

Prevalence of Respiratory Symptoms in Construction Workers in Gujarat: A Cross-sectional Survey

Rutvik Purani^{1,*}, Nehal Shah²

ABSTRACT

Background: Non-communicable respiratory morbidities such as asthma and COPD are rapidly rising to emerge as leading causes of mortality worldwide. Occupational lung diseases form the majority of the work related morbidity in India, mainly in the form of occupational asthma and COPD. Due to paucity of data on respiratory disorders among construction workers in India, this study was conducted to investigate the prevalence of respiratory disorders among construction workers in Gujarat. **Methods:** 236 construction workers at sites across different regions of Gujarat state were screened using a Gujarati and Hindi versions of St. George Respiratory Questionnaire (SGRQ). Full time workers, having work experience more than 2 years and above the age of 20 years were included. Those with BMI >25 kg/m² and with history of trauma, pre-existing medical conditions like diabetes, hypertension, stroke or any obvious musculoskeletal deformities like scoliosis, genu valgum and those with history of chest trauma, previous pulmonary surgery or on medications for pulmonary diseases were excluded. **Results:** The prevalence of respiratory symptoms was found to be high with 60% having attacks of wheezing, 50% workers complaining of cough, 45.1% complaining of phlegm, 40% having shortness of breath. Also, those with 16-20 years of exposure in the construction industry reported a significant impact on their respiratory health as measured by SGRQ. **Conclusion:** The prevalence of respiratory symptoms was found to be high among the construction workers, hence it becomes imperative to highlight these impairments for appropriate prevention and intervention.

Key words: Construction workers, Respiratory Symptoms, St. George Respiratory Questionnaire, Prevalence, Asthma and COPD.

INTRODUCTION

Non-communicable respiratory morbidities such as asthma and COPD are rapidly rising to emerge as leading causes of mortality worldwide.¹ Occupational lung diseases form the majority of the work related morbidity in India, mainly in the form of occupational asthma and COPD followed by occupational cancers, cardiovascular diseases, reproductive disorders, neurotoxicity, skin and psychological disorder.

Construction is one of the stable growing industries in the world including India. The hazards in construction industry are 8 times riskier than those from any manufacturing industry.² It is one of the labor intensive work and construction workers perform high risk work for meager wages. Dusty tasks such as abrasive blasting, emptying bags of cement, cutting wood and masonry expose workers to risk. Construction workers are exposed to multiple risks at working and living places. They are exposed to physical, chemical, biological, ergonomic hazards and environmental and psychosocial risks.

The Health and Safety Executive (HSE-2002) states that construction has a reputation for being a

particularly unhealthy industry because its rate of work related illness is one of the highest of all occupational groups. Construction workers are exposed to risks that differ markedly from general industry in relation to occupational health and safety. Workers are exposed to variety of health hazards, namely musculoskeletal strain from the adaptation of uncomfortable working position, noise resulting in noise induced hearing loss. Skin diseases from close contact with irritant or sensitizing materials, respiratory irritant from dusts, fume and gases, as well as developing more serious lung diseases related to exposure to asbestos and other fibrogenic materials.³

Currently, there is very limited data on prevalence of respiratory disorders among construction workers in developing countries like India. Hence, the aim of this study was to investigate the prevalence of respiratory disorders [measured using the St. George's Respiratory Questionnaire (SGRQ)] among construction workers in Gujarat. From rehabilitation perspective, it becomes imperative to highlight these impairments for appropriate prevention and intervention.

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MATERIALS AND METHODS

Sample size was estimated using formula $n = Z\alpha^2 p(1-p)/D^2$. As per study done by Ranganathan. B.A *et al.*,⁴ prevalence of respiratory problems in construction workers was 33.2 in India. At confidence level (alpha) of 95%, power of study (beta) at 0.80 and confidence interval of 6, estimated sample size was found to be 235. A cross-sectional survey was then conducted in a sample of two thirty six full time employed construction workers from various sites across different regions of Gujarat state. Construction workers were mainly from sites across urban areas, with over 75% and only 25% were working at rural worksites. All the participants above the age of 18 years having more than 2 years of working experience and working for average of 5 h or more were included. Those having BMI more than 25 Kg/ m² and those with relevant history of history of trauma, pre-existing medical conditions like diabetes, hypertension, stroke etc. or any obvious musculoskeletal deformities like scoliosis, genu valgum, having history of chest trauma, previous pulmonary surgery or on medications for pulmonary diseases were excluded. Nature of study was explained and written informed consent was obtained from all subjects. Ethics approval was obtained from Medilink Ethics Committee.

