ORIGINAL ARTICLE

Bronchial Asthma among Sawmill Workers

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Abstract

This is a cross-sectional study among the sawmill workers working 3 years and above around the Rajshahi metropolitan city. Lung function test was measured by microspirometer and percentage of FVC / FEV_1 was calculated that confirms the diagnosis of asthma of occupational origin. 409 sawmill workers were examined from 47 timber workshops. Job duration among workers ranged from 3 - 38 years and the age of workers ranged from less than 18 - 58 years and above. Rhonchi is present in 19(6.65%) workers. 164 sawyers were experiencing cough in the morning and at night. 65 (15.89 %) workers were productive of mucoid and watery phlegm and 44 (10.76 %) workers were discharged purulent phlegm. Percentage of FVC / FEV_1 was decreasing as the duration of job advances. In this diagnostic calculation 3 workers were suffering from occupational asthma and another 13 workers were considered advancing towards asthmatic suffering from this occupational origin. Maximum workers were working without any personal protective equipment (PPE) (358, 87.53 %) and few (51, 12.47 %) of them were using PPE. It is observed that ratio of FVC / FEV_1 is also declined gradually among the non-user of PPE were considered prone to be sufferer from occupational asthma.

Key words : Bronchial asthma, Sawmill worker

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Introduction

Occupational asthma is a disorder with generalized obstruction of the airways, usually reversible, and caused by inhalation of substances or materials that worker manufactures or uses directly, or that are incidentally present at the worksite.[1]

Clinically asthma is manifested by chest tightness, cough, wheezing, rhonchi and shortness of breath.[2]

Substances of vegetable origin are probably most commonly reported causes of reversible airway disease in industry. Carpenters, joiners and sawmill workers can be sensitized to sawmill dusts, fungal spores and substances used in treatment of wood. In particular, wood dusts implicated include cedar, oak, mahogany, oroko, keejat, quilaja bark, African zebra wood and western red cedar. [3,4,5]

In Bangladesh, there are varieties of wood used in household furniture, construction purposes e.g., mango, black berry, neem, mangosteen, woodapple, mahogany, sishu, jack fruit etc. But incriminated wood dust is not detected and intensity of suffering also not identified though thousands of sawmill workers are engaged in this occupation.

In a recent epidemiological investigation with western red cedar (WRC), a high prevalence of asthma was observed among workers in jobs with greatest dust exposure-sawyers, packers, chippers and splitters.[6]

A study conducted by Department of Chest Medicine, Hospital du Sacrecoeur, Montreal, Canada presented 3 cases of occupational asthma caused by oak wood dust. The diagnosis reconfirmed by specific inhalation challenges.[7]

Another study taking 18 years old man who worked in furniture factory of Denmark reported rhinitis and asthma when he was exposed to wood dusts. That was confirmed by a series of tests.[8]

In 1936, Bridge described the effects of bronchial

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spasm in men handling mansonia wood (stercolicea altissima). Another study done by Davidson in 1941 reported 9 cases of asthma, coryza, conjunctivitis in men exposed to saw dust from iroko wood (chlorophora excelsa). [9]

Doig in 1949 had conducted another study and recorded two small outbreaks of asthma in factories where western red cedar (thuja plicata) was handled. Asthma, hypersensitive pneumonitis and alveolitis also found. [10,11,12]

The majority of workers developed WRC asthma within 3-5 years of continuous exposure, but 19% of workers with asthma were employed for more than 10 years.[2]

This study was desigined to reveal the proportion of occupational asthma cases in relation to standard of working environment, PPE used, employers' health measure for their workers. The result findings will help the concerned health authority to initiate a surveillance of industrial working environment and to provide healthful working atmosphere for prevention of occupational health hazards to her poor citizen.

Objectives

1. General Objective :

   To find out the proportion of workers suffering from occupational asthma in saw-mill.

2. Specific Objectives :

(i) To find out the workers with occupational asthma by examining the respiratory health for diagnosis clinically.

(ii) To assess the occupational environmental factors responsible for the asthma of the sawmill workers.

(iii) To assess the level of worker's knowledge for preventing the occurrence of the disease.

Materials and methods

For the cross-sectional study of the occupational asthma among saw mill workers engaged in wood splitting operation for a period more than 3 years in timber workshops around Rajshahi city corporation. Available sawmills of all adjacent areas of this city were surveyed. A pretested designed questionnaire was used to gather information regarding worker's occupational history, place and environment of sawing, uses of personal protective equipment, educational level and the knowledge of health hazards of the workers, aspects of respiratory sufferings and physical sufferings other than respiratory illness etc. Random sampling method was adopted to include 47 sawmills from the sampling frame and 409 sawmill workers were selected randomly for the study. Microspirometer was used to measure FVC and percentage of FVC/FEV_1 that confirmed the diagnosis of asthma of occupational origin. Peak flow is the maximal expiratory air flow rate sustained by a subject for at least 10 milliseconds expressed in liter/minute. Occupational asthma is one of the obstructive lung diseases. Occupational history and presence of lung lesions detecting by stethoscope is the simplest way to find out the asthma sufferers. Readings from peak flow meter may compliment the diagnosis. The findings were categorized, arranged and presented by tables and charts according to objectives of the study.

