Pak. J. Chest Med. 2026;32(01)

Original Article

journal homepage: https:/www.pjcm.net/

Pakistan Journal of Chest Medicine

Official journal of Pakistan Chest Society

Occupational Exposure and Associated Respiratory Diseases in Patients Presenting to a Tertiary Care Hospital in Peshawar

Safia Khanam[1], Aiman Hafeez[1], Anila Basit[2] ✉

[1]Khyber Girls Medical College, Peshawar - Pakistan [2]Department of Pulmonology, Lady Reading Hospital, Peshawar - Pakistan

Corresponding Author:
Anila Basit
Department of Pulmonology,
Lady Reading Hospital,
Peshawar - Pakistan
Email: anilalrh@gmail.com

Article History:

Received:	Aug 09, 2025
Revised:	Nov 05, 2025
Accepted:	Jan 14, 2026
Available Online:	Mar 02, 2026

Author Contributions:
AB conceived idea, SK drafted the study, SK AH collected data, AB did statistical analysis and interpretation of data, AB SK critical reviewed manuscript. All approved final version to be published.

Declaration of conflicting interests:
The authors declare that there is no conflict of interest.

How to cite this article:
Khanam S, Hafeez A, Basit A. Occupational Exposure and Associated Respiratory Diseases in Patients Presenting to a Tertiary Care Hospital in Peshawar. Pak J Chest Med. 2026;32(01):04-10.

ABSTRACT

Background: Occupational exposure to dust, fumes, gases, and chemical substances is an important cause of respiratory diseases across the world, especially in developing countries. Workers in industries such as construction, mining, agriculture, and textiles are at an increased risk of suffering from occupational respiratory diseases.

Objective: To assess occupational exposure and its association with respiratory diseases among patients presenting to a tertiary care hospital in Peshawar.

Methodology: A cross-sectional descriptive study was conducted in the Department of Pulmonology, Lady Reading Hospital, Peshawar from January to December 2024. In the present study, a structured questionnaire was used for collecting demographic information, occupational history, type of exposure, and duration of exposure. The study also involved clinical evaluation and investigations such as chest X-ray, spirometry, sputum examination, and CT scans for diagnosis.

Results: The highest percentage of participants was exposed to silica/cement dust (31.2%), followed by textile dust (17.5%) and coal dust (16.2%). Chronic obstructive pulmonary disease (COPD) was the most common respiratory disease observed (33.7%), followed by occupational asthma (22.5%), pneumoconiosis/silicosis (17.5%), hypersensitivity pneumonitis (12.5%), and other chronic respiratory diseases (13.7%).

Conclusion: Occupational exposure to dust, fumes, and chemical substances were the major factors that influences the occurrence of respiratory diseases. COPD and occupational asthma were the most common issues. It is necessary to strengthen the measures for ensuring occupational safety, the use of personal protective equipment, and the implementation of health screening programs to combat respiratory diseases.

Keywords: Occupational Exposure; Respiratory Diseases; Chronic Obstructive Pulmonary Disease; Occupational Asthma

Introduction

Occupational exposure to harmful substances is a major cause of respiratory diseases and morbidity in the world.[1] In many different industries, workers are often exposed to dust, fumes, gases, vapors, and biological agents, which have a harmful effect on lungs. Such exposures are often encountered in mining, construction, agricultural, manufacturing, textile, and chemical industries, among others, where protective measures are lacking. Long-term exposure to these harmful substances can cause a number of respiratory diseases, a group of diseases called as occupational respiratory diseases (ORDs). These respiratory diseases include pneumoconiosis, occupational asthma, chronic obstructive pulmonary disease (COPD), hypersensitivity pneumonitis, and lung cancer.[2,3]

Occupational respiratory diseases have emerged as an important public health issue due to their high rate of occurrence and their long-term impact on public health in general, as well as worker health and productivity in particular. Work-related respiratory diseases have been reported to account for 10–20% of all cases of chronic respiratory diseases in the whole world, thus underscoring their contribution to disease development. Moreover, workplace exposure to dust, fumes, vapors, and gases has been estimated to account for 10–15% of the total burden of COPD cases in the world. These diseases have also been reported to be underdiagnosed, given that their symptoms emerge gradually, sometimes even 10–20 years following initial exposure.

