major safety and health issues in the textile industry can be stated as under:

- 1) Exposure to cotton dust
- 2) Exposure to chemicals
- 3) Exposure to noise
- 4) Ergonomic issues

**Exposure to cotton dust:** 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. In the year 1938 in India<sup>2</sup>, it was estimated that about 35000 people had already been affected by the disease, while 100000 other people were at risk of contracting it. Hence the Occupational Safety and Health Administration i.e. OSHA made it compulsory for employers in the textile industry to protect their workers from over exposure to cotton dust and its evil effects. The OSHA determined certain guidelines which are applicable to all private employers in the US textile industry.<sup>3</sup>

OSHA has laid down a Cotton Dust Standard with a view to reducing the exposure of the workers to cotton dust and protecting them from the risk of byssinosis. It has set up Permissible Exposure Limits (PELs) for cotton dust for different operations in the textile industry. This standard has helped bring down the rate of occurrence of byssinosis significantly. Different states might adopt different standards for occupational safety and health; however, in those states where there are no standards fixed by the State<sup>4</sup>, the Federal standards are accepted. For an eight-hour day, the OSHA Cotton standard has been determined at 200 micrograms of cotton dust per cubic meter of air in case of yarn manufacturing, 500 micrograms in case of textile waste houses, 750 micrograms in case of weaving operations, and 1000 micrograms in case of for waste recycling. Employers are required to measure the quantity of respirable cotton

dust once in 6 months or whenever there is any change that might lead to a change in the level of dust. If the level of dust in the atmosphere is higher than that as per OSHA guidelines, the management should take measures to reduce the same.<sup>5</sup> As per these guidelines, the employer is required to inform the employees in writing of the dust level present in the atmosphere as well as the steps that the management is planning to take for its reduction. If the dust level cannot be reduced, it is the duty of the management to provide respirators to the employees. The OSHA Cotton Dust Standard was amended in the year 2000, which exempted a method of washing cotton from the rule. A study conducted by R. Steinberg, J. Hannak and K. Balakrishnan regarding textile units in India revealed that pulmonary function in textile workers decreased significantly with exposure to cotton dust over a long period of time.<sup>6</sup> Another study conducted on textile units in Mumbai, India indicated an 11-33% incidence of chronic bronchitis in textile workers. Another study revealed an increase in the rate of occurrence with an increase in exposure to cotton dust. Studies have revealed that acute respiratory diseases are more common among the children working in carpet weaving units in Jaipur as compared to other children in the same city. The prevalence of respiratory diseases among child textile workers was 26.4%, while it was 15.2% among other children. Experts believe that this is on account of high exposure to cotton dust.<sup>7</sup>

**Exposure to chemicals:** Workers in the textile industry are also exposed to a number of chemicals, especially those engaged in the activities of dyeing, printing and finishing. Chemicals based on benzidine, optical brighteners, solvents and fixatives, crease-resistance agents releasing formaldehyde, flame retardants that include organophosphorus and organobromine compounds and antimicrobial agents are used in textile operations. 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.<sup>8</sup> Contact of the chemicals with skin as well as inhalation of the chemicals can lead to several serious health effects. A study conducted in USA revealed a correlation between the presence of cancer of the buccal cavity and pharynx and occupation in the textile industry. Another study revealed that textile workers were at high risk for developing cancer of the stomach while another study indicated a low degree of correlation between oesophageal cancer and working in the textile industry.<sup>9</sup> Moreover, a high degree of colorectal cancer, thyroid cancer, testicular cancer and nasal cancer was observed among textile workers. Also, a relationship between the presence of non-Hodgkin's lymphoma and working in the textile industry was observed. As per a study conducted on 1300 people working in 'tie and dye' units in Jodhpur and neighboring areas, 100 workers were observed to have occupation-related dermatitis. This constituted 7.69% of the total sample. Red RC base and naphthol were observed to be the most common culprits in this regard.<sup>10</sup>

**Exposure to noise:** High levels of noise have been observed in most of the units engaged in the textile industry, particularly those in developing countries. 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. A study of 77 employees in textile mills in Nagpur was conducted by Ruikar MM, Motghare DD and Vasudeo ND. This study revealed that 76.6% of the employees were at risk for developing noise-induced hearing loss. The study of Indian textile units by R. Steinberg, J. Hannak and K. Balakrishnan indicated that 21.3% of the workers studied suffered from noise-induced hearing loss.<sup>11</sup>