Results

Relevant clinical features of occupational asthma among sawmill workers were studied and found several workers are suffering from such asthmatic attack during their works. These findings have tabular and graphic presentation with a discussion.

Table I : Worker's age and job duration

Job duration in years	Age in years						Total
	Less than 18	18-27	28-37	38-47	48-57	58 +	
3 - 7	5	27	11	10	3	4	60
8 - 12	0	14	52	14	2	4	86
13 - 17	0	1	45	19	4	0	69
18 - 27	0	1	32	78	21	5	137
28 - 38	0	0	0	15	26	6	47
38 +	0	0	0	0	3	7	10
Total	5, 1.22	43, 10.51	140,34.23	136, 32.25	59, 14.43	26, 6.36	409

Table I showed the age of the sawmill workers and length of job in the mills. 28 - 37 and 38 - 47 years age group labour tops the list (140+136, 66.48 %). As the age of the labour advances, retention in the job decreases. Fewer workers had sustained such physical work in their advanced age stage.

Table II : Presence of rhonchi over job duration

Rhonchi	Job duration in yrs.						Total & %
	3-7	8-13	13-17	18-27	28-37	38 +	
Yes	6	2	1	4	3	3	19, 4.65 %
No	54	84	68	133	44	7	390, 95.35 %
Total	60	86	69	137	47	10	409, 100 %

In the table II it was shown that one of the respiratory symptom, rhonchi was present among 19 workers (4.65 %). Most of the workforces were free of this symptom (390, 95.35 %).

Table III : Experience of coughing over job duration

Job duration In years	Coughing				Total
	More at time of work	More at night	More in morning	No such symptom	
3 - 7	5	12	2	41	60
8 - 12	5	7	9	64	86
13 - 17	4	10	11	44	69
18 - 27	14	27	26	70	137
28 - 38	3	14	12	18	47
38 +	1	1	0	8	10
Total	33, 8.07 %	71, 17.36 %	60, 14.67 %	245, 59.90 %	409

Table III shows that 164 workers were with respiratory involvement by the symptom of coughing. These 3 times coughing (164, 40.10%) is indicating respiratory disease particularly due to allergic alveolitis.

Table IV : Production of phlegm over duration of sawing logs

Job duration In years	Phlegm			Total
	Mucoid & watery	Purulent	Not remarkable	
3 - 7	9, 13.85	1, 2.27	50	60, 14.67
8 - 12	7, 10.77	3, 6.82	76	86, 21.03
13 - 17	12, 18.46	5, 11.36	52	69, 16.87
18 - 27	28, 43.08	25, 56.82	64	137, 33.50
28 - 38	8, 12.30	10, 22.73	29	47, 11.49
38 +	1, 1.54	0, 00	9	10, 2.44
Total	65,15.89	44, 10.76	300, 73.35	409, 100%

Mucoid phlegms were present among 65(5.89%), purulent phlegm among 44(10.76%) and non categorized among 300(73.35 %) workers. These symptoms were centered with the sawmill workers those sustained their works from 13- 27 years. (Table IV)

Table V : Percentage of FVC / FEV_1 in relation to duration of sawing

FVC/FEV_1	Job duration in years						Total and %
	3	4-8	9-13	14-18	19-28	29-38	
60%	0	0	1	1	1	0	3, 0.73
61 - 69%	1	2	1	1	0	1	6, 1.47
70 - 79%	3	0	0	3	1	0	7, 1.71
80 - 89%	56	84	67	132	45	9	393, 96.09
Total	60	86	69	137	47	10	409,100

The ratio of FVC and FEV_1 were at the level of obvious asthmatic persons among 3(0.73%) of the sawmill workers. This is decreasing gradually during their sawing works. 6(1.47%) workers were advancing towards asthmatic suffering and showed the ratio from 61- 69%.

Table VI : Surrounding environment of saw mill affecting FEV_1

FEV_1 in Lit	Surrounding Environmental condition		Total
	Dusty	Clean	
2.00 lit	4	0	4
2.1 - 3.00	98	3	101
3.1 - 4.00	277	2	279
Above 4.00	25		25
Total	404,98.78	5, 1.22	409,100

Outer environmental condition also affected the measures of lung function.

Table VII : Percentage of FVC and FEV_1 related to surrounding environmental aspects

% of FVC/FEV_1	Surrounding Environmental condition		Total And %
	Dusty	Clean	
60%	3	0	3, 0.73
61 - 69%	6	0	6, 1.47
70 - 79%	7	0	7, 1.71
80 - 89%	388	5	393, 96.09
Total	404, 98.78	5, 1.22	409, 100

Outer environmental condition also affected the measures of lung function.

Percentages were progressively decreasing in dusty mill environment and creating positive lung function for diagnosing occupational asthma.

