

OCCUPATIONAL HEALTH AND SAFETY CONCERN IN COTTON INDUSTRY IN FAISALABAD

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ABSTRACT:

Occupational health is the study of effect of work and the working environment on the health of the worker. Occupational diseases are those diseases, which arise out of or during working at employment place.

Introduction:

Occupational health were defined by the joint committee of I.L.O. and W.H.O. in 1950 as follows; "The promotion and maintenance of the highest degree of Physical, mental and social Wellbeing of workers in all occupations. The protection of workers in their employment from risks resulting from factors adverse to health, the placing and maintenance of the workers in an occupational environment."

Occupational diseases 1 are those diseases which arise out of or during working at employment place. A worker may be exposed to 5 types of hazards, depending upon his / her occupation. Metals like Arsenic, Cadmium, Mercury, CaCO_3 , Manganese etc. have very toxic effects on our body. Since the introduction of social security scheme in Pakistan in 1966 and occupational diseases regulations 1967 **2** (which only admit three occupational diseases of which one is Byssinosis). It is also known that certain dusts increase mortality rate in pulmonary tuberculosis and other respiratory diseases rate to a great extent.

OCCUPATIONAL RESPIRATORY DISEASES IMPORTANT CAUSATIVE FACTORS OF RESPIRATORY ILLNESS

Following are the important causative factors of respiratory illness; 3

- 1- Infection
- 2- Atmospheric pollution
- 3- Tobacco smoking

CLINICAL MANIFESTATIONS OF BYSSINOSIS

FIRST STAGE

The characteristic of Byssinosis is chest tightness and wheeze. This condition may persist without getting any worse, until the workers leave the industry. Removal from exposure to cotton dust during the first stage will result in complete cure, but symptoms recur suddenly and with greater severity if work at the factory is resumed.

SECOND STAGE

As the disease progresses and chest tightness and breathlessness may persist and there is constant dyspnea on every working day. If exposure continues, the attacks of bronchitis and asthma follow.

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THIRD STAGE

The disease progress to chronic bronchitis with emphysema associated with asthmatic features. Cough with asthmatic features, Cough with muco-purulent sputum is present, but there is not fibrosis, its final stages the disease. The patient often forgets his early symptoms and is diagnosed as suffering from respiratory disease.

RADIOLOGY OF BYSSINOSIS

It may show evidence of over inflation. The radiological features of emphysema are (a) widely spaced ribs by unusually translucent lung fields (b) bullae (c) low flat diaphragm and (d) abnormal prominence of pulmonary arterial shadows at both hila.

DIAGNOSIS OF BYSSINOSIS

Together with characteristic symptom of chest tightness, symptoms are associated with a marked fall in ventilator capacity. This measurement of FEV₁ or airway resistance.

TREATMENT OF BYSSINOSIS

In the developed case of Byssinosis⁵, the treatment is the same as that of chronic bronchitis with asthmatic features i.e. avoidance of dusty and smoke atmospheres, use of appropriate antibiotics for concurrent infections and symptomatic measures like cough suppressants, bronchodilators and breathing exercise.

OBJECTIVES OF THE STUDY

1. To find out the number of cotton workers who were suffering from respiratory illness.
2. To find out the various categories of illness of respiratory system.
3. To see any association between exposure to cotton dust and respiratory diseases.
4. To give recommendations for prevention and control of these diseases.

STUDY DESIGN & METODOLOGY

The prevalence of respiratory diseases ⁴ in cotton workers at Faisalabad was a cross sectional study based on simple random sampling. Most important step in a study is the selection of the criteria used for

the selection of factory workers. Workers of card room and weaving sections were involved mainly in this study.

POPULATION OF THE STUDY

Total workers strength of cotton factory Faisalabad is about 300. The workers in cotton factory of Faisalabad are all male between age (10 – 20), (21 – 45), (46–60) years. 60 workers are selected for study randomly.

