

ORIGINAL ARTICLE

Year : 2018 | Volume : 32 | Issue : 2 | Page : 54--58

Prevalence of respiratory symptoms in automobile spray painters of Mumbai: A cross-sectional study

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Abstract

Background: Spray painting poses health hazards that affect the respiratory system. During spray painting, workers are exposed to different paint components. Toluene diisocyanates, methylene diisocyanates, and hexamethylene diisocyanates are commonly used isocyanates in the spray painting. The major route of occupational exposure to isocyanates is the inhalation of the vapor or aerosol that can sensitize workers. The short- and long-term consequences of the respiratory system can be raised from these occupations. Hence, the aim and objective of this study were to find the prevalence of respiratory symptoms in automobile spray painters of Mumbai and to study the use of safety measures in automobile spray painters.

Materials and Methods: The study was a cross-sectional study. A total of 50 automobile spray painters were selected based on inclusion criteria. The self-made validated questionnaire was used as an outcome measure. **Results:** About 90% of the automobile spray painters have reported respiratory symptoms in their occupation among which 88% had the most prevalent symptom of breathlessness followed by 84% workers had the symptom of coughing. Nearly 60% of workers were aware about the safety measures, but only 33% were using the safety measures during work. **Conclusion:** The study showed a high prevalence of respiratory symptoms. The lack of awareness and the use of safety measures had increased the severity of the symptoms.

How to cite this article:

Nahar SK, Ashraf MA. Prevalence of respiratory symptoms in automobile spray painters of Mumbai: A cross-sectional study. Indian J Allergy Asthma Immunol 2018;32:54-58

How to cite this URL:

Nahar SK, Ashraf MA. Prevalence of respiratory symptoms in automobile spray painters of Mumbai: A cross-sectional study. Indian J Allergy Asthma Immunol [serial online] 2018 [cited 2018 Oct 17];32:54-58

Available from: <http://www.ijaai.in/text.asp?2018/32/2/54/243249>

Full Text

Introduction

Respiratory problems affecting the lungs and respiratory system are may be due to short-term infections or long-term conditions. Many respiratory problems are chronic which commonly include chronic sinusitis, allergies, asthma, and chronic obstructive pulmonary disease.[1] Common symptoms of upper respiratory tract infection generally include a cough, sneezing, nasal congestion, sore throat, and fever. Symptoms of lower respiratory tract infection include shortness of breath, weakness, coughing, fever, and fatigue. Lower respiratory tract infection places a considerable strain on the health budget and is generally more serious than upper respiratory tract infection.[2],[3]

India has the world's highest death rate from chronic respiratory diseases and asthma.[4] A sharp rise in the cases of chest and throat disease in India is alarming, and the probable cause is worsening of air pollution in the country. India at present is now considered the most polluted country in the world, ranked at number 13 of the 20 countries.[5] According to India's National Health Profile (2015), there are almost 3.5 million cases of acute respiratory infection has been reported with 30% increase since 2010.[6] The rise has occurred despite steady improvements in medical care and nutrition as well as a shift away from using wood as fuel in the rural areas.

Attention to the problem of air pollution in India has so far focused almost exclusively on the capital. The World Health Organization had surveyed the air quality in 1600 cities in the world among which the air quality in Delhi, the capital of India, is worst of any major city in the world.[7] However, the rest of the cities of India had received less attention, though in many cases, the problem is almost as acute or possibly worse.

Mumbai also has the higher pollution levels. The International Institute of Population Sciences surveyed the slums of Mumbai metropolitan region and had revealed that 89.6% of deaths in slums were occurred due to respiratory diseases.[8] In the recent study by the Environmental Pollution Research Center has stated that the carbon monoxide levels were not monitored and there was a high level of this gas from traffic exhausts in Mumbai.