Permission was obtained from original author of a two part St. George Respiratory Questionnaire (SGRQ) and its translated Gujarati and Hindi versions were then used for the study.⁵ It is a disease-specific instrument designed to measure impact on overall health, daily life and perceived well-being in patients with obstructive airways disease and consists of 50 items. This questionnaire has been widely used in the general population, different industrial workers and patients with respiratory diseases.⁶ There are two parts: part 1: questions 1–8 address participants' recollection of their symptoms over the preceding period of 3 months and part 2: questions 9–16 address participants' current state (questions 11 and 15 measure disturbances to participants' daily physical activity and questions 9–10, 12–14 and 16–17 cover a wide range of disturbances of psychosocial function). It comprises of 50 questions (with 76 weighted responses) covering three independent domains. The symptom component has eight items concerning frequency and severity of respiratory symptoms. The activity component has questions that identify physical activities that either lead to, or are limited by, breathlessness. The impact component has 26 questions related to different aspects of social functioning and psychological disturbances resulting from airway disease. A total score is calculated that summarises the impact on overall respiratory health status. The score is expressed as a percentage of impairment where 100 represents the worst possible respiratory health status and 0 indicates the best possible respiratory health status.⁷ The SGRQ is available in English, Gujarati and Hindi.⁸ The Hindi translation of SGRQ performs adequately well as a HRQoL instrument in Indian patients with COPD, with Cronbach's alpha coefficient having high values exceeding 0.7 for symptom, activity and impact scores.⁹ Hindi translation of SGRQ is an excellent discriminative and a good evaluative instrument for COPD patients and its use should be encouraged in routine assessment of patient's health status.

Other details such as pack-years, native state and work profile was also assessed. Pack-year is a measure of the amount of cigarettes a person has smoked over a long period of time. It is calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked.¹⁰ Data was statistically analyzed using SPSS 20.00, Microsoft Excel 16. Level of significance was set at 5%. Both descriptive and inferential statistics were applied wherever appropriate. The response rate of participants was 100%.

RESULTS

All variables were measured for mean and standard deviation and the demographic details are represented in Table 1. Figure 1 shows the distribution of pack years among the participants, with 179 workers having pack years between 0-5 years. Table 2 shows the stratification of workers according to their work profile. Distribution of workers according to their nature of job is represented in Figure 2. Addiction patterns of workers was also assessed and it was observed that 138 workers (58.4%) were alcoholics and 98 (41.6%) were tobacco users. Unskilled workers were 162 whereas 74 had received skilled training of construction, which was classified as per the International Labour Organization guidelines.

For part 1 of SGRQ, it was found that 50% workers complained of cough on most days, followed by 21% on several days, 12% with chest infections and only 5% with no complains of cough. For complains of phlegm (sputum), 45.1% had this symptom for most days, 26% on several days, 22.5% had with chest infections whereas only 7% had no such symptom. Shortness of breath was present on most days in 40%, on several days in 12% workers whereas only 5% had no such symptom. Attacks of wheezing were present among 60% on most days, 35% on several days, 27% on few days, 15% with chest infections and 9% had no such symptom. Out of those who did experience wheezing, 50% complained it was worse in the morning. 62% workers had 3 or more attacks of chest trouble, 35% had 1 or 2 attacks whereas 25% had no such attacks previously. Only 10% workers had good days with no chest trouble every day, whereas 45% had no good days without any chest trouble, whereas only a few good days were experienced by 25% workers and 15% had most good days.

Further, respiratory health status as per total score of SGRQ was assessed and then analysed according to work experience of workers, as shown in Table 3. There was a statistically significant difference in SGRQ scores as per work experience of the construction workers with $p < 0.01$, as determined using chi-square test, suggesting significant impairments amongst those working for more years in construction industry.

Table 1: Demographic and work details of construction workers.

VARIABLES	Mean \pm SD and N (%)*
Mean Age (Years)	35.6 \pm 8.3
Males*	141 (59.7%)
Females*	95 (40.2%)
Work Experience (Years)	17.5 \pm 5.5
Working Hours	8.9 \pm 1.1

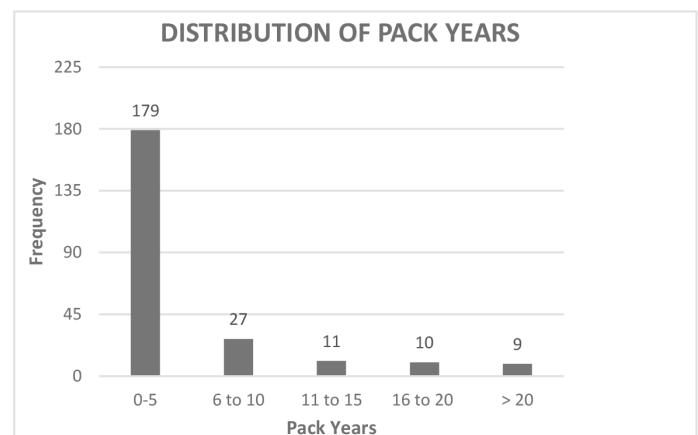


Figure 1: Distribution of pack years among the participants.

