



## Full Length Research Article

### A STUDY OF PULMONARY FUNCTION TESTS IN COTTON MILL WOMEN WORKERS OF COIMBATORE DISTRICT

\*Haridass, P.

Ph.D., Research Scholar, WCSC – Bharathiyar University, Coimbatore, Tamilnadu, India

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#### ABSTRACT

Byssionosis is a respiratory disease caused by inhalation of cotton dust for prolonged period of time. This is most frequently occurs in the cotton mill women workers. The word byssionosis is derived from Latin which means fine, soft, white fibers. Byssionosis is characterized by cough, wheeze, and chest tightness on the 1st day of work after returning from rest.

**Aim:** The present study taken to evaluate the lung function of cotton mill women workers who were working for past 5 years in Coimbatore district.

**Methods:** The present study was conducted on two groups of female subjects, comprising of apparently healthy females, of age ranging from 20-30 years. Group -1 consists of 50 female subjects who had occupational history of working in card room of cotton mills for about 5 years. Group-2 consists of 50 female subjects of same ages (20-30years) who were working in the packing room for the past 5 years taken as control group. The study was conducted on Mondays (which is first working day after rest) on computerized spirometer - spirolyser SPL 95. Pulmonary functions were recorded i.e FVC, FEV1, PEFR, PEF25%-75%.

**Results:** FVC was decreased significantly ( $<0.001$ ) in group-1 when compared with group-2. FEV1 in the cotton mill workers decreased significantly ( $<0.001$ ) than the control subjects. Group-1 showed significant decrease ( $<0.001$ ) in PEFR than group-2. FEV 25%-75% in the cotton mill workers decreased significantly ( $<0.001$ ) than the control subjects.

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#### INTRODUCTION

Byssionosis is a respiratory disease caused by inhalation of cotton dust for prolonged period of time. This is most frequently occurs in the cotton mill women workers. The word byssionosis is derived from latin which means fine, soft, white fibers. Byssionosis is characterized by cough, wheeze, and chest tightness on the 1st day of work after returning from rest. India is the 2nd leading cotton producing country in the world next to china. It is estimated that nearly 20 million people working in the cotton industry. Workers are exposed to cotton dust particles which are in the sizes from 0.1 to 150 microns. They are released in to atmosphere during processing, picking, crushing, grinding, abrading and loading. The particles more than 10 microns settle down from the air rapidly while smaller particles remain suspended indefinitely. The particles which are smaller than 5 microns are directly inhaled into lungs and they are retained there.

This fraction of dust is called irrespirable dust and is mainly responsible for pneumoconiosis. When the women workers exposed to cotton dust for more than 5 years their lung function altered which is depending on size of the particle, duration exposure. FVC is the maximum amount of air that can be expired forcefully after maximum inspiration. FVC is decreased in restrictive lung diseases. FEV1 the maximum amount of air that can be forcefully expired in the first second after force full inspiration. It is the most frequently used index for assessing airway obstruction, bronco constriction. FEV1 is expressed as percentage of the vital capacity. PEFR is the maximum speed of expiration. PEFR decreased in restrictive lung diseases. FEV 25%-75% is the flow of air coming out of the lung during the middle portion of a forced expiration. The average flow is between 25% and 75% of vital capacity.

Table-1/ FIG -1: Comparison of Age, Height, Weight, BMI, FVC, FEV1, PEFR, PEF25%-75% In Group-1 (cotton mill women workers) and Group-2(controls)

\*Corresponding author: Haridass, P.

Ph.D., Research Scholar, WCSC – Bharathiyar University,  
Coimbatore, Tamilnadu, India.

Table 1.

	Group-1	Group-2	p-value
AGE	25.32	25.16	>0.05
HEIGHT cm	132.3	132.8	>0.05
WEIGHT kg	43.4	43.6	>0.05
BMI cm/kg	20.07	20	>0.05
FVC LITRES/SEC	2.16	2.78	<0.001
FEV1 LITRES/SEC	2.02	2.53	<0.001
PEFR LITRES/SEC	2.68	5.42	<0.001
PEF 25%-75%	2.08	3.12	<0.001

Table – 2 / FIG – 2: Comparison of FVC, FEV1, PEFR, PEF25%-75% In Group-1(cotton mill women workers) and Group-2 (controls).