Automobile spray painting industry, in Mumbai, is a small-scale family acquired the business. The workplaces are usually situated in the slums of Mumbai city. Spray painting is a painting technique where a device sprays a coating through the air onto a surface [Figure 1], [Figure 2], [Figure 3]. The coating material usually consists of paints, inks, and varnishes [Figure 4]. The most common types employ compressed gas, usually air to atomize and direct the paint particles.{Figure 1}{Figure 2}{Figure 3}{Figure 4}

Automobile spray painters while painting a car apply a clear coat which contains polyols and hardeners that are prepolymerized forms of diisocyanates. Toluene diisocyanates, methylene diisocyanates, and hexamethylene diisocyanates (HDI) are commonly used isocyanates in the manufacture of coatings such as paint, varnishes, and elastomers.[9] During spray painting, workers are exposed to all the paint components which are atomized. In addition to polyisocyanates, these constituents include organic solvent, metals such as leads and chromium and quantities of HDI monomer.[10]

Most occupational lung diseases are caused by repeated, long-term exposure to a hazardous agent that can damage the lungs. The major route of occupational exposure to isocyanates is the inhalation of the vapor or aerosol that can sensitize workers, making them subject to severe asthma attacks if they get exposed again.[11]

Spray painting poses various health hazards that affect the respiratory system. Short-term health effects from inhalation and injection of spray paintings are respiratory tract irritation, shortness of breath, tightness of chest, nausea, headache, and dizziness.[12] Long-term effects are sensitization of respiratory systems, asthma, abnormal reduction in lung function, and emphysema.[12] As the short- and long-term consequences of the respiratory system can be raised from these occupations. Hence, to know, the level of severity of respiratory problems and symptoms is important.

The aim of this study was to find the prevalence of respiratory symptoms in automobile spray painters of Mumbai. Study objectives were to find the most prevalent respiratory symptom and the use of safety measures in automobile spray painters.

Materials and Methods

Ethical approval

The Institutional Research Review Committee had approved the study before its commencement. Written and signed informed consent was obtained from all the participants.

Study design

This study was a cross-sectional study. The area from Mumbai suburb was selected for the study.

Participants

A total of 50 automobile spray painters were selected based on the inclusion criteria. The inclusion criteria comprised the age group of 18–50 years and workers having experience of more than 1 year. Workers with a history of respiratory problems before joining the occupation or any acute respiratory illness were excluded from the study.

Outcome measure

The self-made validated questionnaire was used in the study. The questionnaire included the components of demographic data, occupational history, history of respiratory symptoms, awareness about safety measures, and history of addiction. The questionnaire was filled by taking interviews with the automobile spray painters.

Statistical analysis

The data analysis was performed using SPSS software V.16 (IBM SPSS Statistics).

Results

In the demographic data, of 50 automobile spray painters, 56% (28/50) were from the age group of 31–40 years. The mean age was 36 years with a standard deviation of ± 5.95 . In the education strata, only 40% (20/50) were educated, and 60% (30/50) were uneducated.

The mean occupation status of 50 automobile painters is described in [Table 1].{Table 1}

[Table 2] represents the presence of respiratory symptoms among automobile spray painters. About 90% (45/50) of the automobile spray painters have reported respiratory symptoms in their occupation.{Table 2}

[Table 3] represents the prevalence of respiratory symptoms. Nearly 88% (40/45) had reported breathlessness as the most prevalent respiratory symptom followed by 84% (38/45) had reported coughing. Only 36% (16/45) of the workers had reported symptoms of wheezing.{Table 3}

According to the American Thoracic Society's Grades of breathlessness, 60% (24/40) of automobile spray painters have shown Grade I dyspnea [Table 4].{Table 4}

[Table 5] represents the awareness about safety measures in automobile spray painting occupation. Nearly 60% (30/50) spray painters were aware of safety measures and among them, only 33% (10/30) were using the safety equipment during the work [Table 6].{Table 5}{Table 6}

Discussion

In the present study, 90% of the workers had respiratory symptoms during their occupation of automobile spray painting. Breathlessness was the most prevalent respiratory symptom in automobile spray painters.

