

**PREVALENCE OF RESPIRATORY MORBIDITY IN CONSTRUCTION WORKERS**

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ABSTRACT

Background and Objectives: This study was done to assess the prevalence of respiratory morbidity using PEFR and to evaluate factors associated with it. **Methods:** A cross-sectional survey was carried across Pune. Total 100 workers working at construction sites for 1-10 years were randomly recruited. The purpose of the study was explained and an informed consent was taken. All subjects were interviewed using respiratory surveillance questionnaire and the PEFR was recorded. Statistical analysis was done using independent t-test and ANOVA test.

Results: Total 73 workers aged 25-30 years (59 males, 14 females) and 27 workers aged 30-35 years (25 males, 2 females) were surveyed. The mean PEFR was less in carpenters (330, ± 56.56) than tile fixators (380, ± 62.98), masons (360.8, ± 79.71) and welders (372, ± 75.68). The mean PEFR varied significantly with years of exposure and was 285(± 49.49) in workers with 2 years exposure; 420.9(± 81.17) of those exposed for 2-4 years; 391(± 69.90) for 4-6 years, 357.39(± 80.06) for 6-8 years, 328.12(± 71.94) for 8-10 years and 340.47(± 65.53) for more than 10 years of exposure. The mean PEFR of smokers was higher 372.4(± 67.25) than that of non-smokers 360.6(± 79.28). The mean PEFR of workers exposed to animals was higher 401(± 79.36) than those who are not exposed to animals 359.5(± 75.51). **Conclusion:** The study showed significant respiratory morbidity among the construction workers which varied with job profile, years of exposure and comorbid factors such as smoking, exposure to allergens and use of protective measures.

KEYWORDS: Construction workers, PEFR, Respiratory morbidity, Respiratory surveillance questionnaire.

INTRODUCTION

With the increasing trend of globalization, there is huge migration of people around the world towards the economic cities and increased demand on infrastructure development. In India, followed by agriculture, construction involves major economic activity.^[1] Construction industries are an unorganised sector involving huge number of skilled and semi-skilled man force.^[1]

In India, NDP (Net Domestic Product) involves nearly two-third of the unorganised sector.^[2] Maximum amount of dust is generated from the construction sites including concrete, silica, asbestos, cement, wood, stone, sand and leads to exposure of workers to airborne dust.^[3] However, the labourers work is not considered significant and they are supplied with lack of amenities.^[4]

Occupational lung diseases include mesothelioma, occupational asthma, silicosis, asbestosis, and sick building syndrome.^[5] Mostly the occupational exposure triggers adult onset of asthma.^[5] Occupational asthma is

considered as a heterogenous condition with history of acute episodic deterioration in the background of chronic persistent inflammation or structural changes reducing the lung function.^[6] In developed countries the incidence of occupational asthma is increasing whereas in developing countries it is still unknown.^[7]

The occupational lung diseases are considered as the leading cause of morbidity and mortality among the global risk factors. In India, the occupational health was ignored for long which was one of the components included in National Health Policy 1983. In National Health Policy 2002 and 2015, it is mentioned that occupational health requires greater emphasis.^[8] Thus, work-sites and institutions must be encouraged and monitored to ensure safe health practices and accident prevention providing preventive services.^[4]

In the past few years, the occupational lung disease has gained a lot of attention of researchers. The present study was done to assess the prevalence of respiratory morbidity in construction site workers; to study of relationship between associated factors such as job

profiles, years of exposure to dust, exposure to animals and smoking; and to evaluate the commonest symptoms in construction site workers.

MATERIALS AND METHODS

Study design: Cross sectional Survey was done for 6 months at different construction sites across Pune, Maharashtra, India.

Participants: The labourers (total no 100) working at construction sites for minimum 1 year aged between 25-35 years.

Procedure: The study was approved by institutional ethical committee, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune. The participants selected for the study were the labourers working at the construction site recruited randomly using lottery method. The respondents were made clear that the information gathered would remain confidential and would be used only for research purpose. Aim and objectives of the study were clearly stated in a questionnaire in order to obtain the consent of respondents.

All the participants underwent clinical examination and evaluation for socio-demographic was done with

occupational history. The participants were interviewed using the "Respiratory surveillance questionnaire by OHF (March 2013)".

The respiratory morbidity was determined using peak expiratory flow rate (PEFR) which is the maximum flow achieved during an expiration delivered with maximal force starting from the level of maximal lung inflation.^[9] The most commonly used instrument is a flow meter measuring only PEF called peak flow meters.^[9]

Total three PEFR readings were recorded for an individual during working hours using a peak flow meter and highest of three measurements were taken for analysis. The values obtained were compared with job profile at construction site, years of exposure at construction site, exposure to animals and smoking.

RESULTS AND DISCUSSION

Results: Total 100 construction workers from different construction sites were surveyed which included 73 workers aged 25-30 years (59 males and 14 females) and 27 workers aged 30-35 years (25 males and 2 females).

Table 1 shows the relationship between PEFR and job profile at construction site. It was found that PEFR was reduced in all the participants with lowest in carpenters.

Table 1: Relationship between PEFR and job profile at construction site

Job Profile	Number of workers	PEFR	
		Mean	Sd
Tile fixator	13	380	(±)62.98
Mason	75	360.8	(±)79.71
Carpenter	02	330	(±)56.56
Welder	10	372	(±)75.68
P value		0.75	

Table 2 shows the relationship between mean PEFR and years of exposure. It was found that the PEFR of those exposed for >2 years is least however those exposed for 2-4 years is more.

