Original

Self-reported disease conditions among workers of the textile mill in Bahir Dar, Northwest Ethiopia

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Abstract: This cross sectional study was conducted among textile mill workers in Bahir Dar city of Northern Ethiopia in 1995/96. The main objective of the study was to examine the nature and magnitude of self reported disease conditions and to assess the distribution of health problems by work departments. A pretested questionnaire was administered by trained health professionals to 394 production workers. In a period of one month, 72 workers complained of one or more respiratory symptoms. The odds of having respiratory symptoms in the Spinning

Department was about twice that of the Weaving Department and the difference was statistically significant (P<0.05). Periodic screening of workers for common health problems should be conducted and preventive measures should be undertaken, the Spinning Department needing the utmost attention. [*Ethiop. J. Health Dev.* 1999;13(2):151-156]

Introduction

Adverse health effects of cotton dust occur in a majority of textile workers in dusty mills. The major health problems associated with cotton dust are respiratory problems which include byssinosis, cough, bronchitis and bronchial asthma (1,2). The above problems are highly prevalent in mills of developing countries such as Ethiopia (3-5), Sudan (6,7), Egypt (8), Central Africa (9), and to a lesser extent, in South Africa (10), India (11,12), and China (13). In these countries sickness absence due to respiratory problems has also been reported to be high (14,15). In developed countries, however, modern mill engineering and dust control measures have kept respiratory problems significantly low (16,17). Even where the dust concentration is low, the well-being of workers can be affected by other contaminants of cotton. For example, ocular and nasal irritations in workers in spinning mills of cotton have been reported (18). These symptoms were not related to dust concentration or respiratory disease but to as yet undefined agents unrelated to cotton dust (18). The respirable cotton dust implicated in the pathogenesis of adverse health effects is a heterogeneous mixture of plant parts, soil particles, and microbial contaminants.

Other disease conditions related to working in textile mills are musculoskeletal pain, headache, easy fatigue, and changes in blood pressure (20,21).

At the Bahir Dar Textile Mill, the dust concentration measured by a vertical elutriator ranged from 0.86 mg/m3 to 3.52 mg/m3 in different sections of the mill (3). These concentrations were 4-17 times higher than the permissible concentration of 0.2mg/m3 recommended in 1983 by the American Conference of Government Industrial Hygienists (ACGIH) (19). Despite an attempt to retrofit current ventilation system in the early 1980s, plant officials have stated that the dusty environment has remained unchanged since the mill was established.

The main objective of this study was to examine the nature and magnitude of self- reported disease conditions among workers of the Bahir Dar Textile Mill and assess the distribution of common complaints by work sections.

Methods

This cross sectional study of disease conditions reported by workers in a textile mill in Bahir Dar city, northwest Ethiopia, was conducted in 1995/96. There were 1604 production workers in the different sections of the factory. Production workers are those involved in the direct processing of textile materials. Sample size was determined with 95% confidence level, 50% disease/symptom prevalence, acceptable difference of 5% and contingency 20% to compensate for possible potential non-response. Prevalence of 50% was chosen to obtain maximum sample size in the absence of estimates. A sample size of 372 was calculated while the actual number of the study population was a little more (394). Stratified sampling was used to select the study population. Although a total of eight different sections were noted by the factory management, the sections were categorized into three departments based on the similarity of the jobs. Thus, those sections dealing with the spinning of textile were categorized as Spinning Department and those engaged in the weaving process as Weaving Department. The third department was the Finishing Department. Then a simple random sample of respondents was selected in each section proportional to the size of the department. Table 1 shows the population size in each department and the sample size selected.