SAMPLING METHOD AND DESIGN

During selection of workers for study purpose the following precautions were taken;

1. Workers from both sections should be included in the study.
2. Workers of three age groups must be included in the study.
3. Workers themselves were not told the purpose of examination.

SAMPLE SIZE

To ensure the result of study, correct, a big sample size of 60 workers was selected.

SAMPLING METHOD

Simple random sample and multistage method was used. In the 1st stage the worker were categorized according to their work place and divided 300 cotton workers in to two sections of 150 workers, and formed each age group in to 50 cotton workers, then every 5th cotton worker from each age group was randomly selected. This made 10 selected cotton workers in each age group and formed 30 selected cotton workers in one section, so according to random method this was made the sample of 60 cotton workers.

VARIABLES

A variable is a quantity which can be measured or categorized. The most common universal variable is age. The purpose of this variable was twofold;

- 1- The younger persons are claimed to have better resistance against disease.
- 2- Compensatory mechanisms of the body are at higher level in the young than in

the older..

ADDITIONAL VARIABLES

WORK PLACE

Faisalabad cotton factory is divided in to various sections according to the process Cotton machines. Both sections were most dusty. The work place of the worker was made out from recruitment register and O.P.D. record of social security. I.T.C.

DURATION OF EXPOSURE

Mean exposure of 30 weaving section cotton worker and 30 carding section cotton.

HISTORY OF THE PATIENT

After record of age, work place and duration of exposure, medical history of the Person was taken. Physical and clinical examination of the patient is done in any hospital of chest disease. Special attention was given to the lung function tests;

- 1- Vital capacity
- 2- F.E.V.
- 3- Residual volume

Radiological findings were the next variable in the study.

LABORATORY FINDINGS

For the purpose of simplicity, accuracy and quickness only essential Laboratory tests were carried out in the laboratory of I.T.C. social security Faisalabad. The tests conducting were;

- 1- E.S.R.TLC, DLC.
- 2- Sputum examination for games staining and Z.N.staining.
- 3- After patient was labeled as having respiratory illness. These Illnesses were divided in to four categories;
 - 1- Acute respiratory infection/ inflammation.
 - 2- Chronic respiratory infection
 - 3- Acute respiratory obstruction
 - 4- Chronic respiratory obstruction

FINDINGS

STATE OF RESPIRATORY ILLNESS

A total number of 60 workers in

Faisalabad cotton factory were examined and Screened for respiratory disease. 60 workers were found suffering from respiratory illness.

FREQUENCY OF SYMPTOMS

About 33% cotton workers having respiratory illness complained of sputum or postnasal discharge. 25% cotton workers were having productive cough. Dyspnea of grade II and III was in 17% cotton workers.

RELATION OF THE ILLNESS TO THE WORKPLACE

The percentages of illness in the workers of both sections is shown in table-1.

FREQUENCY OF SYMPTOMS

TABLE - 1

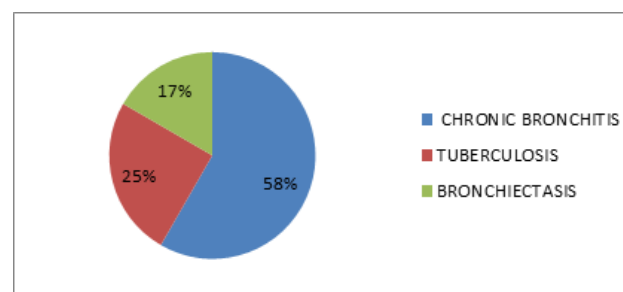
Symptoms of Cotton workers	Percentage	Age
Cough	25%	10-20
Dyspnea	17%	21-45
Chest pain	17%	21-45
Sputum	33%	46-60
Loss weight	08%	46-60
Total no of cotton workers:		60

CLINICAL CLASSIFICATION OF RESPIRATORY ILLNESS

The clinical classification of 60 workers having chronic ineffective illness was as follows;

