

Original Articles

Byssinosis in a Bombay textile mill

V. MURLIDHAR, V. J. MURLIDHAR, V. KANHERE

ABSTRACT

Background. Till a national campaign against dust-related lung diseases was launched by a voluntary agency in Ahmedabad in 1992, government records for the 150-year-old textile industry showed no cases of byssinosis—the disabling occupational disease caused by cotton dust. The worldwide incidence of byssinosis among workers in the dusty sections of textile mills is nearly 40%.

We assessed the prevalence of byssinosis in a Bombay mill so that the Employees State Insurance Scheme would start conducting medical checks in all the 55 textile mills in Bombay and officially recognize the disease.

Methods. The study was conducted under the auspices of the Occupational Health and Safety Centre, a voluntary organization. Textile workers were called to a camp conducted over 3 nights and 3 days. We asked them to answer a questionnaire and tested their lung function using a Wright's ventilometer.

The diagnosis of byssinosis was made if there was a feeling of chest tightness on exposure to cotton dust, and if the FEV₁ was less than 60% of the expected result or the FEV₁/FVC was less than 75%.

Results. Of the total 1075 workers in the mill only 273 came to the camp; 54 (30%) of the 179 individuals working in the dusty sections of the mill had byssinosis. In the non-dusty departments, 16 (17%) out of the 94 workers were affected. Among those working for less than 10 years in textile mills, 24% had byssinosis and among those working for more than 30 years, 45% had the disease.

Conclusion. We found a prevalence of byssinosis among textile workers which is similar to that reported worldwide. The disease affected those who worked in both the dusty and non-dusty sections of the mill. There are an estimated 40 000 affected workers in Bombay and we suggest that the disease be recognized by the Employees State Insurance Scheme, and that the textile mill workers be compensated if they are affected by byssinosis.

Natl Med J India 1995;8:204-7

INTRODUCTION

Byssinosis is a disabling occupational lung disease caused by cotton dust. It is characterized by a feeling of chest tightness and breathlessness at work after a weekend break or other form of absence. In its late stages, which usually occur after many years of dust exposure, the worker is severely disabled with chronic bronchitis and emphysema.¹ Byssinosis is a compensable disease under the Workmen's Compensation Act, 1923 and the Employees State Insurance (ESI) Act of 1948 and is notifiable by a factory to the inspectorate.

In India, two previous studies to diagnose byssinosis were conducted by Kamat *et al.* from G.S. Medical College, Bombay, in 1974² and by Parikh of the National Institute of Occupational Health, Ahmedabad in 1987.^{3,4} Unfortunately the results did not reach the affected workers and most may have died from this disease without receiving compensation.

In 1990, many voluntary organizations and trade unions working in the field of occupational health and safety formed the National Campaign on Dust-Related Lung Diseases (NCDRLD). This body established a detection camp in three textile mills in Ahmedabad and publicized the findings of the study. Thus, the ESI scheme (ESIS) was persuaded to take up the cases of the affected workers and officially record the incidence and prevalence of byssinosis among Ahmedabad's textile workers. Later claims were filed with the ESI Corporation (ESIC) and the workers began getting compensation for the first time in 150 years of the textile industry in India.

Another voluntary organization, the Occupational Health and Safety Centre, was formed in 1988 by trade unionists, lawyers, doctors, scientists, safety engineers, researchers and health activists to conduct surveys at workplaces, organize training and other educational inputs and assist in obtaining compensation. This body initiated the campaign in Bombay to estimate the prevalence of byssinosis and make the authorities aware of its existence.

SUBJECTS AND METHODS

The Occupational Health and Safety Centre collaborated with a workers' union—the Mumbai Textile Mill Kamgar Kalyan Mandal—and held a detection camp in the factory premises from 4 to 6 April 1994.

The Mumbai Textile Mill manufactures spun cloth from

L.T.M. Medical College, Bombay 400022, Maharashtra, India
V. MURLIDHAR Department of Surgery
Occupational Health and Safety Centre, Bombay, Maharashtra, India
V. J. MURLIDHAR, V. KANHERE

Correspondence to V. MURLIDHAR

cotton. It employs 1075 men and women of whom 436 work in the dusty spinning and winding departments in three continuous shifts. Women are employed only in the maintenance sections, but they too may be affected by the general increase in dust levels in the entire factory.