A structured questionnaire was developed on the socio-demographic characteristics of the workers, disease symptoms experienced, health
problems detected earlier, and conditions that aggravate disease symptoms. Common disease symptoms of the respiratory tract, usculoskeletal and cardiovascular systems were listed and the workers were asked if they experienced each symptom or any other during the previous one month. The questionnaire was pretested on a sample of workers not included in the final study and it was administered by health workers who were trained by the investigators in techniques of interviewing. Written and verbal consent was obtained from the factory manager and all respondents, respectively. Data were entered and analyzed using the statistical package EPI INFO. Proportion of workers with reported diseases and disease symptoms in the different departments were calculated. Odds ratios and 95% confidence intervals were used to assess the degrees of association of reported symptoms with work department.

Results

Socio-demographic characteristics of the study population is shown in Table 2. The mean age of the workers was 44.2 $\pm$ 6.5 years. About 55% were males. The majority of the respondents were married and the mean monthly family income was Birr 337 $\pm$ 104 (range 90 - 1006). About 18% were unable to read or write.

There were only few smokers (2.5%) in the study population. Average duration of smoking was 11.2 years and the average number of cigarettes smoked in a day was The odds of having a respiratory symptom in the Spinning Department was about twice that of the Weaving Department and the difference was statistically significant ($P<0.05$). One hundred ninety eight workers (48.2%) complained that they had respiratory tract or eye irritation from cotton dust and 36 (9.1%) said that they believed such irritations were from chemicals (Table 5).

Twenty six (6.3%) respondents claimed to have one or more symptoms related to the musculoskeletal system (back pain, pain or stiffness of limb, pain or numbness of hand or wrist). There was no

statistically significant association between presence of a musculoskeletal complaint and working department (Table 6). Among the diseases reported by the workers, bronchial asthma 41 (10.4%), bronchitis 21(6.3%), and tuberculosis seven (1.8%) were the most common. Fifty two workers (13.2%) associated the disease or the symptoms they reported with the work in the mill.

Discussion

The study population of this investigation comprised of workers who had been exposed to high levels of cotton dust over many years. Mean duration of exposure was high (25.4 $\pm$ 7.1 years) and labour turnover was very low.

The most frequent complaints reported by the workers within a period of one month were symptoms related to the respiratory system. The most common respiratory health problems they suffered from were bronchial asthma, bronchitis and tuberculosis. This is expected from dusty work environment such as the Bahir Dar Textile Mill, although it is difficult to make firm conclusions about the prevalence of these problems compared to the general population because of lack of controls. Dust concentrations in the various sections of this mill measured previously were much higher than the permissible concentration (3). The lowest levels found in the Weaving Department were about 20% higher than the limit levels for industrial weaving units. The dust concentration observed in the spinning areas were up to 17 times higher than the recommended standard (3). Thus, the complaint by the workers that cotton dust is the most common irritating agent is in conformity with high dust levels in this mill. In this study the odds of having respiratory symptoms in the Spinning Department was twice that of the Weaving Department for reasons mentioned above.

The number of smokers in the factory was too small to allow comparison by disease symptoms or departments. Musculoskeletal complaints had relatively low prevalence and there was no statistically significant association between working department and musculoskeletal complaints. Whether this is because the workers in this mill are not highly exposed to physical labour affecting the musculoskeletal system or not needs further investigation.

Generally, data on the prevalence of the symptoms reflected in this study in the general population of Bahir Dar are scarce. A study done by Abebe and Seboxa revealed that chronic cough was significantly higher among textile workers compared to controls (4). In developed countries, respiratory diseases have shown a declining trend due to the introduction of dust control measures in textile mills.

developing countries, however, respiratory diseases are still found in a high percentage of textile workers. In India, a mean prevalence of 36-60% respiratory problems was reported in the Spinning Department (11). Similar studies in South Africa (15), Central Africa (17), Sudan (20, 21), and Egypt (22) have shown high prevalence of respiratory diseases.
Only 52 (13.2%) workers associated the diseases or the symptoms they reported with the work in the mill. The long duration of work in the mill had perhaps influenced the responses. As the respondents have worked in the mill for so long, it might be difficult for them to associate a disease or symptom with work in the mill or not.