Spray painting usually consists of spraying, polishing, mixing the solvent agents, and brushing techniques. The substances being hazardous with spray painting are paints, solvents, lead, powders, lacquers, paint removers, resins, adhesives, degreasers, surface preparation products, rust converters/removers, and dust, which have induces symptoms due to the lack of use of safety measures and also aggravated the persistent symptoms and their severity.[13] During the working period, spraying and polishing were the major aggravating activities to cause breathlessness in automobile workers. Repetitive exposure to such activities has induced sensitization and inflammatory reactions to paint particles in the respiratory systems of these populations. Therefore, these activities have been found as more triggering in their work and production of breathlessness.

In the study of Abuelfadl et al., the authors have stated that spray painters comprise a large population at risk with potentially high isocyanate exposure because most lacquers contain HDI. There is an evidence for exposure-response relationship between mixtures of isocyanates in car paints and work-related respiratory symptoms.[14]

Although 60% of the population have a mild form of breathlessness (Grade 1), only 11% have moderate-to-severe breathlessness (Grade 3) which is suggestive of prolonged period of working, the presence of addiction, and lack of use of safety measures. About 62% of population were working for 8–12 h a day and 70% were working more than 6 days in a week. Such a prolonged period of working duration has increased the exposure to the toxins and probably has increased the influence of symptoms to occur.

The second following symptom found to be was coughing (84%), in which only 19% were having expectoration (sputum production) at evening time after completion of their work on a particular day, which implicates that the person may have accumulated all the toxins after exposing during daytime at work and until the end, the retention of secretions was particularly present at the end of working session.

Almost 30% of people were aware of the safety measures, but only 10% of people were using it. The safety measures

included the facemask, gloves, and uniform. The use of facemask was in the form of a piece of cloth. About 80% have confirmed the use of facemask and only 30% of people had uniform during their working period. Majority of them have started using safety measures after their symptoms have produced over prolonged period of exposure to toxins/paints. The substances being hazardous with spray painting has induced symptoms due to the lack of use of safety measures and also aggravated the persistent symptoms and their severity.

Addiction has evoked more addition to symptoms due to physiological changes which have occurred in respiratory system. In this study, 88% have reported addiction, in which 91% have smoking habit and 37% have alcohol consumption. The various studies have reported that smoking can increase both the severity of an occupational lung diseases and the risk of lung cancer. Hence, smoking addiction in addition to the inhalation of paints/toxins during work has reportedly increased their respiratory symptoms.[15]

In the study of Numan, the author has stated that the automobile spray painting is considered an occupation with a high risk of respiratory impairment and asthma. Exposure to organic solvents used for spraying might be of high risk for the development of dysfunction in other organs. There is a need of regular medical examinations and implementation of appropriate measures to prevent adverse respiratory effects of workplace exposure in automobile spray painters.[16]

According to the spray painters, the occupation of an automobile spray painting is a small-scale business and is the only source of income for their families. Majority of the spray painters lives in the slums of Mumbai suburb areas. Due to lack of awareness about the safety measures, lack of health checkups and screening by government organization led them to be reluctant about their health and as their livelihood is depending on their daily wages; they were compelled to continue their work in the least available resources.

Conclusion

In the current study, the prevalence of respiratory symptoms was high. Breathlessness was the most prevalent respiratory symptom in automobile spray painters followed by coughing. The lack of awareness and the use of safety measures with chronic addiction were the alarming factors in the respiratory symptoms and its severity.

Limitations

The study has a small sample size.