The workers had never heard of byssinosis but some of them had been treated for 'tuberculosis' continuously for years. Seven of them could work in the dusty departments only after taking bronchodilators. Repeated meetings were held with the workers to explain to them the need for a medical check-up to detect byssinosis. Although both the union and management cooperated, only 273 workers (25% of the total number; 179 from the dusty sections) came to the camp and answered the questionnaire (Fig. 1) which was similar to the one used by Parikh of the National Institute of Occupational Health, Ahmedabad. Their lung function was also tested.

The questions related to the occurrence and severity of symptoms such as a feeling of tightness in the chest, breathlessness and coughing; the relation of these symptoms to particular shifts; history of smoking, tuberculosis or other chest diseases; and whether or not the symptoms were getting worse.

Lung function tests were carried out using a Wright's ventilometer (VM1) which gives digital readings for forced vital capacity (FVC), forced expiratory volume in the first second (FEV_1), FEV_1/FVC and peak expired flow rate (PEF).

Criteria for the diagnosis of byssinosis

The criteria used for the diagnosis of byssinosis were (i) symptoms of chest tightness after exposure to cotton dust,^{1,2} and (ii) FEV_1 less than 60% of the expected volume (for Indians)^{1,5} or an FEV_1/FVC below 75%.^{3,4}

RESULTS

Age and Sex

There were 266 men and 7 women whose ages ranged from 24 to 60 years. The majority (79%) of the workers were between 35 and 54 years of age (Table I).

Symptoms

Seventy-eight (29%) complained of chest tightness on coming back to work after time off, 70 (26%) felt chest tightness all week and 44 (16%) had grade 3 or 4 dyspnoea.

FEV_1 and FEV_1/FVC

Sixty-four (23%) workers had an FEV_1 less than 60% and 30 (11%) workers had an FEV_1/FVC below 75%.

Distribution, length of services, smoking and other characteristics

Fifty-four (30%) of the workers in the dusty departments of spinning and winding were detected to have byssinosis, 9/53 (17%) were affected in the weaving department and 7/41 (17%) in the other sections (Table II). The overall proportion of those affected in all the departments was 26%.

Workers who had less than 10 years of service had a 24% prevalence and those with more than 30 years of service had a 45% prevalence of byssinosis.

Twenty-two (32%) of the affected workers were smokers,

TABLE I. Age groups and departmental distribution of workers tested

Department	Age group				Total (%)
	24-34	35-44	45-54	>54	
<i>Dusty section</i>					
Spinning (Blow-rooms, card-rooms and combing)	6	15	10	2	33 (12)
Frame	5	12	16	1	34 (12)
Ring	18	33	22	3	76 (28)
Winding	2	13	18	3	36 (13)
<i>Non-dusty sections</i>					
Weaving	6	38	7	2	53 (19)
Others	3	20	12	6	41 (15)
Total (%)	40 (15)	131 (48)	85 (31)	17 (6)	273

TABLE II. Years of service of workers affected by byssinosis according to department

Years of service	Departments				Total (%)
	Dusty section	Weaving	Others	Total (%)	
0-10	24 (7)	5 (0)	5 (1)	34 (8)	24
11-20	99 (28)	39 (7)	29 (4)	167 (37)	22
21-30	40 (11)	6 (1)	4 (1)	50 (12)	24
>30	16 (8)	3 (1)	3 (1)	22 (10)	45
Total	179 (54)	53 (9)	41 (7)	273 (70)	26

Number of workers affected by byssinosis is given in parentheses

4 of whom smoked heavily. The others were non-smokers. Twenty-four (32%) of them had a chronic cough lasting more than three months and 5 had pulmonary tuberculosis which was treated with a course of antitubercular drugs.