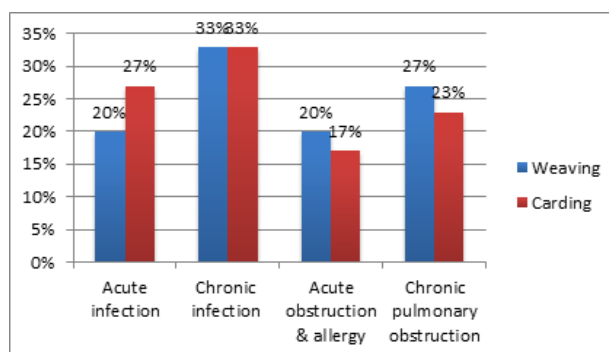
Chronic bronchitis	35
Tuberculosis	15
Bronchiectasis	10

Chart-1



RELATION OF DURATION OF EXPOSURE TO ILLNESS

It is evident from the Chart-2, that frequency of chronic illness increases with Increase in time of exposure to the same environment.



EFFECT OF AGE ON RESPIRATORY ILLNESS

The relation of age to the respiratory illness in persons exposed to the same environment is an important variable.

TABLE-3

RELATION BETWEEN DUST AND RESPIRATORY ILLNESS

Slight Dust	Intensity Moderate		Dust Intensity		Total
	Weaving (30)		Carding (30)		
	No	%age	No	%age	
Acute infection	6	20%	8	24%	14
Chronic Infection	10	33%	10	33%	20
Acute Obstructive	6	20%	5	17%	11
Chronic Obstructive	8	27%	7	23%	15

TABLE -4

EXPOSURE TO COTTON DUST AND CLINICAL DISTRIBUTION OF RESPIRATORY ILLNESS

Duration	within 1year		within 1-2year		within 2-3year		within 3-4year	
	No	%age	No	%age	No	%age	No	%age
Acute infection(14)								
Acute bronchitis	1	7%	2	14%	1	7%	1	7%
Acute pneumonia	2	14%	2	14%	2	14%	1	7%
Pneumonia								
Other diseases	1	7%	1	7%	0	0%	0	0%
Acute obst.(11)								
Br.asthma	3	27%	4	36%	2	18%	2	18%
Chronic P.O.D.(15)								
Emphysema	4	27%	3	20%	5	33%	3	20%
Chronic infection(20)								
Chronic bronchitis	1	5%	3	15%	3	15%	3	15%
Tuberculosis	2	10%	3	15%	4	20%	6	30%
Bronchitis	1	20%	-	-	-	-	-	-

H_0 : There is no association between age and years of work in card room

H_1 : There is some association between age and years of work in card room

H'_0 : There is no association between the exposure in hours and the disease caused

H'_1 : There is some association between the exposure in hours and the disease caused

H''_0 : There is no association between Physical Health of the work and disease causes

H''_1 : There is some association Physical Health of the work and disease causes

H'''_0 : There is no association between Disease symptoms & clinical diagnosis

H'''_1 : There is some association Disease symptoms & clinical diagnosis

	Chi-Square	Significant Value
Place of work * correlation between age and years of work in card room	90.550	.000
Place of work * correlation between the exposure in hours and the disease caused	130.648	.000
Place of practice * Physical Health of the work and disease causes	111.104	.000
Place of practice * Disease symptoms & clinical diagnosis	67.346	.001

Interpretation:

The chi square significant values are less than 0.05 that confirmed that there exists a significant relationship between the age and years of work in the card room of the cotton factory, between exposure of hours of work in the card room and the disease caused in the worker of the cotton factory, between the

Physical Health of the worker in the card room of the cotton factory and the disease caused and between the disease symptoms and the clinical diagnosis of the cotton factory of the cotton factory workerso $H_0, H_0\phi$, and $H_0\phi\phi$ should be rejected in the favour of $H_A, H_A\phi$ and $H_A\phi\phi$.