**Ergonomic issues** are observed in a majority of the units engaged in textile-related activities in India. Most of these units have a working environment that is unsafe and unhealthy for the workers. Workers in these units face a number of problems such as unsuitable furniture, improper ventilation and lighting, and lack of efficient safety measures in case of emergencies. The workers in such units are at risk for developing various occupational diseases. Musculoskeletal 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 among the workers on account of poor ergonomic conditions. These issues are more common in developing nations as compared to developed ones. As per a study by some researchers in year 2006, there is a considerable difference in the heights of the stools and the tables used for various operations such as cutting and ironing. This led to the workers having to sit in an uncomfortable position for entire work days. The stools were not padded in most of the units, leading to increased discomfort on the part of the workers. Moreover, the stools did not have a backrest, as a result of which the workers did not get adequate support to the back. In most of the units, the level of lighting was low and improper placement of

lighting fixtures led to low lighting at the point of work, leading to eye strain. On account of the continuous use of irons in some units, the humidity level is very high, contributing to the workers discomfort. Apart from this, lack of efficient measures for the safety of the workers was also observed. Lack of essential items such as first aid kits, fire extinguishers, and alarms was noted in most of the units. This puts the workers under great risk in times of an emergency. Protective equipments like metallic gloves were not provided to the workers in several units for protection against potential accidents and injuries.<sup>12</sup>

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.

## **II.DISCUSSION**

Workers in the textile industry risk developing various respiratory and pulmonary diseases due to exposure to cotton dust. The particles from the cotton lint are inhaled by the workers and results in the breathing problems including asthma, shortness of breath, cough and tightness in the chest. The poor health of labor contributes to the low productivity of the labor and in serious cases loss of jobs leading to the poverty. The weaving unit involves the process of threading or interlacing together different yarns to make cloth or fabric. There are certain health hazards workers might be exposed to in weaving units, be it integrated or independent weaving units or power loom units. The particles from the cotton lint are inhaled by the workers and results in the breathing problems including asthma, shortness of breath, cough, and tightness in the chest. The poor health of labor contributes to the low productivity of the labor and in serious cases loss of jobs leading to the poverty. The association between the existence of respiratory illnesses among the industrial workers from the cotton dust is well recognized in literature. Due to extended exposure to cotton dust, workers in the cotton processing industries face risk of developing obstructive respiratory conditions. The affected workers of the factory further transform the diseases to the members of their family that widen the effects to the overall community. These effects caused by exposure to cotton dust could be short term and long term chronically damaging the overall health publicly. Due to bad postures for long hours and lifting heavy weights, workers are also prone to developing musculoskeletal disorders like carpal tunnel syndrome, forearm tendinitis, bicipital tendinitis, and lower back pain. Workers might also develop hearing problems due to some weaving machines emitting noises greater than 90 dBs. Continued exposure to noise may have damaging consequences for people who experience it for long stretches of time. High noise causes speech interference and hearing loss.<sup>13</sup>

The textile industry has plenty of departments such as weaving, spinning, dyeing and printing and furthermore, processes that are essential to manufacturing finished garments or fabric. In the textile industry, health and safety are vital problems for the operating personnel. It is a kind of industry in which the profession affects the health of the workers. These professions have plenty of associated hazards and risks. These hazards not only affect the physical health of the workers but also affect them mentally and psychologically. The diseases that arose from the textile industries are characterized by a serious decline in respiratory function. The professionals in the textile industry are exposed to various hazards such as physical hazards, chemical hazards and biological hazards, and psychosocial hazards such as mental stress and psychological imbalance. In a study, it is stated that lung-related disease stands first in the row of occupational hazards in the textile industry, followed by reproduction system disorder, noise-induced hearing loss, heart-related and vision-related diseases, Neurotoxicity and other dermatological conditions and mental stress. The workers are highly exposed to specks of dust from various materials like wool, cotton, hemp, flax, sisal and a few other materials which can occur during various processes that are carried out in the textile industries. At the time of inhalation, these dust particles travel through our respiratory tract and enter our lung, alveoli are the last part of the respiratory system it filters the dust completely and transfers the inhaled oxygen to the bloodstream. The trapped dust particles remain to settle in the alveoli and prevent the further diffusion of oxygen to the blood cells. This issue leads to various respiratory disorders among workers.<sup>14</sup>

