



THE IMPACT OF OCCUPATIONAL EXPOSURE IN PULMONARY STATUS OF WOOD WORKERS

Pulmonary Medicine

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ABSTRACT

Background: Respiratory health status of an individual has got a close relationship with one's lifestyle, profession and environment. Lung, being in constant communication with external environment, is affected by the composition of atmosphere and more importantly by its pollutants. This study was designed to assess the impact of occupational exposure in the respiratory status among carpenters who are having at least five years experience.

Methodology: Respiratory symptoms among carpenters were assessed by case control study using questionnaire. Lung function was evaluated by pulmonary function test. The control group comprised of workers engaged in non- carpentry industry.

Results: Respiratory symptoms were more prevalent among carpenters. Cough was the most frequent symptom (50.7%) and was statistically different compared to control group (p- value .000). Bronchial asthma was present in 40% of carpenters. FEV1 < 70% predicted was observed in 49.3% of carpenters.

Conclusion: Occupational exposure makes the carpenters more prone for developing respiratory ailments and declined lung function.

KEYWORDS

carpenters, occupational lung disease, wood dust, Lung function

INTRODUCTION

Recent research literature has shown relation between lung disease and certain occupations. Occupational exposure to dust is often results in significant health impacts like cough, breathlessness, rhinitis etc¹⁻⁴. Among all systems in human body lungs are most vulnerable to air born hazards produced by exposure to wood dust generated in carpentry, saw mills etc^{5,6,7}. According to (ONAP) Observatoire National des Asthmes Professionnels job-related asthma is common among car painters, bakers and pastry makers, carpenters, and woodworkers⁸. Among wood workers, carpenters have been highlighted as a risk group for developing respiratory diseases in some earlier studies^{9,10,11}. In this background, this study was carried out to assess the frequency of respiratory symptoms among carpenters in Calicut, Kerala.

MATERIALS AND METHODS

Study design: Case control study

Study setting: Institute of Chest Disease, Govt. Medical College, Calicut

Study subjects: 75 non smoking carpenters engaged in carpentry industry for at least last five years

Inclusion criteria

Non smoking carpenters engaged in carpentry industry at least for last 5 years and non smoking workers involved in non carpentry industry for last 5 years

Exclusion criteria

Current or ex smokers
Subjects with pre existing lung disease due to other known causes

Sampling method: consecutive sampling

Table1: comparison between respiratory symptoms and lung function among carpenters and control group.

Symptom	Carpenter group		Control group		odds ratio	p- value
	Number	Percentage	Number	Percentage	odds ratio	
Asthma	30	40%	10	13.3%	4.33	.000
Shortness of breath	18	24%	10	13.3%	2.05	.094
Cough	38	50.7%	16	21.3%	3.78	.000
Chest tightness	21	28%	0	00%	59.56	.000
FEV1,70%	36	48%	14	19.2%	4.02	.572

With respect to lung function, percentage of subjects with FEV1 < 70% was more common in carpenter group (48% vs 19.2%) than in control (table 1), but the difference was not statistically significant (p- value-.572).

MATERIALS AND METHODS:

This study comprised of 75 non smoking carpenters engaged in the industry at least for last 5 years as cases and 75 non smoking workers involved in occupation other than carpentry as the control group. A questionnaire was designed to assess the respiratory symptoms among carpenters. It included data regarding age, smoking habits, nature of job, work experience in years, type of wood they are exposed with duration of exposure and the use of any protective device during work time. The respiratory symptom related questions were about asthma, cough, wheeze, chest tightness with duration of each symptom. Pulmonary function was assessed in both carpenters and control group as per ATS guidelines. The study was approved by our institution ethical committee. Informed written consent was obtained from each candidate.

Statistical analysis:

The respiratory symptoms in cases and controls were expressed as percentage. The statistical difference between the two groups was analysed using Chi- square test. P value of .05 was set as the criteria for statistical significance. The data was analysed using SPSS software version 23.0.

RESULTS:

The average age of carpenter group was 44.64 and that of control group was 42.48. All of the candidates were male non-smokers. The prevalence of bronchial asthma was more in carpenter group (40%) than in control group (13.3%) with statistically significant difference between the two groups (p value - .000) (odds ratio - 4.33). Respiratory symptoms were more predominant in carpenter group with cough and chest tightness being the most common symptoms (p- value .000 each) (table 1). Shortness of breath was also more commonly noted in carpenter group (24% vs 13.3%), but the difference between two groups was not significant (p- value-.094).