H_0 : There is no association between Gender and types of diseases

H_A : There is some association between Gender and types of diseases

H'_0 : There is no association between the Qualification and types of diseases

H'_A : There is some association between Qualification and types of diseases

H''_0 : There is no association between Age and types of diseases

H''_A : There is some association Age and types of diseases

	Chi-Square	Significant Value
Gender and types of diseases	29.259	.000
Qualification and types of diseases	31.781	.000
Age and types of diseases	62.130	.000

The chi square significant values are less than 0.05 that confirmed that there exists a significant relationship between the Gender and types of diseases, Qualification and types of diseases and Age and types of diseases so H_0 , $H_{0\phi}$, and $H_{0\phi\phi}$ should be rejected in the favour of H_A , $H_{A\phi}$ and $H_{A\phi\phi}$.

DISCUSSION:

Byssinosis is an occupational respiratory disease which is present among those who clean and prepare fibers, particularly workers on the Carding machines are exposed to highest concentration. Current incidence in United States is around 4%. In Britain, 361 Lancashire cotton workers received disability pensions for Byssinosis. In Australia Byssinosis is present in less than 2% of the exposed population. Introduction of mechanical picking of crops has increased the incidence of Byssinosis. Smoking has some relation with Byssinosis. The main differentiating findings among Byssinotic and other workers engaged in industrial work e.g. coal miners is that there is initial tightness of chest on Monday/Saturday with temporary decrease in FEV1 in Byssinotic whereas coal miners do not show temporary reduction in ventilator capacity. There are no characteristic radiological or pathological findings of Byssinosis. The diagnosis⁷ mainly rests upon history of long exposure to cotton dust together with chest tightness on beginning of week. The respiratory illness found in cotton workers were also cough, sputum, and pain Chest, all nonspecific.

RECOMMENDATIONS

The various measures recommended for the prevention of respiratory illnesses in cotton factory workers are mainly consist of dust control, medical measures, engineering control measures, personal protection of workers and few general measures.

DUST CONTROL

In this epidemiological survey of 60 cotton workers, dust concentrations were also measured. At concentration of 2.5mg/cum, more than 23% of workers have symptoms of acute infection 33% of chronic infection. At 1mg/m³ concentration, no one has been affected. On the basis of these results, American conference of Government Industrial Hygienists⁸ in 1973 adopted the threshold limit value (T.L.V) of total lungs of 1mg/m³. There is recent data to suggest that this level should further be lowered to 0.1mg/cu.m in the carding area and 0.75mg/m³ in the weaving area. The T.L.V. adopted in 1974 is 0.12mg/m³ in the United States. British Occupational Hygiene society has adopted 0.5mg/cu.m of dust as the practical threshold limit. This hygiene standard is difficult to achieve by traditional methods like oiling the cotton, exhausting and enclosing the carding engines. Dust can be controlled at the point of origin by water sprays. Suppression of dust by oil is used in cotton, cotton factory and hospital floors. Environmental monitoring by gravimetric dust, sampling is necessary as a mean of detecting hazardous processes and maintaining dust control.

MEDICAL CONTROL MEASURES

PRE-PLACEMENT EXAMINATION

Pre-placement examination at the time of

employment and include worker's medical, family, occupational and social history, a thorough physical examination and a battery of biological and radiological examinations e.g. x-ray chest, electro-cardiogram, vision testing, urine and blood examinations, special tests for endemic disease, is the foundation of an efficient occupational health service.

PERIODICAL EXAMINATION

Many diseases of occupational origin require months or even years for their development. Their slow development very often leads to their non-recognition in the early stages. So, a periodical medical checkup of workers is necessary when they handle toxic or poisonous substances. The examination includes;

- Grading of the respiratory symptoms by means of standardized questionnaire and
- Ventilatory capacity may be measured and

graded before and after a work shift, The questionnaire grades respiratory systems as follows:

Grade 0: No symptoms of respiratory illness

Grade 1/2 : occasional chest tightness on the first day of working week.