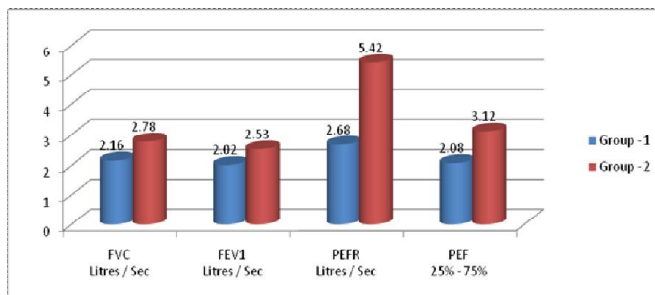


Figure 1.

## MATERIALS AND METHODS

The present study was conducted on two groups of female subjects, comprising of apparently healthy females, of age ranging from 20-30 years. Group-1 consists of 50 female subjects who had occupational history of working in card room of cotton mills for about 5 years. Group-2 consists of 50 female subjects of same ages (20-30 years) who were working in the packing room for the past 5 years taken as control group. The group-1 and group-2 subjects apparently healthy individuals free from cardiovascular, neurological and diseases.

**Exclusion criteria:** obesity, cardiovascular disease, anemia, neurological diseases.

All the subjects of group-1 and group-2 were informed about the experimental protocol and taken consent. The heights and weights of subjects were recorded BMI calculated. The study was conducted on Mondays (which is first working day after rest) on computerized spirometer - spirolyser SPL 95. The subjects were asked to stand in front of the spirometer and with mouth piece held firmly between lips. They were asked to inhale or exhale in to the spirometer with nose clip applied. Subjects were asked to take two or three normal breathings after which deep inspiration followed by rapid and forceful expiration. Pulmonary functions were recorded i.e FVC, FEV1, PEFR, PEF25%-75%. Results statistically analyzed using student t-test and p - values calculated.

## RESULTS

There is no significant difference in age, height, weight, BMI of the two groups (table-1/fig-1). FVC was decreased

significantly (<0.001) in group-1(cotton mill women workers) when compared with group-2(controls). FEV1 in the cotton mill women workers decreased significantly (<0.001) than the control subjects. group-1 showed significant decrease (<0.001) in PEFR than group-2. FEV25%-75% in the cotton mill workers decreased significantly (<0.001) than the control subjects (Table-2/fig-2)

## DISCUSSION

Cotton dust is a complex mixture of components which may include ground-up plant matter, cotton fiber, bacteria, fungi, soil, or pesticides. It may include other contaminants that have accumulated during the growing, harvesting, and subsequent processing or during storage periods. Any dust present during the handling and processing of cotton is considered cotton dust. Manufacturing processes using new or waste cotton fibers or cotton fiber by-products from textile mills also produce cotton dust (1). Inhalation of cotton dust causes release of histamine from mast cells. Histamine acts on the smooth muscles resulting broncho constriction. Air way mucus glands secrete more amount of mucus in the presence of histamine. Histamine directly stimulates vagal nerves causing smooth muscle contraction. Contraction of smooth muscles of air ways reduces the air entry in to lungs. In the present study cotton mill women workers (Group – 1) showed decreased FVC, FEV1, PEFR, FEV25% - 75% levels when compared to controls. The studied pulmonary function in Coimbatore cotton ginners and found that significant fall in the FVC, FEV1, and PEFR of cotton ginners which is consistent with our study.1. The studied pulmonary function tests in workers of different dust industries and found that FEV1, PEFR, FEV25% - 75% values were decreased in cotton industry workers which correlated with present study. In the present study there was significant decrease in FVC in Group – 1 subject. FEV1 showed significantly decreased values in the cotton mill women workers when compared with controls are in accordance with the studies.

## Summary

Dramatic and disastrous episodes of air pollution inversion have been documented in many industrial centers in the world. Exposure occurs through the manufacturing process, but is most pronounced in those portions of the factory involved with the treatment of cotton prior to spinning i.e blowing, mixing and carding. The women workers of carding room exposed more to cotton dust and are likely in getting byssionosis. In the present study it was observed that there was an inverse relationship between chronic exposure to cotton dust and pulmonary function tests.

To decrease the diseases related cotton dust exposure the following measures have to be implemented.

- 1) Usage of exhausts to increase ventilation.
- 2) Wetting procedures to decrease aerosols.
- 3) Sampling of work place done to determine the amount of cotton dust in the environment for every six months.
- 4) Regular health checks up.
- 5) Providing masks.

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