The commonly used wood in carpentry in southern India includes Eeti, Kunni, Teak, Jack, Mango etc. (table 2). Respiratory symptoms were more common in those who used 'Kunni' than other woods with an odds ratio of .699 (table 3). 'Kunni' (Albizia odoratissima) is a member

of the Fabaceae family. It is a deciduous tree native to large parts of south india.

during their work. It was also found that the compliance for using face mask during work period was very low.

Only 14.6 % of carpenter group used protective devices like facemask

Table 2: correlation between type of wood used and percentage of respiratory symptoms

WOOD TYPES	ASTHMA		SHORTNESS OF BREATH		COUGH		CHEST TIGHTNESS		FEV1	
	YES	NO	YES	NO	YES	NO	YES	NO	I	II
ALL	10	28	7	31	21	17	8	30	15	23
	26.31%	73.60%	18.42%	81.58%	55.26%	44.73%	21.05%	78.94%	39.47%	60.52%
EETI	1	2	1	2	1	2	1	2	2	1
	33.33%	77.77%	33.33%	77.77%	33.33%	77.77%	33.33%	77.77%	66.66%	33.33%
JACK	1	2	0	3	0	3	1	2	1	2
	33.33%	77.77%	0.00%	100%	0%	100%	33.33%	77.77%	33.33%	66.66%
KUNNI	14	10	9	15	12	12	9	15	14	10
	58.33%	41.66%	37.50%	62.50%	50%	50%	37.50%	62.50%	58.33%	41.66%
MANGO	1	0	0	1	1	0	0	1	1	0
	100%	0%	0%	100%	100%	0%	0%	100%	100%	0%
TEAK	3	3	1	5	5	1	2	4	4	2
	50%	50%	17%	83%	83%	17%	33.33%	66.66%	66.66%	33.33%

Table 3: odds ratio for Kunni (Albizia odoratissima) and other wood types

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for group (CASE-SUB GROUP-KUNNI / OTHERS)	.699	.587	.912
For cohort = kunni	.692	.564	.850
For cohort group = other	3.000	1.582	5.690
N of Valid Cases	75		

DISCUSSION:

The results from our study highlights that wood workers like carpenters are at high risk of developing respiratory symptoms and diseases like bronchial asthma. Previously conducted studies in different locations among carpenters also show greater prevalence of respiratory symptoms in them, supporting the results of our study.

A study conducted by Marlo J et al shows high prevalence of occupational asthma in workers exposed to white cedar wood¹². According to (ONAP) Observatoire National des Asthmes Professionnels, maximum chance of job-related asthma was found in car painters, bakers and pastry makers, carpenters, and woodworkers⁸. Study conducted by Bosan and Okpapi, verified significant obstructive pattern in FEV1 among wood workers in the Savannah belt of Northern Nigeria¹³. Another study conducted among wood workers in Thailand presented significant negative relations between mean dust exposure levels and lung function¹⁴. A study in Turkey showed that 53.7% of wood workers had features of cough and chest tightness and 43% had shortness of breath and rhinitis which was significantly higher than controls. The wood workers had lower mean FEV1 compared to controls¹⁵. A recent meta-analysis showed that woodworkers have a higher prevalence of asthma, which was more pronounced among Caucasian compared to Asian populations¹⁶.

Carpenters are exposed to diverse organic and inorganic pollutants in their work place. The most important factor behind the increased respiratory symptoms among carpenters is wood dust itself⁷. Adding to the wood dust as such, microorganisms like bacteria, fungi and the toxins produced by them can lead to asthma and hypersensitivity pneumonitis. The chemicals in glue, solvents, paints which are commonly used in carpentry can cause bronchial epithelial, mucosal damage, and hyper responsiveness which in turn can lead to asthma¹⁸⁻²⁰.

The chemicals can also damage other organ systems by inducing eye irritation or causing dermatitis either by direct contact or by hypersensitivity²¹. Respiratory symptoms are more in those with greater experience in the wood work. And those who do not use protective measures like masks.

Most of subjects were unaware of the long term ill health effects of wood dust. This ignorance could be the reason for low level of adherence to protective devices like mask in workplace.

CONCLUSION:

Our study shows that occupational exposure to wood dust and related pollutants has got a significant influence in the respiratory health status of carpenters. It is recommended to carry out baseline respiratory evaluation of carpenters when they enter to their profession and periodic health check-up so that respiratory diseases like asthma can be early diagnosed and addressed. Protective measures such as ventilated work areas and usage of suitable masks is will be beneficial.

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