Exposure to cotton dust for a high period may lead to a deadly disease called byssinosis usually known as the brown lung. This disease is indicated by difficulties in breathing, chest tightening, and wheezing. It has been reported by OSHA (Occupational Safety and Health Administration) in the year 1938 in the united states of America, that more than 30000 people are affected by byssinosis and nearly 100000 people are at a stage of high risk to get affected by this disease. Due to the evaluation of types of machinery, the nature of work in the textile sector has become quite

comfortable for women and they show a majority of workers in the textile sector. By the division of the work based on gender lines, the women are subjected to be highly exposed to organic fibres than men do.<sup>5</sup>

Byssinosis is actually far more different from actual bronchitis, initially, it has a dry cough and the same develops to a severe stage and sometimes leads to lifetime disabilities. Represents the chest radiographic view of a female adult of age 56, she has been working in the textile industry for a period of 7 years. The traces of the cotton dust show the degradation of the lung<sup>7</sup>



### **Diffuse Lung Disease**

This type of disease is characterized by the degradation of the interstitial connective tissues which are present between the lung portion and the alveoli. These connective tissues give stability for the alveoli to maintain a proper fit during the inhalation of the air. A case report from a study reveals that a subject age 66 had been exposed to cotton dust for a period of nearly 50 years and interestingly he had possessed no symptoms of byssinosis but after a severe examination organic cellulose fibres were found in the subject's lungs and it is stated that the situation can be called as the cotton dust pneumoconiosis<sup>9</sup>

### **Dry Cough**

Persons working in the cotton dust exposure zone experienced the effect of chronic cough. chronic cough is signified as prolonged coughing for a period of 3 months. It is defined as a dry cough only from the throat and not from deep down. It causes irritation in the throat due to the inhalation of allergic cotton dust. The chronic cough differs from usual asthma but it is the progression towards asthma.<sup>11</sup>

### **Discomfort in breathing and chest constriction.**

It was found that there is a significant difference between the breathing ability in cotton dust exposed and non-exposed workers and it was found that most of the subjects felt uncomfortable breathing. 7.2% of the total experienced chest constriction and 9.9 % of the total experienced breathing difficulties and the study also stated that there was some good amount of gap observed in the results between the exposed and non-exposed workers. It is recorded that in a study by shortness of breath was found common among the 16.5% of the total 224 exposed and 80 non-exposed individuals.

### **Chronic Bronchitis**

A study by AV Hinson defines chronic bronchitis as the regular cough accompanied by the mucus fluid from the respiratory tract for a period not less than three months. It seemed in an observation recorded 3.5% in the exposed

while 0.9% in the non-exposed people . similarly a study reports on an average exposure of  $196 \mu\text{g}/\text{m}^3$  across shift change in the Yarn manufacturing workers suffered 9.4% on total of 827 falling above 40 years of age .

### **Toxic Liver Disease.**

Dimethylformamide is usually a solvent that is defined to have excellent properties and hence It is mainly used in aramid fibres which contributed a major per cent of the military fabrics. The studies show that the N, N-dimethyl amides which are commonly known to be Hallcomids are characterised by toxicity in several animal species such as mice, cats, rabbits and rats. It is clarified that dimethylformamide is accountable for toxic liver diseases and could be a carcinogenic chemical that may lead to cancer in living beings it also affects the reproducing system in women and leads to birth defects .<sup>9</sup>

