

■ **Original Articles**

Respiratory morbidities of jute mill workers in Nepal

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Abstract

Background: Occupational safety, health and working conditions indicate that there are potential risks of health hazards and diseases at workplaces. Jute processing yields dust. Respiratory symptoms are common among workers exposed to high dust area. **Objectives:** To find out respiratory morbidities among jute mill workers and to compare the rate of peak expiratory flow among jute mill workers. **Methods:** Cross-sectional study was conducted among 900 workers in jute processing departments of Arihant multi-fibres Ltd., Sonapur, Sunsari, Nepal. Pre-tested semi-structured questionnaire were used. Peak expiratory flow rate (PEFR), height and weight were measured. Proportion, chi-square test and odd ratio were calculated. ANOVA was applied. **Results:** About 24 % workers belong to 25-29 years of age. Around 21% and 86% workers were smokers and tobacco chewers respectively. Two fifth of workers (41.6%) were working for less than 5 years. Acute upper respiratory infection (14.2%), chronic bronchitis (0.3%), acute lower respiratory infections (0.77%), allergic rhinitis (0.1%) and asthma (0.4%) were the respiratory morbidities among the workers. Chest tightness was found among 7 workers. Difficulty in breathing was found among 26 workers. The PEFR variations were found significant among workers in the low and high dust area and without and with symptom of cough. Association between cough and exposure to dusty area was shown to be statistically significant ($p < 0.05$). **Conclusion:** Acute respiratory problems predominates the chronic problem. The risk of having cough in high dust area is higher.

Keywords: respiratory morbidities, jute mill, Nepal

Introduction

People face numerous hazards at work. Occupational risks alone account for 1.7% of DALYs lost worldwide. Occupational exposure to airborne particulates is estimated to cause 12% of deaths due to chronic obstructive pulmonary disease.¹ The World Health Report 2002 places occupational risks as the tenth leading cause of morbidity and mortality. Almost 22.5 million DALY and 699 000 deaths are attributable to these risk factors. The dust-

related deaths are placed at 243,000. Occupational health is of major concern in the South-East Asia Region.²

Current occupational safety, health and working conditions indicate that there are potential risks of health hazards and diseases at workplaces in the industrial establishments.³

Arihant Multi- fibers Ltd. is the largest and modern jute mill located in the Dharan- Biratnagar industrial corridor of eastern Nepal.⁴ The workers are involved in jute processing departments like batching, drawing, spinning, winding, twisting, beaming, reeling, weaving, and finishing to yield final products. The monitoring of the environmental conditions suggested that the softening and batching processes were dusty and the mean dust concentration was 18.33 mg/M cube.

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The main subjective complaints prevalent among the workers were cough, expectoration, breathlessness, headache and nasal blockage.⁵

The relationship of PEFr with age, height, duration of exposure and smoking habit were also studied in jute mill workers of Calcutta.⁶

Occurrence of byssinosis was shown among jute mill workers particularly in those who are exposed to high concentrations of dust for a longer period.⁷

In Nepal, the second long-term health plan (1997-2017) has identified occupational health as priority and addressed chronic respiratory disease, accident, cancers, eye and skin diseases and hearing loss.⁸

High respiratory problem among workers (38%) was found in a jute mill of eastern Nepal.⁹

This study was conducted to find out respiratory morbidities and compare rate of peak expiratory flow among jute mill workers.

Methods

A cross sectional study was carried among 900 Jute mill workers from Arihant Multi-Fibers Ltd. Sonapur, Sunsari, Nepal. Non probability sampling technique was applied to select the samples from jute processing departments like batching, drawing, spinning, winding, twisting, beaming, reeling, weaving, and finishing. Department of batching is called as high dust area as compare to others. Subjects as trainees, working other than in jute processing department, not willing to participate and not giving verbal consent were excluded from the study. Data was collected using pre-tested semi structured questionnaire along with physical examination. Already diagnosed respiratory conditions were considered as per the available prescription or verbal reporting. Peak expiratory flow rate was measured by Vitalograph peak expiratory flow meter.¹⁰ Height and weight were measured.¹¹

The collected data was entered in dBASE and analysis was done using in SPSS V12.0. Percentages and proportions were calculated. Independent t-test and ANOVA were used to see the mean PEFr variations among workers. Chi-square test was applied to see the association between exposure and respiratory symptom. The odd ratio was also calculated.

Result

Table 1 shows that maximum number (23.8%) of the workers belong to 25-29 years of age. Females constituted about 16 %. Around 17% workers were illiterate.