DISCUSSION

Workers in India rarely participate actively in health promotion campaigns. This is especially true of those who work in the textile industry as they are threatened by mill closures, selling of mill land and the exit policies which have resulted from the new economic liberalization policy of the government.

Textile mills have dusty and non-dusty sections. The dusty sections include the spinning and winding sections. The former is sub-divided into a blow-room, card-room, combing, frame and ring sub-sections. Here the raw cotton is cleaned and the fibres straightened. The non-dusty sections include the weaving, processing and maintenance sections.

The mills have a first-aid centre and dispensary but workers are not checked periodically for byssinosis and no medical records are given to them. Workers from the dusty sections are rarely transferred to the non-dusty sections because they achieve skills in their respective areas. However, there is an increased dust level even in the non-dusty sections and workers there too can develop the disease.² There are about 100 000 textile workers in Bombay of whom 15-40% work in the dusty sections and according to our findings 10 000 workers probably have byssinosis.¹

Code No:

Date:.....

- 1 Name of the worker
- 4 Residential address

2 Age 3 Sex

Work and symptoms

- 5 a) Department
- b) How many years have you been working in this department?
- 6 Have you worked in any other mill? Yes/ No If yes, please give details below

S. No.	Name of mill	Department	Years of service

- 7 a) In which shift do you work? First/Second/Third
- b) Does your shift change? Yes/No
- 8 Do you smoke? Yes/No If yes, please give details
- a) For how many years?
- b) What do you smoke? Bidi/Cigarette/Other
- c) How many do you smoke in one day?
- d) If you do not smoke now, did you smoke earlier? If yes, for how many years

Byssinosis-related questions

- 1 Did you have any problem after starting work today? Yes/No
- If yes, did you have any cough? Yes/No
- Difficulty in breathing 1 Chest tightness 2 Was there any sputum? 3
- Did you have any other problem?
- 2 Do you have any problems on the first day after a weekly off? Yes/No
- If yes, what is the problem?
- Cough 1 Difficulty in breathing 2 Chest tightness 3 Cough with sputum 4
- 3 What is your experience after you join work after long leave?
- No problem when on leave 1 Problem is less on leave 2
- Problem starts or increases after joining work 3 No difference on leave or during work Yes/No
- 4 Breathing problem/Chest tightness
- First day of work 1 Everyday of work 2 At work and also at home 3
- 5 Cough
- a) Do you cough immediately after getting up? Yes/No
- b) Is this problem present for 3 months or more of the year? Yes/No
- c) For how many years have you had this problem? Less than 2 years 1 2 or more years 2
- 6 Sputum
- a) Do you cough out sputum immediately after getting up? Yes/No
- b) For how many years do you have this problem? Less than 2 years 1 2 or more years 2
- c) Do you have this problem in a particular season? Rainy 1 Winter 2 Summer 3
- 7 Breathlessness
- Grade 0 Can walk on plane with usual speed
- Grade 1 Problem while climbing
- Grade 2 Problem on plane level too
- Grade 3 Can walk upto 100 metres before forced to stop
- Grade 4 Problem even after few steps
- 8 Have you suffered from tuberculosis? Now or earlier
- Was it for more than 3 months? Yes/No
- If yes, what were the symptoms and what treatment was prescribed?

Weight: Height:

9 Lung function tests

10 Comments

FIG 1. Byssinosis questionnaire, Mumbai Textile Mill, Bombay

Our admittedly small sample size was probably because of poor worker morale. Many did not come for testing in spite of being aware that they might get compensation if they were diagnosed to be suffering from byssinosis. They were afraid that they might be declared unfit because of the illness and lose their jobs. We tried to allay their fears with the help of a group of lawyers, but were not entirely successful. This contrasts with the situation in Ahmedabad;^{2,3} the workers who had attended a byssinosis detection camp in 1985 also came in 1987. Moreover, it was a governmental organization which conducted the study, whose findings the workers thought the ESIS would have to accept. Hence the percentage of workers who participated in the Ahmedabad study was higher (90%).