### **Noise-Induced Hearing Loss (NIHL)**

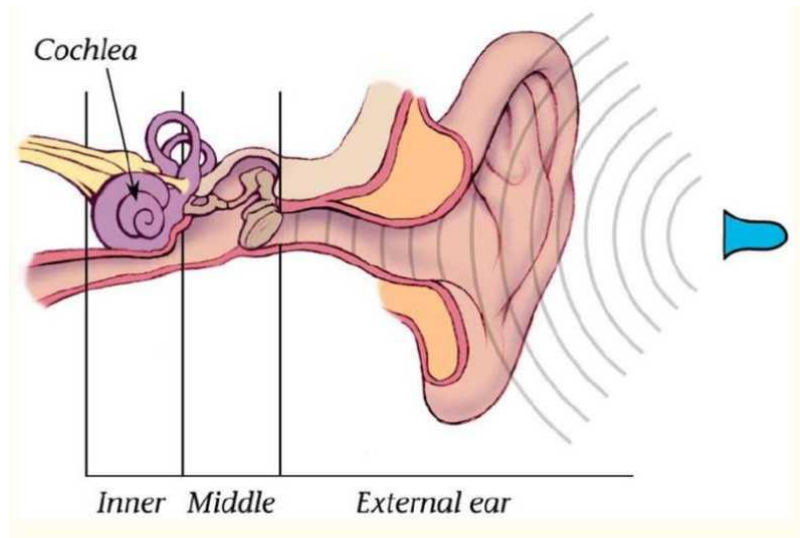
Any undesirable signal is termed to be noise. Theoretically, there are three classifications of noise such as continuous noise, impact noise and intermittent noise. The regulations in Tamilnadu show that 90 dBA for the continuous noise for 8- hour exposure, and 140 dB for the impact noise not exceeding 100 impacts a day. The external portion contains Pinna and ear canal, the middle portion contains three bones namely a hammer, anvil, and stirrup and the innermost portion called cochlea consists of numerous tiny oscillating hair cells. The cochlea transmits the signal to the brain in correspondence with the sound received. It is evident that when a person is exposed to high noise continuously the hair cells in the cochlea begin to stop responding to the sound frequency further. The stationary cochlea sends no signal to the brain upon receiving a sound signal. This is known to be an irreparable disease commonly known to be Noise-induced hearing loss. A study reveals that there is a high noise level in the textile processing sections that could lead to lifetime hearing loss which could be accompanied by tinnitus in the early stages characterised by a temporary ringing sound in the ears. Noise in various sections of the textile industry ranges from 40 dBA to 100 dBA. Varied subjects including the non-exposed areas such as the administration block.<sup>11</sup>

## **III.RESULTS**

DEPARTMENT	NOISE LEVEL (dBA)	
	Range	Average
Weaving	94-100	97
Spinning	94-96	95
Blowing	85-89	87
Carding	85-87	86
Engineering and maintenance	85-89	87
Cone- winding	85-91	90
Washing and bleaching	83-85	84
Dyeing and Printing	80-85	83
Packing and storage	64-75	68
Administration	40-60	56



The audiometric test results of these subjects clearly indicate that there is a significant amount of threshold shift



**Fig. Anatomy of the ear**

All the subjects in this study are explored in detail and they presented at least one symptom which is considered symptomatic in this study. It is revealed that among all the diseases byssinosis is considered to be the most vulnerable to human health. Women are most affected by these diseases than men. The worst part observed that no proper preventive measures are taken by the management such as lack of awareness programs and lack of the required facilities, it has its main source from poor funding from the management. In most cases, professionals are not told about their occupational hazards and that may stand as a major reason for their exposure to hazardous particles, it is believed that the awareness of health conditions could have possibly reduced the occurrence of these diseases. Some cases from the early 19th century report that the doctors weren't able to diagnose the byssinosis the reason is stated as they were not able to differentiate between bronchitis and byssinosis. This paper reminds the management of the severity of occupational diseases in the textile sector. On the whole, the impacts of these diseases are not only observed among the exposed subjects but also among the non-exposed individuals, this reveals the polluted environment surrounding the textile sectors.<sup>13</sup>

**The following suggestions can be made to improve the safety and health conditions in textile units:**

1. The seats of the workers and the tables should be well aligned in height so that there is no musculoskeletal strain.
2. There should be proper lighting at the place of work so that eye strain can be avoided.
3. Machinery should be well maintained in order to reduce the level of noise. If necessary, certain parts of machines can be replaced.
4. In case the noise level cannot be controlled, workers should be provided with earplugs so that exposure to noise can be reduced.
5. Workers can be rotated within jobs so that they are not faced with continuous noise exposure for a long period of time.
6. There should be proper ventilation at the place of work.
7. In order to reduce the exposure to dust, workers should be provided with masks.
8. 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.
9. In units where there is heavy exposure to dangerous chemicals, workers should be provided with safety gloves.
10. Proper dust control equipment should be set up and maintained to reduce the workers exposure to cotton dust.
11. Medical examinations should be conducted by the employers for the workers from time to time. If significant occupational health problems are observed, appropriate measures should be taken by the management.<sup>9</sup>