In conclusion, the most important health problems are respiratory and the spinning department needs the utmost attention. It is of paramount importance to implement protective measures such as instillation of hoods and dust filters, ventilators and the use of vacuum cleaners especially in the Spinning Department. Periodic screening test for common health problems in the mill should also be conducted.

References

1. Schilling RSF. Byssinosis in cotton and other textile workers. Lancet 1956;2:261-5.

2. Molyneux MKB, Tombleson JBL. An epidemiological study of respiratory symptoms in Lancashire mills, 1963 - 66. Br J Ind Med 1970;27:225-34.

3. Woldeyohannis M, Bergevine Y, Mgeni AY, Theriault G. Respiratory problems among textile mill workers in Ethiopia. Br J Ind Med 1991;48:110-5.

4. Abebe Y, Seboxa T. Byssinosis and other respiratory disorders among textile mill workers in Bahir Dar, northwest Ethiopia. Ethiop Med J 1995;33:37-49.

5. Seboxa T, Abebe Y. Byssinosis and tuberculosis among textile mill workers in Bahir Dar, Ethiopia. Trop Geog Med 1994;46(3):180-3.

6. Awaad Elkarim MA, Osman Y, El Haimi YAA, Byssinosis: environmental and respiratory symptoms among textile mill workers in Sudan. Int Arch Occup Environ Health 1986;57:101-8.

7. Awaad Elkarim MA, Onsa Slieman H. Prevalence of byssinosis and other respiratory symptoms among spinners in Sudanese cotton mills. Am J Ind Med 1987;12:281-9.

8. Noweir MH, Noweir KH, Osman HA, Mosheli M. An environmental and medical study of byssinosis and other respiratory conditions in the cotton textile industry in Egypt. Am J Ind Med 1984;6:173-83.

9. Takam J, Nemery G. Byssinosis in a textile factory in Cameroon: a preliminary study. Br J Ind Med 1988;45:803-

10. White NW. Byssinosis in South Africa. A survey of 2411 textile workers. S Afr Med J 1989;75:435-42.

11. Parih JR, Bhjagia LJ, Majmudar PK, Shah AR, Kashyap SK. Prevalence of byssinosis in textile mills in Ahmedabad, India. Br j Ind Med 1989;46:787-90.

12 Gupta Saroj, Gupta BK. A study of byssinosis and associated respiratory disorders in cotton mill workers. Ind J Ches Dis Allied Sc 1988;28:183-8.

13 Christiani DC, Eisen EA, Wegman DH. Respiratory disease in cotton textile workers in the People's Republic of China. Respiratory symptoms. Scan J Work Envron Health 1986;12:40-5.

14 Weiss KB, Gergen PJ, Wagener DK. Breathing better or wheezing worse? The changing epidemiology of asthma morbidity and mortality. Annu Rev Public Health 1993;14:491-513.

15 Post WK, Burdorf A, Bruggeling TG. Relations between respiratory symptoms and sickness among workers in the animal feed industry. Occup Env Med 1994;51:440-46.

16 Cinkotai FF, Rigby A, Pickering CAC, Seaborn D, Faragher E. Recent trends in the prevalence of byssinotic symptoms in the Lancashire textile industry. Br J Ind Med 1988;45:728-9.

17 Merdit SK, Taylor VM, McDonald JC. Occupational respiratory diseases in the United Kingdom 1989: a report to the British Thoracic Society and Society of Occupational Medicine by the SWORD Project Group. Br J Ind Med 1991;48:292-8.

18 Fishwick D, Fletcher AM, Pickering CA, Niven RM, Farghen EB. Ocular and nasal irritation in Lancashire cotton and synthetic fiber mill. Occup Environ Med 1994;51(11):744-8.