Table VIII : Percentage of FVC / FEV_1 of PPE users (mask)

% of FVC/FEV_1	Workers using PPE		Total
	No	Yes	
60 %	3	0	3, 0.73
60 - 69 %	6	0	6, 1.47
70 - 79 %	6	1	7, 1.71
80 - 89 %	343	50	393, 96.09
Total	358, 87.53	51, 12.47	409, 100

The table VIII showed that 3(0.73%) workers were asthmatic and other 13 sawyers were progressively advancing towards bronchial asthma of occupational origin among non-users of PPE.

Figure 1: Knowledge of sawyers about disease from sawing

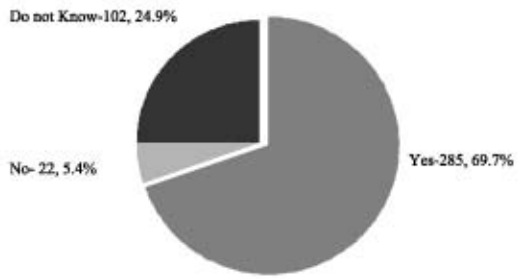

Figure 1 postulated the knowledge of the sawmill workers about the respiratory diseases caused by saw dusts. 285(69.7%) workers know that sawmill wood dusts may cause lung disease.

Discussion

On study findings of occupational asthma among sawmill workers, the author pondered over the diagnostic, environmental and knowledge level of the sawyers presents the following discussion.

In table I it is obvious that a few numbers of workers below 18 years were engaged in this occupation though it is restricted to the employment of child labour. More sawyers were working at their young age. Workers of advanced age gradually decreased due to intolerance of such physically laborious job (85, 20.79 %).

Table II pointed that musculoskeletal and respiratory systems are much involved in this job. 19(4.65 %) of them showed that they had been affected by one of the respiratory discomfort but majority of the workers were free from this symptom and retained job in their advanced ages.

Table III exhibits that 164 (40.10%) workers developed one of the symptom, coughing in this job. When the percentage of FVC and FEV_1 marching towards below from 100% it is seemed that the workers are catching obstructive lung disorders gradually.

In Table V it is observed that sawmill workers are showing downward trend of this measures. Among 16(3.91%), 3(0.73%) workers were suffering from asthma of occupational origin and 6(1.47%) sawmill workers were advancing towards that suffering during their working tenure. 7(1.17%) workers remained in the primitive advancing track towards occupational asthma.

Table VII exhibits that dusty surrounding of work premises predominantly enhances the respiratory sufferings among workforces. 3(0.73%) workers positively diagnosed as the case of occupational asthma and 13(3.18%) of the workers are advancing towards the occupational lung disorders.

Table VIII revealed that though the PPE is the 1st line defense against dust borne disease, the mask or napkin could not protect the workers. It may be due to improper and irregular use. It may also be due to lack of knowledge about lung diseases that might be prevented by appropriate and regular uses PPE and adopting other optimum measures.

Occupational asthma among sawmill workers can be studied with immunological diagnosis taking different types of timbers used in Bangladesh in future alleviating the limitation of this study.

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References

01. Murphy RLH. Jr.Industrial disease with asthma. In: Weis EB and sergal MS. ed. Broncheal asthma:Mechanism and therapies Boston: Little Brown, 1976: 517-36.

02. Willam N. Rom, eds. Environmental & occapational Medicine. 1st ed. Boston: Liltle Brown Company, 1983: 253.

03. Brooks SM. Bronchial asthma of occupational origin. Scand J Work Environ Health 3; 1977: 53.

04. Raghuprasad AK, Brooks SM, Litwin A et al. Quillaja bark (soap bark) induced asthma. J Clin Immunology 1980; 65: 285.

05. Sosman AJ, Schleuter DP, Fink JN et al. Hypersensitivity to wood dust. New Eng J Med 1969; 281: 977.

06. Brooks SM, Mcgowan K, Bernstein IL et al. Relationship between number of beta adrenergic receptors of lymphocytes and disease severity in asthma. J Allergy Clin Immunology 1972; 49: 337.

07. Malo JI, Cartier A, Dejardins A,Van-de-Weyer R, Vandeplas Occupational asthma caused by oak wood dust. Chest 1995; 108(3): 856-8.

08. Fernandez RM, Perez C, Senent CJ. Occupational asthma and rhinitis caused by ash (fraxinus exelsior). Wood dust allergy. 1997; 52 (2): 196-9.

09. Hunter D. eds Diseases of occopation 5th ed. Hodder and Stoughton 1976: 1032.

10. Brooks SM, Edward JJ, Agol A, Edward FH. An epidemiologic study of workers exposed to western red cedar and other wood dusts. Chest 1981; 80: 305-25.

11. Carosso A, Ruffino C, Bugiani M. Respiratory diseases in wood workers. Br J Ind Med 1987; 44: 53-6.

12. Belin L. Clinical and immunological data of wood trimmers diseases in Sweden. Euro J. Resp Disease 1980; 61:169-76.