Recommendations

Proper health screenings should be conducted by the government organizations. Furthermore, the various awareness campaigns regarding risk and severity of respiratory symptoms and use of suitable safety equipment and safety measures during work should be conducted in automobile spray painting occupation.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- 1 Ford ES, Croft JB, Mannino DM, Wheaton AG, Zhang X, Giles WH, *et al.* COPD surveillance – United States, 1999-2011. *Chest* 2013;144:284-305.
- 2 Moore M, Little P, Rumsby K, Kelly J, Watson L, Warner G, *et al.* Predicting the duration of symptoms in lower respiratory tract infection. *Br J Gen Pract* 2008;58:88-92.
- 3 Woodhead M, Blasi F, Ewig S, Garau J, Huchon G, Ieven M, *et al.* Guidelines for the management of adult lower respiratory tract infections – Summary. *Clin Microbiol Infect* 2011;17 Suppl 6:1-24.
- 4 Aggarwal AN, Chaudhry K, Chhabra SK, D'Souza GA, Gupta D, Jindal SK, *et al.* Prevalence and risk factors for bronchial asthma in Indian adults: A multicentre study. *Indian J Chest Dis Allied Sci* 2006;48:13-22.
- 5 McKay AJ, Mahesh PA, Fordham JZ, Majeed A. Prevalence of COPD in India: A systematic review. *Prim Care Respir J* 2012;21:313-21.
- 6 Gardiner H. Delhi Wakes Up to an Air Pollution Problems it Cannot Ignore. *New York Times*; 2015. Available from: www.nytimes.com/2015/02/15/world/asia/delhi-wakes-up-to-an-air-pollution-problem-it-cannot-ignore.html. [Last

retrieved on 2015 May 30].

- 7 Ambient (Outdoor) Air Pollution in Cities Database 2014. World Health Organization; 2014. Available from: www.who.int/phe/health_topics/outdoorair/databases/cities-2014/en/. [Last retrieved on 2015 May 31].
- 8 Basu M. 89.6% of Deaths in Slums Due to Respiratory Diseases, Reveals IIPS Survey. Mumbai: The Indian Express; 2015.
- 9 Tornling G, Alexandersson R, Hedenstierna G, Plato N. Decreased lung function and exposure to diisocyanates (HDI and HDI-BT) in car repair painters: Observations on re-examination 6 years after initial study. *Am J Ind Med* 1990;17:299-310.
- 10 Janko M, McCarthy K, Fajer M, van Raalte J. Occupational exposure to 1,6-hexamethylene diisocyanate-based polyisocyanates in the state of oregon, 1980-1990. *Am Ind Hyg Assoc J* 1992;53:331-8.
- 11 Occupational Lung Diseases. Johns Hopkins Medicine Health Library. Baltimore, USA: The John Hopkins University; 2012. Available from: www.hopkinsmedicine.org/healthlibrary/conditions/adult/respiratory_disorders/occupational_lung_diseases_85, P01318. [Last retrieved on 2016 Jun 20].
- 12 Fabbri LM, Caramori G, Beghé B, Papi A, Ciaccia A. Physiologic consequences of long-term inflammation. *Am J Respir Crit Care Med* 1998;157:S195-8.
- 13 Hon Julia Gillard MP, Minister for Employment and Workplace Relations. Code of Practice under Subsection 70(1) of the Occupational Health and Safety Act 1991. Canberra, Australia: Minister for Employment and Workplace Relations; 1991. Available from: <http://www.legislation.gov.au/Details/F2008L02054>. [Last retrieved on 2016 Aug 17].
- 14 Abuelfadl A, El-Ebiary A, El-Maddah E, Ibrahim I, El-Shourbagy S. Pulmonary toxicity among car spray painters. *Mansoura J Forensic Med Clin Toxicol* 2010;18:51-64.
- 15 Ribeiro LI, Ind PW. Effect of cannabis smoking on lung function and respiratory symptoms: A structured literature review. *NPJ Prim Care Respir Med* 2016;26:16071.
- 16 Numan A. Effect of car painting vapours on pulmonary and liver function of automobile painting worker within Baghdad governorate area. *Al-Kindy Coll Med J* 2012;8:58-64.

Wednesday, October 17, 2018

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