We based our diagnosis both on the history and on results of lung function tests. Kamat *et al.* had diagnosed the disease based only on history² while Schilling gave importance to an FEV₁ of less than 60% of the expected value.¹ In the Ahmedabad study an FEV₁/FVC of less than 75% was considered diagnostic.^{3,4} Schilling reported a 60% incidence of byssinosis among card-room workers in England but a 27% incidence in Egypt.^{6,7} Our study showed a 30% prevalence of the disease in dusty sections comparable to world statistics. In developing countries the risk of byssinosis is greater.¹ The gradual changeover from natural to synthetic fibres will reduce the risk of occupational respiratory disease since synthetic fibres do not give rise to byssinosis.¹

We did not carry out radiological investigations because these were not necessary for the diagnosis of byssinosis¹ but may be useful in diagnosing associated diseases such as tuberculosis. That the prevalence of byssinosis would be high in the dusty sections of the mill was confirmed in our study. However, we found that the disease occurred in the non-dusty sections of the mill as well due to an overall increase in the cotton dust level in the entire factory. This was also found in Kamat's study.²

The incidence of the disease increases with the number of years of service as has been described earlier.² This may be an underestimate because many workers have had to leave their jobs after years of service following the textile strike in 1981.

We have issued medical certificates to all the affected workers. A special form regarding work-related illness was also filled in and forwarded to the ESIS. Once the medical board of the ESIS confirms existence of the disease, the workers will be eligible to file for compensation from the ESIC.

Following the Ahmedabad study the workers started getting compensation for the first time in the 150-year history of the textile industry in India.^{3,4} This encouraged workers of many textile mills in Gujarat to come together and start a 'Ban Byssinosis' campaign. Many more camps have been conducted and affected workers compensated. We hope that the workers will continue this campaign in Bombay and extend it to all the 100 000 textile workers who are at present working as well as the other 100 000 who have left the textile industry. Byssinosis is incurable and even those who have left the mills will qualify for compensation.

The best way to prevent the disease is to reduce the level of cotton dust. Mechanical equipment such as exhaust fans must be installed in the dusty sections and workers should be provided with gas masks or other protective gear. Byssinosis is caused by the leafy portion of the cotton pod and one possible preventive measure would be to pluck the cotton pod carefully leaving its leafy portion behind.^{2,4}

ACKNOWLEDGEMENTS

The Occupational Health and Safety Centre thanks the Department of Preventive and Social Medicine, Lokmanya Tilak Medical College, Sion for allowing Drs Vijaya Mhase and Ashish Mishra to join the study. We are also grateful to Harsh Jaitley of the Society for Participatory Research in Asia (PRIA), Delhi who brought the Wright's ventilometer and contributed his experience of the Ahmedabad study. Mellisa Soans of the Forum for Environment Concern (Nirmal Niketan) and Sujata Gothoskar helped during the camp and the management of the Mumbai Textile Mill who allowed the camp to be conducted in the premises of the mill. We are grateful to Rajesh Walawalkar for computer assistance.

REFERENCES

- Schilling RSF. *Byssinosis. Encyclopaedia of occupational health and safety.* Geneva:International Labour Organization, 1983:350-3.
- Kamat SR, Kamat GR, Salpekar VY, Lobo E. Distinguishing byssinosis from chronic obstructive pulmonary diseases: Results of a prospective five-year study of cotton mill workers in India. *Am Rev Respir Dis* 1981;124:31-40.
- Mukul. The dust of death—Textile workers struggle for safety. *Frontline* Feb 12 1993:82-6.
- Pandey R, Jaitley H. Byssinosis among textile workers of Ahmedabad. *OHS Bulletin.* Delhi:Participating Research in Asia (PRIA), 1992.
- Kamat SR. Lung function in Indian adult subjects. *Lung India* 1982.
- Schilling RSF, Hughes JPW, Dingwall Borydce T, Gilson JC. Epidemiological study of byssinosis among Lancashire cotton workers. *Br J Ind Med* 1956; 12:217-27.
- El Batawi MA, Schilling RSF, Valic F, Walford J. Byssinosis in Egyptian cotton industry: Change in ventilatory capacity during the day. *Br J Ind Med* 1964;21:13-19.