Table 2: Relationship between years of exposure at construction site and PEFR

Experience of work	Number of workers	PEFR	
		Mean	Sd
<2 yrs	02	285	(±)49.49
2-4 yrs	11	420.9	(±)81.17
4-6 yrs	27	391	(±)69.90
6-8 yrs	23	357.39	(±)80.06
8-10 yrs	16	328.12	(±)71.94
>10 yrs	21	340.47	(±)65.53
P value		0.004	

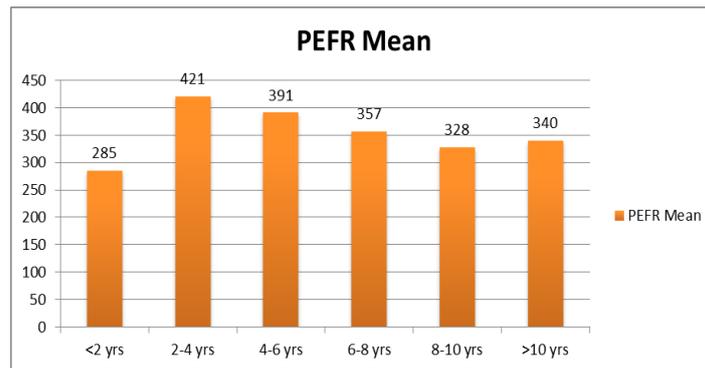


Fig 1 Relationship between years of exposure at construction site and PEFR

The Respiratory surveillance questionnaire demonstrated that none of the construction worker was using respiratory protective equipment (RPE). The mean PEFR of smokers (25) was significantly ($p=0.01$) higher $372.4(\pm 67.25)$ than that of non-smokers $360.6(\pm 79.28)$. The mean PEFR of workers exposed to animals was higher $401(\pm 79.36)$ than those who are not exposed to animals $359.5(\pm 75.51)$ which is significant ($p=0.034$).

Table 3 demonstrates commonest symptom in construction site workers. It was found that prolonged or repeated sneezing is the most common symptom in construction workers as compared to breathlessness, running or blocked nose, watering eyes, chest tightness, skin irritation or skin disease, wheeziness or phlegm.

Table 3: Commonest symptom in construction site workers

Symptoms	Number of workers
Cough	15
Phlegm	03
Breathlessness	56
Wheeziness	06
Chest tightness	23
Watering eyes	36
Running/blocked nose	39
Prolonged/repeated sneezing	63
Skin irritation/skin disease	20

DISCUSSION

This study was a survey based study for evaluation of respiratory morbidity in construction workers. It was observed that almost all participants were unaware about the occupational hazards and importance of using respiratory protective equipment at worksite.

The construction workers evaluated belonged to different job profiles namely tile fixators, masons, carpenters and welders. It was found that PEFR was reduced in all the participants with lowest in carpenters. The activities at construction site involves the arousal of quantum of dust particles which are inhaled by the labourers resulting in cough, phlegm, breathlessness, chronic bronchitis.^[10] Overall decrease in PEFR could be because of the intrathoracic and extrathoracic airway obstruction. The intrathoracic obstruction leads to the increased resistance within the airways limiting the airflow and the extrathoracic obstruction limits the chest expansion and respiratory muscle function.^[9] Rajula Tyagi *et al.* also found that the PEFR of construction workers is reduced compared to clinically normal subjects.^[11]

The PEFR values showed variation with the years of work exposure with lowest mean PEFR of the workers

exposed for less than 2 years. This could be correlated to the pathophysiology of silicosis as being the most common occupational lung disease in construction site workers.^[12] The silicosis is graded according to the symptoms and years of exposure as acute silicosis (less than 1 year), accelerated silicosis (3-10 years) and chronic or classic silicosis (decades of exposure).

The clinical presentation of silicosis reflects the intensity of exposure.^[12] The freshly fractured particles of silica are the most dangerous because the surface of the particles is chemically more active which are then taken up by the macrophages. The macrophages eventually die and release the silica, which is indigestible. The silica particle is then taken up by other macrophages, and the process is perpetuated. As other inflammatory cells are recruited to the alveoli, the process continues to gather momentum, resulting in destruction of more cells and the tissue around them.^[12] Thus, the study showed the reduced PEFR of workers exposed for less than 2 years.

While evaluating effect of smoking on construction site workers, it was observed that the PEFR was lesser in non-smokers as compared the smokers. This suggests that the effects of smoking are independent of the effects of long term exposure to cement. E. Meijer *et al.*^[9] also

found that concrete exposure is independent of smoking habits and history of allergy.

The study showed the maximum manifestation of prolonged and repeated sneezing in construction site workers which may be due to the hypersensitivity. The other manifestation included breathlessness, running or blocked nose, watering eyes, chest tightness, skin irritation or skin disease, cough and phlegm in labours. Sandeep H *et al.*^[1] found the prevalence of respiratory morbidities among the construction workers to be 22.34%. The study conducted by Rothenbacher D *et al.*^[13] showed the 7.6% prevalence of respiratory morbidity among the construction workers. An another study done by Seema P *et al.*^[14] also revealed that 26.2% of the cement block workers had respiratory morbidity. The implementation of prevention of direct contact of hazardous substances of construction site with the labours is now an important focus of awareness program. Thus, this study is essential as it will create awareness about the prevalence of occupational lung disease among the construction site workers.

First aid services and safety measures, Periodic general health check-up facilities, Health education awareness programs will ensure health promotion, health protection and highest degree of well-being among the construction workers

CONCLUSION

The study showed significant respiratory morbidity among the construction workers which varied with job profile, years of exposure and comorbid factors such as smoking, exposure to allergens and use of protective measures.

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