



Respiratory function of workers at a construction company in Bangalore Urban district

Abstract:

Introduction: Construction sector is one among the largest employers in India. Most of the construction workers are migrants susceptible to occupational health hazards. Construction workers are exposed to a variety of dust and chemicals that may pose a risk to the respiratory system. There is paucity of data on the respiratory function of construction workers in India. **Objectives:** The objectives were to assess the respiratory function of construction workers and to study possible factors associated with the respiratory function of these construction workers. **Methods:** A cross sectional study was conducted among 197 workers in a construction company in Bangalore Urban district from November - December 2010. The study tools were an interview schedule to study the respiratory function and possible associated factors and clinical examination which included anthropometry (height, weight) and Wright's mini peak flow meter to measure peak expiratory flow rate (PEFR). The data was analyzed using standard statistical software. **Results:** Among male workers, the mean PEFR was 457.43 l/min (SD 65.38 l/min) while among female workers, the mean PEFR was 326 l/min (SD 46.95 l/min). Respiratory function as measured by peak flow meter was decreased in 127 (64.5%) workers. The current reported tobacco smoking was 41.2% (77) among 187 males. Only 3 (1.5%) workers reported to use of face mask. There was no significant association ($p>0.05$) between respiratory function, and duration of work more than a year at construction company, use of face mask or smoking. **Conclusion:** This preliminary study revealed that the respiratory function among the workers was decreased. More precise studies with population control matched for age using pulmonary function tests are needed to assess the findings of the study.

Key Words: Construction worker; migrant worker; respiratory function; peak flow meter.

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Introduction

Majority of the working population (about 92%) of India i.e. 92% belongs to the unorganized sector.[1] 44% of the workers in unorganized sector working in urban areas are employed in the construction sector [2]. According to NSSO 1999-2000 about 1.76 crore workers in our country are employed in the construction activities [3]. Thus construction sector has been one of the largest employers in India [4]. Construction work is generally unskilled, and therefore mostly attracts migrant agricultural labor during off-season [3]. Construction workers are exposed to a variety of dust and chemicals in cement that may pose a risk to the respiratory system. The presence of dust in the workplace might result in difficulty in breathing [2] the effect might be compounded by lack of use of face mask. There is paucity of data regarding respiratory function among construction workers

in Indian settings and hence this study was conducted in a Construction company located in Bangalore.

Objectives:

1. To assess the respiratory function of construction workers in a private construction company in Bangalore Urban district.
2. To study possible factors associated with the respiratory function of these construction workers.

Methods

A cross-sectional study was carried out at a construction company during November - December 2010 in Anekal taluk, Bangalore Urban District, Karnataka. The permission to conduct the study was taken from the management of the construction

company. Informed consent was obtained from the participants of the study. The study population comprised of the construction workers and most of the employees in the company were migrant laborers. Workers like security guards and cooks who were not directly involved with construction work were excluded from the study.

The study tools used were as follows:

1. Interview schedule: A structured interview schedule consisting of 2 parts was used to collect relevant data from the respondents:

Part 1 – Demographic details and the study variables like duration of work, use of face mask, respiratory morbidities, tobacco use

Part 2 – Smoking history and Fagerstrom test for nicotine dependence (FTND).

FTND is a validated questionnaire to assess the dependence of nicotine (smoking form) [5-7]. It was administered to those who reported smoking. It contains 6 questions. Each of the questions has a set of responses to choose from and each response has a score ranging from 0 to 1/2/3. Total score ranges from 0 to 10 with scores corresponding to various levels of dependence: Low: 0-3; Medium: 4-6; High: 7-10.

2. Clinical examination: This included two components:

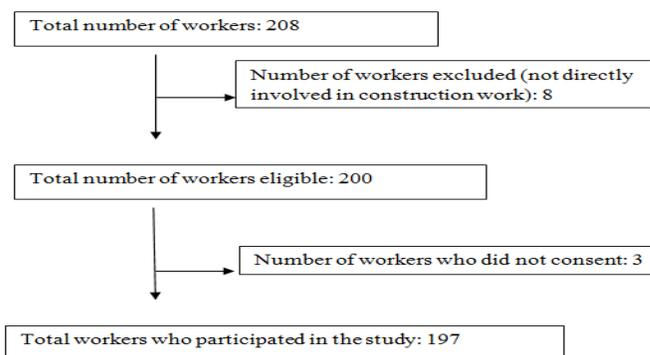
a. Anthropometry (Height, Weight): The anthropometric measurements were recorded with calibrated and standardized equipment's.

b. Peak expiratory flow rate (PEFR): It is a lung function test that assesses the maximum flow rate of expired air. It is therefore an indicator of airway competence and is lowered following airway obstruction. Forced expiratory volume or PEFR is dependent on sex, height and age of the person. PEFR is measured with a peak expiratory flow rate meter such as the Wright's peak flow meter. It serves as a convenient tool in field studies for determination of lung function, and provides an estimation of airway obstruction [8]. The study employed Wright's peak flow meter which is a portable hand held device which has been used in Indian setting earlier [9]. The procedure was demonstrated to the workers in small groups before the 3 consecutive readings were taken from each worker. After use for every worker, the mouth piece of the peak flow meter was disinfected with spirit. The highest of the three readings of every worker was used for analysis. It was plotted on the nomogram to assess its appropriateness for the sex, age, height of the worker.