Table 1: Distribution of the workers according to age, sex and literacy status (N=900)

Characteristics		Number of workers	Percentage
Age	> 20 years	46	5.1
	20-24 years	171	19.0
	25-29 years	214	23.8
	30-34 years	190	21.1
	35-39 years	119	13.2
	40-44 years	79	8.8
	45-49 years	45	5.0
	≥ 50 years	36	4.1
Sex	Male	755	83.9
	Female	145	16.1
Literacy Status	Illiterate	156	17.3
	1-5 Class	266	29.6
	6-10 Class	365	40.6
	SLC and above	113	12.6

Around 21% of workers were current smokers while 86% of the workers were tobacco chewers. Alcohol intake was reported by 35.6% workers (Table 2).

Table 2: Personal habits of the jute mill workers

Personal Habit		Male % (n=755)	Female % (n=145)	Total % (N=900)
Smoking Status	Current smoker	24.5	4.8	21.3
	Non Smoker	68.5	93.8	72.6
	Ex Smoker	7.0	1.4	6.1
Tobacco Chewing	No tobacco Chewing	47.2	86.9	53.6
	Tobacco	52.8	13.1	46.4
Alcohol Intake	No alcohol Intake	58.7	94.5	64.4
	Alcohol intake	41.3	5.5	35.6

Most (41.6%) of the workers were working for less than 5 years. Around 14 % workers were busy in high dust area (Table 3).

Table 3: Distribution of workers according to employment duration and working area (N=900)

Characteristics		Number	Percentage
Duration of work in years	< 5 years	374	41.6
	5-9 years	279	31.0
	10-15 years	247	27.4
Working area	High dust area	130	14.4
	Low dust area	770	85.6

Among the mill workers 14.2% suffered from acute upper respiratory infection. Chronic bronchitis (0.3%), acute lower respiratory infections (0.77%), allergic rhinitis (0.1%) and asthma (0.4%) were the respiratory morbidities among the workers. Difficulty in breathing was reported by 26 workers (2.8%). Figure 1 shows difficulty in breathing situations among them. Six workers pointed out overwork for difficulty in breathing. Four workers suffered difficulty in breathing most of the days of the week.

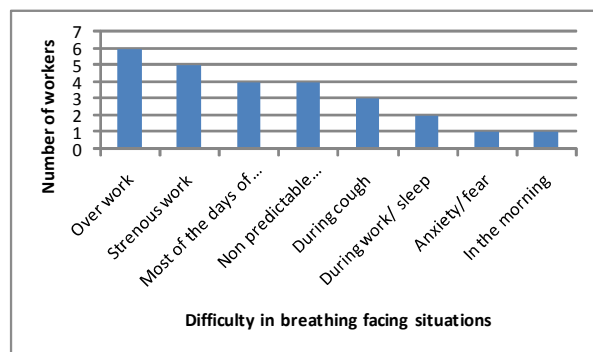


Figure 1: Difficulty in breathing facing situations among the workers (n=26)

Chest tightness was reported by 7 workers (0.8%). Three of them suffered chest tightness to most of the days of the week. Two could not predict the situation for the chest tightness. Two workers reported over work and strenuous work were the situations for the occurrence of chest tightness. Mean PEFR variations were highly significant in age, sex, height and weight categories of the workers ($p < 0.001$).

Table 4 shows that mean PEFR among workers in the low dust area and without symptom of cough was significantly higher as compared to the workers in high dust area and with symptom of cough.

Table 4: Comparison of PEFR among the jute mill workers (N=900)

Characteristics		No. of workers	PEFR (Mean \pm SD)	p value
Exposure Area at work	High dust	130	435.00 \pm 91.67	<0.001
	Low dust	770	472.21 \pm 85.32	
Cough Symptoms	Yes	138	453.19 \pm 86.09	<0.05
	No	762	469.30 \pm 87.23	

Association between cough and exposure to high dust area and low dust area was shown to be statistically significant ($p < 0.05$). The exposure to high dust area showed a risk of having cough symptom was 1.64 times higher than that of low dust area {Odds ratio: 1.64, CI (1.03 – 2.62)} (Table 5).

Table 5: Relationship between dust exposure and cough among the workers (N=900)

Dust exposure	Cough		Total	X ²	p value
	Present	Not present			
High dust area	28	102	130	4.50	<0.05
Low dust area	110	660	770		
Total	138	762	900		

Discussion

The main objective of this study was to find out respiratory morbidities and compare rate of peak expiratory flow among jute mill workers. Nine hundred workers were enrolled in the study. High activity rate was observed at age 25-29 years (23.8%) followed by 30-34 years (21.1%), 20-24 years (19%) and 35-39 years (13.2%). Most (82.7%) of the workers were literate. Around 21 % of workers were current smokers while 86% of the workers were tobacco chewers. Alcohol intake was reported by 35.6% workers.

