

A Study of FEV1/FVC Ratio in Loom Workers of Meerut City

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ABSTRACT

Background: In India, around 20 million workers are involved in textile industry. With rapid industrialization of the developing world, cotton dust induced lung diseases are poised to become a global health problem.

Aims & Objective: To evaluate and compare the lung functions in subjects exposed to cotton dust with unexposed once (control groups) and to find out the correlation between duration of exposure with observed respiratory parameters.

Materials and Methods: The present study was conducted in the department of physiology at LLRM Medical College, Meerut with the help of SPIROLAB II (MIR) over a period of twelve months. A total of 100 individuals, 50 power loom workers and 50 controls were included in this study.

Results: The average FEV1/FVC ratio in loom workers was 79.63 ± 11.37 , which was significantly lower ($p < 0.0001$) as compared to unexposed subjects 83.30 ± 6.50 . When the FEV1/FVC ratio was studied in correlation with duration of exposure, it was observed that the reduction in FEV1/FVC ratio showed a significant ($p < 0.01$) positive correlation with exposure time.

Conclusion: In our study an attempt was made to compare pulmonary function between unexposed controls and exposed power loom weavers. We must focus on health conditions of the human involving in the manufacturing process and environmental conditions.

KEY WORDS: Byssinosis; Spirometer; FEV1/FVC Ratio; Loom Workers

INTRODUCTION

Textile industry is the second largest industry in the world next to agriculture. The worldwide incidence of dust related disease among workers in the dusty section of textile mills is nearly 40%. (Nat. Med Ind. 1995; 204-7).^[1] In India, the textile industry contributes substantially to the foreign exchange earned by the country. Exposure to cotton dust can produce byssinosis. It is clinically characterized by occasional (early stage) and then regular (late stage) chest tightness towards the end of the first day of the workweek (Monday–chest tightness). Incidence of byssinosis is reported to be 7 to 8% in three independent surveys carried out in Mumbai, Ahmedabad and Delhi.^[2] Exposure to cotton dust occurs throughout the manufacturing process especially in factories involved with the treatment of the cotton prior to spinning (blowing, mixing) and carding (straightening of fibers). Cotton dust deposited in lower respiratory tract, causes irritation of mucosal cells resulting in increased secretion of mucus and formation of mucosal plugs, which causes obstruction to the air passage and decreased lung function parameters.^[3]

As early as in 1846, Hutchinson invented spirometer to measure lung volumes in various groups of people in London. Latest advances in this field include computerized spirometer (SPIROLAB -II).

MATERIALS AND METHODS

The present study was conducted in a Medical College in Meerut over a period of twelve months in various loom workers of Meerut city. A total of 100 individuals, 50 power loom workers and 50 controls were included in the study. A questionnaire (based on the British Medical Research Council recommendation and modified for the use in India) was used to collect information regarding their name, age, economic background, work experience in present occupation, anthropometrics measurements.^[4] A relevant history was taken regarding duration of work, duration of smoking and any known

respiratory pathology. All subjects selected for the study underwent through clinical examination (general and systemic).

FEV₁/FVC ratios were measured with the help of SPIROLAB II. The obtained data for FEV₁/FVC ratio were analyzed by using standard statistical methods.^[5]

RESULTS

The mean FEV₁/FVC ratio in power loom workers was 79.63 ± 11.37 , which was significantly ($P < 0.0001$) lower as compared to unexposed controls (83.30 ± 6.50). When the FEV₁/FVC ratio was studied in conjunctions with duration of exposure, it was observed the reduction in FEV₁/FVC ratio ($P < 0.01$), a significant positive correlation with duration of exposure.

Table-1: Comparison of FEV₁/FVC Ratio

Age Group (Year)	Controls		Power Loom Weavers	
	N	Mean \pm SD	N	Mean \pm SD
20 - 30	20	82.45 \pm 5.86	22	83 \pm 8.30
31 - 40	20	84.87 \pm 5.89	23	77.50 \pm 8.64
41 - 50	8	83.64 \pm 4.48	12	77.77 \pm 12.05
51 - 60	2	85.05 \pm 6.85	4	68.5 \pm 4.72*
Total	50	83.30 \pm 6.50	50	79.63 \pm 11.37**

* $P < 0.001$; ** $P < 0.0001$

Table-2: Duration of Exposure on FEV₁/FVC Ratio

Duration of Work Exposure (years)	n	Mean \pm SD	Correlation Coefficient (r)
< 5	14	85.95 \pm 7.14	-0.45
6-15	24	79.55 \pm 9.25	-0.23
>15	12	73.41 \pm 11.87	-0.07
Total	50	79.62 \pm 11.00	-0.45*

* $P < 0.01$

DISCUSSION

The average FEV₁/FVC ratio in power loom workers was 79.63 ± 11.37 , which was statistically significant ($P < 0.0001$) lower as compared to unexposed controls (83.30 ± 6.50). It showed the declining trend in all age groups. When the FEV₁/FVC ratio was studied in correlation with duration of exposure, it was observed that fall in FEV₁/FVC ratio showed a significant ($P < 0.01$) positive correlation with exposure time.

SH Singh et al in 1985 observed the non-significant change in FEV₁/FVC ratio. They observed fall mean FEV₁/FVC ratio but it was not significant ($P>.05$). However they included in their observation, the younger age groups (20-30 yrs) and workers having short term exposure between 1-3 years.^[6] Jannet JV et al have done a study in 2006 “pulmonary health status of ginning factory women workers”. They found a significant ($Z=3.36$, significant at 1% level) reduction in these women when compared to the control women.^[7]

In the present study, it was observed that there is significant ($P<0.001$) reduction in FEV₁/FVC ratio in loom workers as compared with control subjects. Our finding matched with study of Jannet JV et al and not matched with that of S.H. Singh et al. We also observed a significant ($P<0.01$) positive correlation with exposure time in the exposed groups, which indicate that duration of exposure may also have some relationship with reduction in pulmonary functions.^[6,7] In this study almost all the subjects did not exhibit any respiratory problems. The cotton dust which is creating health hazards to the lakhs of laborers involving in the textile manufacturing process should be controlled by creating awareness among the workers and by the effective management.

CONCLUSION

In our study an attempt was made to compare pulmonary function between unexposed controls and exposed power loom weavers. We must focus on health conditions of the human involving in the manufacturing process and environmental conditions.

REFERENCES

1. Murlidhar V, Murlidhar VJ, Kanhere V. Byssinosis in a Bombay textile mill. *Nat Med J India*. 1995;8:204-7.
2. Park K. Park's text book of Preventive & Social medicine 22nd Ed Jabalpur: M/s Banarsidas Bhanot; 2012.
3. Mundie TG, Ainsworth SK. Etiopathogenic mechanisms of bronchoconstriction in byssinosis. *Am Rev Res Dis*. 1986;133:1181-5.
4. Official Statement of the American Thoracic Society. Standardization of Spirometry, 1994 Update. American Thoracic Society. *Am J Respir Crit Care Med*. 1995;152(3):1107-36.
5. Official Statement of the American Thoracic Society. Standardization of Spirometry, 1994 Update. American Thoracic Society. *Am Rev Respir Dis*. 1987;136(5):1285-98.
6. Singh SH, Gupta HL, Gandhi A, Rai UC. A study of lung function abnormalities in workers of cotton spinning shop. *Indian J Physiol Pharmacol*. 1986;30(1):79-84.
7. Jannet JV, Jeyanthi GP. Pulmonary health status of ginning factory women laborers in Tirupur, India. *Indian J Occup Environ Med*. 2006;10:116-20.

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