Statistics and analysis of the data:

The data was entered in Microsoft Excel and analyzed using standard statistical software package. Frequencies, measures of central tendency and dispersion, chi square tests were used to analyze data.

Fig 1. Flowchart of recruitment of the study participants



Results:

Demographic details:

Majority of the study population were males (94.9%) and most (95.5%) were in the age group of 15-45 yrs. The mean age of workers was 26.4 ± 8.1 years and per capita income was Rs 1298.9± 845.6. 112 (56.9%) of the workers had at least some primary education (Table I).

Table I Age, education, income, gender distribution of the study population

SI NO	Variables		Males	Females	Total
1	Age (in years)	≤14	0	1 (0.5%)	1(0.5%)
		15-45	180 (91.5%)	8 (4%)	188 (95.5%)
		45-60	7 (3.5%)	1 (0.5%)	8 (4%)
		Mean	26.2 (7.9)	30.9 (10.1)	26.41 (8.05)
		Range	17-56	14-45	14-56
2	Education (Highest education attained)	Nil	52 (26.4%)	8 (4.1%)	60 (30.5%)
		Primary education (1-7)	50 (25.4%)	2 (1%)	52 (26.4%)
		Secondary and above	78 (39.6%)	0	78 (39.6%)
3	Income (in Rs/month)	a) Total	Range: 2500-30000 Mean: 6641.7 (4249.9)	Range: 3000-10000 Mean: 5100 (2846.1)	Range: 2500-30000 Mean: 6563.5 (4198.5)
		b) Per capita	Range: 333-6667 Mean: 1323 (857.8)	Range: 529-1750 Mean: 847.9 (353.2)	Range: 333-6667 Mean: 1298.9 (845.6)
	Total		187	10	197

Fifty seven percent (113) of the total study population were unmarried and 86% (140) were Hindus. All the workers who participated in the study were migrants, of them 111 (56.3%) were from West Bengal, 27 (13.7%) from Jharkhand, 16 (8.1%) from Bihar, 14 (7.1%) from Andhra Pradesh, 13 (6.6%) from North Karnataka, 9 (4.6%) from Assam, 3 (1.5%) from Orissa, 1 (0.5%) Uttar Pradesh, 1 (0.5%) from Madhya Pradesh and 1 (0.5%) from Chhattisgarh. The occupational details of the workers are as shown in the table II.

Table II Details of work duration

Duration of work	Mean	S.D	Range
Number of months of work as a migrant laborer	35.94	47.34	0 – 300
In construction work	31.6	41	0 – 300
In the present company	13.7	16	0 – 120
Number of hours in a day	12.4	2.5	8 – 24
Number of days worked in a week	5.9	0.4	4 – 6

Smoking details: The current reported smoking was 41.2% (77) among males. No female worker reported to smoking tobacco. The mean age of initiation was 20.43 yrs (SD 5.1yrs) with a range of 10-43 yrs. FTND scores revealed that most of these (58, 31% males) were on low dependence, followed by medium dependence (15, 8.1% males) and high dependence (4, 2.1% males).

Clinical examination: Height and weight details: The mean height of the workers was 163.6cm (SD7.9cm) with a range of 140-187cm. The mean weight of the workers was 54kg (SD 8.9Kg) with a range of 40-94kg. Most of the workers (134, 68%) were normal weight followed by underweight (54, 27.4%) and 9 (4.6%) were overweight as per the WHO classification [10]. Respiratory function as measured by peak flow meter was decreased in 127 (64.5%) workers and normal for the rest. Average Peak Expiratory Flow Rate (PEFR) was 450.76 l/min (SD 70.67 l/min). Among male workers, the mean PEFR was 457.43 l/min (SD 65.38 l/min) while among female workers, the mean PEFR was 326 l/min (SD 46.95 l/min).

There was no significant association between respiratory function and duration of work at construction more than 1 year ($p>0.05$), use of face mask ($p>0.05$) or smoking ($p>0.05$).

Discussion

There is paucity of data on respiratory function of construction workers in India. Several follow up studies of occupationally exposed cohorts involved in a related unorganized sector of mining have demonstrated that, the annual decline in forced expiratory volume in one second is related to gas, dust and fume exposure. The reported declines were 7–8 ml/yr, after adjustment for age and smoking [11-16].

Workers in the crusher and packing sections were highly exposed to total cement dust relative to total lung volume, and total dust has been found to be related to acute respiratory symptoms and acute ventilatory effects in a study done on cement dust exposure in a cement factory in Ethiopia [17]. This study also demonstrates low PEFR among workers probably due to exposure to dust and inadequate use of face masks. Smoking could also be a contributory factor since the reported current smoking was higher than that for general male population (32.7%) while it was lower than that for general female population (1.4%) as per National Family Health Survey 3 [18].

PEFR normograms for the Indian population has to be developed. The study could cover single construction company. A larger study covering many construction companies and comparison with general population could yield better picture. PEFR values as a surrogate measure of lung function has certain limitations due to poor reproducibility and marked variability based on multifactorial influences of anthropometry, existing lung disease, and smoking.

Conclusion

Respiratory function among the workers was found to be decreased when compared with the existing normograms with no significant association with duration of work, use of face mask and smoking. More precise studies with population control matched for age using spirometric pulmonary function tests are needed to assess the findings of the study.

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