Almost 16 % workers suffer from respiratory problems. Acute upper respiratory infection (14.2%), chronic bronchitis (0.3%), acute lower respiratory infections (0.77%), allergic rhinitis (0.1%), asthma (0.4%) were revealed among the workers. Respiratory problem among jute mill workers was shown as high as 38% in a jute mill of eastern Nepal.⁹

But in our study only 16 % workers had the respiratory problem.

History of chronic bronchitis was found among 23.73 percent male and 4.76 percent female workers.⁵ In another study conducted among 95 workers of a jute mill, chest pain (34.7%), cough with sputum (11.58%), dry cough (7.37%), nasal catarrh (3.16%), breathlessness (2.11%) were major respiratory symptoms.¹²

Chest tightness was also found in 0.8% of workers and that was not of typical byssinotic symptom. Difficulty in breathing was also found in 2.8% of the workers but not a single case was reported of typical byssinotic chest tightness or difficulty in breathing representing byssinosis. Monday chest tightness and wheeze were rare complaints among the jute workers in African jute factory.¹³ However, 22.8% workers were detected as having a typical byssinotic chest tightness in Indian jute mill.¹⁴ In another study among Indian jute mill workers it was shown that 21 (14.2%) workers had byssinotic type respiratory symptoms like chest tightness, cough, breathlessness and difficulty in breathing after the weekend break on Monday.⁷ Typical byssinotic symptoms, along with acute changes in post shift forced expiratory volume in 1 s (FEV1.0) (31.8%) was also studied among jute mill workers.¹⁵ The duration of dust exposure might have role in the occurrence of chronic respiratory effect. The differences in the findings may be the duration of exposure being less in our study population as compare to the study done by others.

Our study revealed that PEFR values were affected by age, sex, height and weight. Similar variation was observed in North Indian population.¹⁶

We observed that mean PEFR among workers in the low dust area was significantly higher as compared to the workers in high dust area ($p < 0.001$) and mean PEFR among the workers with symptom of cough was significantly lower than among the workers without cough ($p < 0.05$). Studies had revealed that FVC, FEV1 and PEFR were significantly ($p < 0.001$, $p < 0.01$ and $p < 0.05$) lower in high dust exposure group in comparison to low dust exposure group.^{7,17} Likewise, all pulmonary function parameters of jute mill workers were found to be significantly reduced except FEV1/FVC.¹² A study on textile mill workers in Bangladesh showed statistically significant low PEFR was identified

among workers with symptoms of cough, chronic bronchitis and/or asthma, chest tightness or breathlessness.¹⁸ Exposure of dust and plant source fine particulate matter among Bengali workers had lower PEFR, PFI and VO2 max (maximum oxygen intake) values than controls.¹⁹ Those studies showing effect of dust to pulmonary function were comparable to our study, but our study was limited to peak expiratory flow meter to know changes in airways calibre.

Our study shows the association between cough and exposure to high dust area and low dust area which was statistically significant ($p < 0.05$). The exposure to high dust area showed risk of having cough symptom 1.64 times that of low dust area {Odds ratio: 1.64 (CI, 1.03 – 2.62)}. Similarly, it was described that the respiratory symptoms was significantly higher ($p < 0.05$) in high dust exposure group as compared to low dust exposure group.⁷ In a prospective study, it was said that exposure to jute dust might cause the development of chronic respiratory symptoms in workers.²⁰ Measurement of organic dust concentration and bacterial endotoxin in airborne dust were done and related to chronic respiratory effect in some studies.^{15,21,22} However, jute dust concentration and bacterial endotoxin level in airborne dust were not measured in our study.

Exposure of jute dust might have adverse effect in respiratory tract. Studies had related jute dust to respiratory symptoms.^{23, 24}

Conclusion

Acute respiratory problem predominates the chronic ones. High dust could be the risk factor for the occurrence of cough in the jute mill workers. Jute dust could deteriorate pulmonary function. Identification of susceptible workers, engineering and administrative controls and practice of personal protective device could prevent respiratory morbidities among jute mill workers.

Acknowledgement

We would like to acknowledge all the participants of the study & Arihant Multi-Fibers Ltd. We also express our gratitude to the support given by all the members of School of Public Health & Community Medicine, BPKIHS, during conduction of the study and special thanks to Dr. Ishwari Sharma Paudel and Dr Shyam Sundar Budhathoki.

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