Grade 1 : chest tightness on every first day of working week.

Grade 2 : chest tightness on first and other days of the working week.

Grade 3 : grade 2 symptoms accompanied by evidence of permanent incapacity from Diminished effort tolerance and/or reduced ventilator capacity.

The FEV is used to measure both temporary (acute) and (chronic) impairment of Ventilatory capacity. The FEV measured before dust exposure or after an appropriate absence (at least 2 days) also gives evidence of the permanent effects of exposure and it is important in deciding whether a change in occupation should be advised. Bouhuys, Gibson and Schilling have recommended the following grade of acute and permanent changes in ventilatory capacity;

FO: No effect of dust on ventilator capacity, no evidence of chronic ventilatory impairment.

F1/2: Slight effect of dust on ventilatory capacity: no evidence of chronic ventilator

impairment.

F1 : Definite acute effect of dust on ventilatory capacity: no evidence of chronic Ventilatory impairment.

F2 : Evidence of a light to moderate irreversible impairment of ventilatory capacity.

F3 : Evidence of a moderate to severe irreversible impairment of ventilatory capacity.

The acute effect in terms of fall in FEV is classified as:

Less than 0.06 litres- no acute effect.

0.06-0.20 litre – slight acute effect.

Over 0.20 litre – definite acute effect.

Chronic ventilatory impairment is classified as a percentage of the predicted normal FEV.

Over 80% of predicted – no chronic ventilatory impairment.

60-80% of predicted - moderate chronic ventilatory impairment.

Less than 60% of predicted - severe chronic ventilatory impairment

If a worker with clinical features respiratory illness, he must be removed from the sections with high dust concentrations. Workers in Grade F1/2 should be encouraged to use mask until the dust levels have been lowered to acceptable levels. Those who in Grade F1 are at risk of developing permanent lung damage if exposure can be moved to non-risk areas. Grade F2 and F3 include workers with permanent impairment of ventilatory capacity, workers in these grades, with symptoms characteristic of Byssinosis must therefore, be removed from further exposure.

MEDICAL AND HEALTH CARE SERVICE

The medical care of occupational diseases is a basic function of an occupational health. The social security scheme provides medical care not only for the worker but also for family.

SUPERVISION OF WORKING ENVIRONMENT

The periodic inspection of working environment such as temperature, lighting,

ventilation, humidity, noise, air pollution and sanitation etc. should be acquainted with the raw materials, processes and products manufactured.

MAINTENANCE AND ANALYSIS OF RECORDS

Proper records of are essential for planning, development and efficient operation of an occupational health service. The workers health record and occupational disability record must be maintained.

HEALTH EDUCATION AND COUNSELING

Ideally health education should start before the workers enter the factory. All the risks involved in the factory in which he is employed and the measures for personal protection should be explained to him. The correct use of protective devices like masks and gloves should also be explained.

ENGINEERING CONTROL MEASURES **DESIGN OF BUILDING**

Measures for prevention of occupational diseases should commence in the blue print stage by the factory architect.

GOOD HOUSE KEEPING

It means much the same as when used domestically. It covers general cleanliness, ventilation, lighting, washing, food arrangements and general maintenance. the walls, ceiling and passages. Masks, gloves, aprons, and other protective equipment should be kept clean and in a state of good repair.

GENERAL VENTILATION

There should be good general ventilation in factories. It has been recommended that in every room of factory, ventilating opening shall be provided in the proportion of 5 sq. feet for each worker employed.

LOCAL EXHAUST VENTILATION

By providing local exhaust ventilation dust, fumes and other injurious substances can be trapped and extracted "at source" before they escape in to the factory atmosphere. In this way, the breathing zone of workers may

be kept free of dangerous dust etc.

ENVIRONMENTAL MONITORING

It is concerned with periodical environmental surveys especially sampling the factory atmosphere to determine whether the dust etc escaping in to the atmosphere are within the limit of permissible concentration.

