First report of byssinosis in Hong Kong

P G M MORGAN¹ AND S G ONG²

From the Ruttonjee Sanatorium,¹ Wanchai, and Department of Community Medicine,² University of Hong Kong, Hong Kong

ABSTRACT There has been no report of byssinosis in Hong Kong although the textile industry has been one of the leading industries for many years. Three workers with a long history of exposure to cotton dust had chronic obstructive airways disease precipitated by their work environment. One had irreversible airways obstruction but none had chronic bronchitis, emphysema, or asthma. Only one gave a history of "Monday morning tightness," and this was attributed to the fact that most of the textile workers in Hong Kong work seven days a week. It was suggested that a survey be carried out to ascertain the importance of byssinosis in the textile workers of Hong Kong and that byssinosis should there be added to the list of notifiable occupational diseases.

Byssinosis has been discovered wherever there is a flourishing textile industry. It has been reported in Europe,^{1,2} Africa,³ and Asia.⁴ Over the past 30 years the number of people working in the textile industry of Hong Kong has grown from 15 000 in 1949 to 100 800 in 1979.⁵ Today textile production is the third largest industry in Hong Kong. About 56% of this work force (as computed from the *Statistics of Establishments and Employment*⁵) are exposed to cotton dust in the course of their work—carding, stripping, weaving, and spinning. Nevertheless, there has been as yet no report of byssinosis, and it is not a notifiable or prescribed compensatable disease.⁶

Between January and May, 1980, a preliminary survey of the members of a textile union in an industrial estate (Kwun Tong) was carried out. From the findings of this survey we report three cases of byssinosis.

Case reports

CASE 1

A 56-year-old male non-smoker had worked for 23 years in the cotton industry, the last 19 years in the carding room. During this period he had worked seven days a week for 20 years except for Chinese festivals. Ten years ago he developed dyspnoea two to three hours after starting carding. The symptoms were more severe on the first day after returning to work after a Chinese festival and were alleviated by

the second or third day. Four years ago he developed an unproductive cough and exertional dyspnoea even when not at work.

Physical and laboratory findings—He was mildly dyspnoeic at rest. The anteroposterior diameter of the chest was increased, the percussion note was resonant, the air entry was reduced, and the breath sounds were prolonged on expiration. The chest radiograph showed hyperinflated lung fields and a normal cardiac silhouette. Haemoglobin was 13.0 g/dl, white cell count $14.4 \times 10^9/l$ (neutrophils 82%, lymphocytes 15%, monocytes 2%, eosinophils 1%). No sputum eosinophils were seen. Results of skin tests with various allergens were negative (*Aspergillus fumigatus*, pollens, house dust mite, cat fur, dog fur, and *D farinae*). The results of lung function studies are given in the table.

CASE 2

A 42-year-old man who smoked 20 cigarettes a day had worked in the carding department of cotton-manufacturing factories for 23 years. He had worked seven days a week for nearly 20 years. He was well until three years ago when two to three hours after starting work he experienced shortness of breath that was relieved when he left the factory. In March 1980 he had had to give up work because, over a three-month period, his dyspnoea had become severe. On stopping work his symptoms resolved.

Physical and laboratory findings—Examination showed that the respiratory and cardiovascular systems were normal. A chest radiograph showed

Received 13 August 1980
Accepted 31 October 1980

Lung function studies on three patients with byssinosis

	FEV ₁ (l)	FVC (l)	FEV ₁ /FVC (%)	RV (l)	TLC (l)	RV/TLC (%)	DLCO (ml/min/mmHg)
Case 1							
Prework	1.12	2.31	49	2.80	5.46	51	25.3
Postwork	0.85	1.65	51				
Predicted	2.88	3.16		0.87	4.11	21	32.9
Case 2							
Prework	2.31	3.40	68	1.51	4.89	31	21.1
Postwork	1.31	2.20	59				
Predicted	3.30	3.60		0.99	4.68	21	24.6
Case 3							
Prework	0.6	2.03	30	2.92	4.85	60	28.0
Postwork	0.61	1.28	48				
Predicted	2.65	2.93		0.81	3.81	21	20.5

FEV₁ = Forced expiratory volume in 1 second; FVC = Forced vital capacity; RV = Residual volume; TLC = Total lung capacity; DLCO = Pulmonary diffusing capacity.

clear lung fields and normal cardiac contour. Haemoglobin was 13 g/dl and white cell count $6 \times 10^9/l$; there was no eosinophilia. Sputum was negative for eosinophils. Skin tests with various allergens were negative (as in case 1). The results of lung function tests are given in the table.

CASE 3

A 49-year-old female non-smoker who had worked in the mule spinning department of a cotton factory for 20 years gave a 17-year history of shortness of breath occurring four to six hours after starting work. Her symptoms occurred only at work and were worse after a rest day, but after working for two or three days there was usually alleviation of her symptoms. Over the past five years her symptoms had become progressive, so that she was dyspnoeic even when not at work.

Physical and laboratory findings—She was mildly dyspnoeic at rest. The anteroposterior diameter of the chest was increased, percussion note was resonant, there was reduced air entry at the bases, and expiration was prolonged. A chest radiograph showed hyperinflated lung fields but the cardiac contour was normal. Haemoglobin was 12.6 g/dl and white cell count $6.8 \times 10^9/l$, the eosinophil count was normal and no eosinophils were detected in the sputum. Skin tests with various allergens (as in case 1) were negative. The results of her lung function tests are given in the table.