#### IV.CONCLUSION

This study permitted us to estimate the histological superiority of respiratory disorders such as Byssinosis, chronic cough, discomfort in breathing, diffuse lung disease, chronic bronchitis, toxic liver diseases and noise-induced hearing loss. Throughout the study, it is evident that the superiority of these diseases was found significantly higher than those of the non-exposed individuals. The superiority of these diseases varies in the sector according to typical climatic conditions, the nature of the working environment, gender, and age. This study has not been able to encompass the environmental parameters in the textile sector such as the humidity level, the quantity of dust present, and temperature. This review leads to reconsideration in the usage of effective personal protective equipment and also the implementation of sound technical and administrative controls against the sources of these diseases<sup>14</sup>

#### REFERENCES

1. "Safety and health issues in workers in clothing and textile industries", Neelam Singh Ph. D Scholar (Home Science Dept.) Chaudhary Charan Singh University, Meerut, Uttar Pradesh, India. IJHS 2014; 2(3): 38-40.
2. "Occupational health hazards in textiles industry", SUDHA BABEL Department of Textiles and Apparel Designing, College of Home Science, Maharana Pratap University of Agriculture and Technology, UDAIPUR (RAJASTHAN) INDIA. AJHS Volume 9 | Issue 1 | June, 2014 | 267-271
3. Occupational safety and health in the textiles sector, Occupational safety and health in the textiles sector.
4. Diffuse lung disease caused by cotton fibre inhalation but distinct from byssinosis, H Kobayashi, S Kanoh, K Motoyoshi, S Aida, Thorax 2004;59:1095–1097. DOI: 10.1136/thx.2003.014027
5. Cotton Dust Exposure and Respiratory Disorders among Textile Workers at a Textile Company in the Southern Part of Benin, Antoine Vikkey Hinson, Virgil K. Lokossou, Vivi Schlünssen, Gildas Agodokpessi, Torben Sigsgaard and Benjamin Fayomi
6. Byssinosis in cotton and other textile workers, R.S.F. schilling, M.D. Lond, M.R.C.P. D.P.H..D.I.H.
7. occupational exposure and Respiratory Illness Symptoms Among Textile Industry Workers in a Developing Country, M. R. Ahasan, Sk. A. Ahmad, and T. P. Khan
8. Nafees, A.A.; Fatmi, Z.; Kadir, M.M.; Sathiakumar, N. Pattern and predictors for respiratory illnesses and symptoms and lung function among textile workers in Karachi, Pakistan. Occup. Environ. Med. 2013, 70, 99–
9. Zuskin, E.; Mustajbegovic, J.; Kern, J.; Doko-Jelani, J.; Pavicic, F. Respiratory findings in textile workers employed in dyeing and cotton. Arch. Hig. Rada Toksikol. 1996,
10. Laraqui, C.H.; Rahhali, A.; Tripodi, D.; Curtes, J.P.; Verger, C.; Caubet, C. Byssinose et asthme professionnels chez les ouvriers exposés aux poussières de coton. Rev. Fr. Allergol. Immunol. Clin. 2002, 42, 133–141.
11. R. Steinberg, J. Hannakand. Balakrishnan, [http s://www.onlineclothingstudy.com/2013/07/safety-and-hazardous-atmosphere-in.html](http://s://www.onlineclothingstudy.com/2013/07/safety-and-hazardous-atmosphere-in.html)
12. Glindmeyer, H.W.; Lefante, J.J.; Jones, R.N.; Rando, R.J.; Weill, H. Cotton dust and across-shift change in FEV1 as predictors of annual change in FEV1. Am. J. Respir. Crit. Care Med. 1994, 149, 584–590.
13. Redlich, C.A., Beckett, W.S., Sparer, J., Barwick, K.W., Riely, C.A., Miller, H., Sigal, S.L., Shalat, S.L. and Cullen, M.R. (1988). Liver disease is associated with occupational exposure to the solvent dimethylformamide. Ann. Internat. Med., 108 (5) : 680-686.
14. Joseph S. Wiles & John K. Narcisse (1971) The Acute Toxicity of Dimethylamides in Several Animal Species, American Industrial Hygiene Association Journal, 32:8, 539-545, DOI: 10.1080/0002889718506502