STATISTICAL MONITORING

Statistical monitoring comprises the review at regular intervals of collected data on health and environmental exposure of occupational groups. The main objective of these reviews is to evaluate the adequacy of preventive measures and occupational health criteria, including permissible exposure levels.

PERSONAL PROTECTION OF WORKERS

The personal protection of the workers is done by different devices.

PROTECTIVE DEVICES

Respirators and gas masks are used to protect workers against air born contaminants.

DUST RESPIRATOR

The latest British respirator is the "micro filter" which combines the quality of filter and comfort of face piece. At the end of day, all respirators in use should be maintained.

SMOKING

Present evidence indicate that smoking potentiates the effects of cotton and jute dust. Every effort should be made to protect every worker. Bronchodilators and antihistamine drugs reduce the effects of dust inhaled in the lungs.

MEASURES FOR GENERAL HEALTH PROTECTION OF WORKERS **NUTRITION**

Malnutrition is an important factor contributing to poor health among workers

COMMUNICABLE DISEASE CONTROL

objective is to detect cases of Communicable diseases and render them

non-infectious to others by treatment or removal from working environment or both.

ENVIRONMENTAL SANITATION

Within the cotton factories establishment, the following need attention for prevention of spread of communicable diseases.

WATER SUPPLY

A sufficient supply of wholesome drinking water is one of the basic need. The installation of drinking water fountains at convenient points should be encouraged.

FOOD

Sanitary preparation, storage and handling of food, measures are necessary to prevent outbreak of gastrointestinal diseases.

TOILET

There should be sufficient number of latrines and urinals of sanitary type at convenient sites. One sanitary convenience for every 25 employees for first 100 employees and thereafter one for every 50. Garbage and waste disposal should be such as to avoid the breeding of flies and vermin.

GENERAL PLANT CLEANLINESS

A high standard of general cleanliness is one of the fundamental needs.

SUFFICIENT SPACE

Sufficient floor space and cubic space are essential to prevent not only respiratory infections. The recommended standard is 500 cubic feet of space for every worker.

LIGHTING

The results of poor illumination on workers are eye fatigue, increased accidents, decreased production and more rejects of finished products. There should be sufficient and suitable lighting in every part of factory where workers are working.

VENTILATION AND TEMPERATURE

Poor ventilation not only increases the chances of infection from person to person

but also affects the mental and physical activity of the workers. Effective and suitable provision should be made in every factory for circulation of fresh air and such a temperature which suits to workers.

HEALTH EDUCATION

Health education is a basic need. It is an important health promotional measure. Health education in the factories settings should be envisaged at all levels- the management, the supervisory staff, the workers, the trade union leaders and the community.

OTHER MEASURES

GOVERNMENT ROLE

Periodic inspection of factories under factories ACT as laid down in Labour code of Pakistan should be carried out by the Medical officers authorized by chief inspector of factories. He should inspect the premises of the factories keeping in view the requirements of law. Punjab Factories Rules 1978 and West Pakistan Social Security⁹ (occupational disease) regulations 1967 should be strictly observed. It is desired that Public Health should be given the right status it deserved.

EDUCATIONAL AND TRAINING IN OCCUPATIONAL HEALTH

There is a great need that professional workers in the field of health and medicine such as Physicians, Nurses, Health Inspectors and Public Health Engineers be especially trained. The teaching programme must be made aware of cotton factory diseases and accidents and their management and prevention. This intensive training should include comprehensive knowledge of working conditions in the factory, the climate and social environment, the special hygiene factors and engineering environments, the factory equipment and machinery and the hours of work. In addition, training should include occupational pathology in relation to occupational hazards¹⁰ and also the prevention of accidents and diseases commonly encouraged in factories.

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When you have to depart from this world and have to meet death (eventually), then why wish delay (why feel nervous about death).

Hazrat Ali (Karmulha Wajhay)