Table 2: Distribution of workers according to native state.

NATIVE STATE	NO. OF WORKERS	PERCENTAGE (%)
Gujarat	171	72.4
Rajasthan	16	6.78
M.P.	14	5.93
Others *	35	14.89

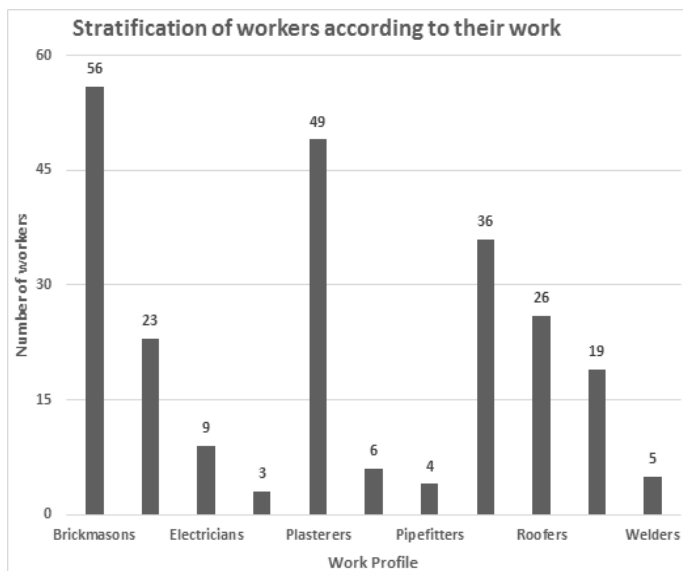


Figure 2: Stratification of workers according to their work profile.

Table 3: Respiratory health status according to work experience.

Working experience (years)	0-5	6-10	11-15	16-20	p value
SGRQ scores	20.6	27.3	36.4	48.5	< 0.01*

DISCUSSION

The prevalence of respiratory symptoms was found to be high among the construction workers in the present study. This finding is consistent with a similar study conducted by Yeole *et al.* who found significant respiratory morbidity among the construction workers with reduced Peak Expiratory Flow Rate (PEFR) in all the participants with lowest in carpenters.¹¹ The Spirometer tests are near ideal or gold standard when it comes to measuring the lung functions or ventilation effects - specifically the measurement of the amount (volume) and/or speed (flow) of air that is inhaled and exhaled. However the current study did not use such measures owing to large sample size.

Manish A Prasad *et al.* found musculoskeletal and respiratory problem in brick workers and made recommendations like regular measurement of lung functions to detect the lung abnormalities in the early stages, continuous usage of personal protective measures during the working h etc.¹² The current study also concludes high prevalence of respiratory disorders among construction workers and thus emphasizes the need of necessary interventions.

This study concluded that working experience was significantly associated with respiratory health status, suggesting that years of exposure in the construction industry has a significant impact on their respiratory health. Similarly, Mariammal *et al.* concluded that working at construction site adversely affected the pulmonary function parameters like FVC, FEV1, FEV1/FVC% and PEFR in construction workers that resulted in

the obstructive pattern of lung function impairment which is associated with the years of exposure and airborne dust in the work site.¹³

Sultana N *et al.* in a study assessing health problems in women building construction workers concluded that different types of skin diseases are present among female construction workers that might be attributable to exposure to hot humid working environment. Besides pain full micturition, uterine prolapse, low backache and respiratory problem were found among them which might need special attention.¹⁴ However this study did not take into consideration the detailed analysis of female construction workers individually and a study with this objective can be conducted in the future.

One seventy nine workers had pack years between one to five years whereas only nine workers had history of more than 20 pack years. This finding strongly supports that irrespective of the frequency of smoking, the construction workers had severe respiratory symptoms, which rules out the possibility of symptoms being attributed to smoking alone. However, more objective tools of assessment should be used to support the same.

Further research with objective tools such as Pulmonary Function Test (PFT) can be conducted and associated with respiratory health status. Also, it can be correlated with years of exposure to undermine the impact of their respiratory health. In conclusion, prevalence of respiratory symptoms was found to be significantly high among the construction workers. From rehabilitative perspective, it becomes imperative to highlight these impairments for appropriate prevention and intervention. Use of Personal Protective Equipments (PPE) should be emphasized along with awareness campaigns regarding the prevention should be done. The study findings could be taken into consideration in future interventional studies aimed at improving the respiratory health status of these workers such as Respiratory Protection Program (RPP).

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CONFLICT OF INTEREST

The authors declare that there is no conflict

ABBREVIATIONS

COPD: Chronic Obstructive Pulmonary Disease, **BMI:** Body Mass Index, **SGRQ:** St. George Respiratory Questionnaire, **HRQoL:** Health-Related Quality of Life, **FVC:** Forced Vital Capacity.

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