Method

Pulmonary function studies were performed before and after the subjects' usual work in the carding and spinning rooms (eight hours' exposure). The studies performed before work were carried out at least 24 hours after the last exposure. The forced expiratory volume in one second (FEV₁), forced vital capacity (FVC), and total lung capacity (TLC) were measured by the Pulmotest Godart wet spirometer (H47 104).

The diffusing capacity was determined by the single breath carbon dioxide diffusion method.

Results

The results are summarised in the table; none of the subjects had normal ventilation before exposure to cotton dust. After eight hours' work subjects 1 and 2 showed a decrease in expiratory flow rates, and all three showed a reduction in vital capacity. Case 3 had irreversible airways obstruction.

Discussion

Interestingly, although the textile industry in Hong Kong has involved a large population for many years, there has been no report of byssinosis. Is byssinosis therefore a recent development or has it been overlooked for many years?

The diagnosis of byssinosis is usually suggested by a typical history of "Monday tightness" in the cotton workers and reduced expiratory flow rates (see below), but there are no specific features on physical examination or on radiological examination of the chest. It is possible that byssinosis has been overlooked because of the (unique) working habits among textile workers in Hong Kong, where, unlike the mills in England, textile factories operate seven days a week. The labour law of Hong Kong entitles the employee a rest day of one in seven and 10 statutory holidays a year. The option is also given for him to work on a rest day if he chooses so to do.⁷ Many of the textile workers work seven days a week and have done so for many years; days off work occur at irregular intervals and coincide with the major Chinese festivals (Chinese New Year, Mid-Autumn Festival). The typical Monday tightness is therefore usually absent and may even be denied on direct inquiry. The continued exposure to cotton dust may cause in the susceptible individual the gradual development of dyspnoea with subsequent irrevers-

ible changes in respiratory function.

Lung function studies of workers with byssinosis usually show a decrease in expiratory flow rates and vital capacity after three to four hours' exposure to cotton dust, with less effect on the subsequent working days.⁸ A reduction in FEV₁ and FVC were observed in all three cases, but the decrease in expiratory flow rate was abolished after moving from the dust in only cases 1 and 2. Case 3 showed irreversible airways obstruction. It has been suggested from patients' histories that acute byssinosis becomes chronic, although this has not been proved from prospective studies.⁹ Byssinosis has been associated with chronic bronchitis¹⁰ and is said to be more common in workers who smoke.^{11 12} Indeed, the post-mortem changes observed in lungs of victims of byssinosis are those of chronic bronchitis. None of the three cases, however, fulfilled the criteria for chronic bronchitis,¹³ nor was there evidence to suggest that the workers had emphysema or asthma. Their airways obstruction can be explained in terms of chronic byssinosis.

Probably there are many more cases of byssinosis among cotton workers in Hong Kong, who present with features of chronic obstructive airways disease but in whom the characteristic history is not obtained. It is essential that a survey is performed to define the importance of byssinosis in the textile industry in Hong Kong and in view of the pathogenesis and irreversible late effects of byssinosis it should be added to the list of notifiable compensable occupational diseases.

We are indebted to Professor M J Colbourne for his helpful advice and review of the manuscript and Mrs

T Lam for her secretarial help.

References

- ¹ Schilling RSF. Byssinosis in cotton and other textile workers. *Lancet* 1956;ii:261-5.
- ² Balin L, Bouhuys A, Hoekstra W, Johansson MB, Lindel SE, Pool J. Byssinosis in cardroom workers in Swedish cotton mills. *Br J Ind Med* 1965;22:101-8.
- ³ El Batawi MA. Byssinosis in the cotton industry of Egypt. *Br J Ind Med* 1962;19:126-30.
- ⁴ Tsai SY. Study of byssinosis in cotton textile workers in Taiwan. *J Formosan Med Assoc* 1964;63:10-5.
- ⁵ Hong Kong Census and Statistics Department. *Statistics of establishment and employment*. Hong Kong: Government, September 1979:1-5.
- ⁶ Hong Kong Labour Department. *Guide to workmen's compensation legislation*. Hong Kong: Government, 1978:9-11.
- ⁷ Hong Kong Labour Department. *A concise guide to the employment ordinance*. Hong Kong: Government, 1978:9-11.
- ⁸ Lammers B, Schilling RSF, Valic F, Walford J. A study of byssinosis chronic respiratory symptoms and ventilatory capacity in English and Dutch cotton workers, with special reference to atmospheric pollution. *Br J Ind Med* 1964;21:124-34.
- ⁹ Bouhuys A, Barbero A, Schilling RSF *et al.* Chronic respiratory disease in hemp workers. *Am J Med* 1969;46:526-37.
- ¹⁰ Molyneux MKB, Tomblinson JBL. An epidemiological study of respiratory symptoms in Lancashire mills, 1963-6. *Br J Ind Med* 1970;27:225-34.
- ¹¹ Bouhuys A, Wolfson RL, Horner DW, Brain JD, Zuskin E. Byssinosis in cotton textile workers. *Ann Intern Med* 1969;71:257-69.
- ¹² Zuskin E, Wolfson RL, Harpel G, Welborn JW, Bouhuys A. Byssinosis in carding and spinning workers. *Arch Environ Health* 1969;19:666-73.
- ¹³ Medical Research Council Report of the Committee on the Aetiology of Chronic Bronchitis. Definition and classification of chronic bronchitis for clinical and epidemiological purposes. *Lancet* 1965;i:775-9.