19 American Conference of Governmental Industrial Hygienists. Threshold limit values. Cincinnati: ACGIH, 1983.

20 Hernigton JM. Work related diseases and injuries. BMJ 1991;908-10.

21 Shilling RSF. Health protection and promotion at work. Br J Ind Med 1989;46:683-88.

Table1: **Distribution of textile mill workes by departments, Bahir Dar, NorthWest Ethiopia, 1995/96.**

Department	Total employees in department	Sample form department No(%)	Percent of total in department
Spinning	619	152(38.6)	24.6
Weaving	753	185(46.9)	24.6
Finishing	232	57(14.5)	24.6
Total	1604	394(100.0)	24.6

Table 2. **Sociodemographic characteristics of workers at Bahir Dar textile mill, NorthWest Ethiopia, 1995-96 (n=394)**

Characteristics	Frequency	percent
Age	11	2.8
20-29	65	16.5
30-39	232	58.9
40-49	86	21.8
50-59		
Sex	216	54.8
Male	178	45.2
Female		

Marital status	332	84.3
Married	11	2.8
Single	29	7.4
Divorced	22	5.6
Widowed		
Family size	39	9.9
1-3	132	33.5
4-6	138	35.0
10 and above	80	20.3
missing	5	1.3
Monthly family income in birr*	20	5.1
90-2000	142	36.0
201-3000	156	39.6
301-400	62	15.7
401-500	14	3.6
501-1006		
Educational status	71	
Illiterate	233	
Completed grades 1-6	81	18.0
Completed grades 7-12	9	59.1
Above grade 12		20.6
		2.3

* 1 US $= 6.9 birr

Table 3: **Diseases symptoms experienced by workers of Bahir Dar textile mill, northwest Ethiopia during a period of one month. (n=394)**

Symptoms	Frequency	Prevalence percent (95% CI)
Cough	60	15.2(11.7, 18.7)
Headache	50	12.7(11.4, 16.6)
Dyspnea	26	6.6 (4.1, 9.1)
Back pain	17	4.3 (2.3, 6.3)
Wheezing	14	3.6 (1.6, 5.6)
Phlegm	12	3.0 (1.3, 4.7)
Pain or stiffness in lower limb	12	3.0(1.3, 4.7)
Sore throat	9	2.3 (0.8, 3.8)
Shoulder pain	9	2.3 (0.8, 3.8)
Pain or numbness on hand or wrist	7	1.8 (0.5, 3.1)

Table 4: **Distribution of respiratory tract complaints by working department among Bahir Dar textile mill workers northwest Ethiopia,1995/96.**

Department	Total	Respiratory Symptom			
Weaving*	152	Yes	No	%	OR 95% CI
		21	131	13.8	
Spinning	185	43	142	23.2	1.9 (1.1,3.5)**
Finishing	57	8	49	14.0	1.9 (0.8,4.6)
Total		72	322		

* Referent category OR= odds Ratio
** P<0.05 CI= Confidence Interval

Table 5: **Complaints of irritation of the eye or respiratory tract by different agents in a period of one month prior to**

data collection by Bahirdar textile mill workers, NorthWest Ethiopia, 1995-96*. (n=394)**

Irritating agent	Frequency	percent
Cotton dust	198	48.2
Chemicals	36	9.1
Steam form hot iron	2	0.5

*These are not necessarily new occurrences in a period of one month.

** One hundred fifty eight workres did not have complaints of irritation by different irritating agents in the mentioned period Table 6: **Distribution of musculoskeletal complaints by department among Bahir Dar textile mill workers, northwest Ethiopia, 1995-96**

Department	Musculoskeletal complaint		OR (95% CI)
	Yes	NO	
Weaving *	13 (7.0)**	172(93.0)**	0.9 (0.4,2.4)
Spinning	10 (6 . 6)	142(93.4)	0.5 (0.07 ,2.4)
Finishing	2 (3 . 5)	55 (96.5)	
Total	29 (6.3)	369 (93.7)	