Among occupational respiratory diseases, pneumoconiosis, including silicosis and coal workers' pneumoconiosis, are frequently diagnosed, especially among those employees who were exposed to mineral dust.[4] Silicosis, resulting from inhalation of crystalline silica particles, is reported as one of the most commonly occurring occupational respiratory diseases in the world, especially in developing countries with poor industrial safety regulations.[5] Aside from pneumoconiosis, occupational asthma ranks as one of the most frequently reported occupational respiratory diseases and may contribute substantially to adult-onset asthma.[6,7] However, the likelihood of acquiring occupational asthma depends on various factors, including exposure duration and intensity, occupational agent, and individual susceptibility to those factors.

Developing countries are particularly at a high risk of suffering from occupational respiratory diseases because of their high rate of industrialization, lack of safety measures, and low awareness about the dangerous effects of occupational exposure to these harmful substances. The people working in these areas are not provided with personal protective equipment and are not subjected to regular check-ups, thus further increasing the risk of acquiring respiratory diseases. Research has been conducted in various industries, and the results have revealed a significant correlation between occupation and respiratory symptoms such as chronic cough, dyspnea, wheezing, and sputum production.

Pakistan, like many low- and middle-income countries, has a high workforce employed in industries that are prone to certain occupational hazards. The workforce in the construction industry, mining sector, brick kilns, textile mills, and manufacturing industries are often exposed to silica dust, chemical fumes, and biomass smoke and these substances are constantly harming their health. However, there is a lack of research that has been conducted to assess the risk of such exposure and its association with respiratory diseases in the local population. In cities such as Peshawar, the prevalence of industrial activities and construction is on the rise, thus there is a need to assess the risk factors for respiratory diseases in the local population. Such knowledge of the pattern of occupational hazards and their respiratory consequences is likely to guide measures aimed at prevention, safety, and early diagnosis and management of occupational lung diseases.

Objective

To assess the occupational exposure and its association with respiratory diseases among patients presenting to a tertiary care hospital in Peshawar.

Methodology

This cross-sectional descriptive study was carried out in the Department of Pulmonology, Lady Reading Hospital, Peshawar, Khyber Pakhtunkhwa, over a period of one year from January 2024 to December 2024. A total of 800 patients who were presenting with respiratory complaints to the outpatient department (OPD), emergency department and inpatient department were included in this study. The inclusion criteria were adult patients aged 18+ who were recruited through a non-probability consecutive sampling method, who had respiratory symptoms such as cough, dyspnea, wheezing, sputum production, or tightness in the chest, with a history of exposure to dust, fumes, gases, vapors, chemicals, or other noxious substances. The patients who were below 18 years of age, had incomplete occupational history, had been diagnosed with other congenital or non-occupational respiratory diseases prior to their employment, and who had declined to participate were excluded from the study.

A structured questionnaire was used to collect data, which included demographic data, occupational history, duration of exposure, and the type of occupational hazards and respiratory symptoms. Information about the age, gender, smoking habits, duration of employment, and use of personal protective equipment was collected

from the subjects. Occupational exposure was classified according to the type of hazard in the work environment, which included dust such as silica, coal, and cement dust, and fumes, gases, vapors, and chemical substances. The duration of occupational exposure in years was also recorded. A thorough clinical examination of all the patients was carried out under the guidance of a pulmonologist. Investigations such as chest X-ray, spirometry, sputum examination, and a computed tomography scan were carried out to establish the diagnosis of respiratory diseases. The respiratory diseases included in the study were chronic obstructive pulmonary disease, occupational asthma, pneumoconiosis, hypersensitivity pneumonitis, and chronic respiratory diseases.

The collected data was analyzed by using SPSS version 26.0. The chi-square test was used to measure the association of occupational exposure with respiratory diseases. The results were considered statistically significant if the probability value was less than 0.05. The ethical clearance for the study was obtained from the ethical committee of the Lady Reading hospital. Informed consent was taken from all the patients for the study. The confidentiality of the patients' information was maintained.

Results

In the present study, 800 participants were included in the study. The highest number of participants (200 (25.0%) were from age group 31 to 40 years. Males were more (68.7%) as compared to female. Concerning the smoking habits of the participants, 60% of the participants were non-smokers, while 40% of the participants were smokers (Table 1).

The highest percentage of exposure was silica/cement dust, with 250 participants (31.2%) being exposed to this type of dust. The second highest percentage of exposure was textile dust, with 140 participants (17.5%) being exposed to this type of dust. Coal dust exposure was seen in 130 participants (16.2%). Exposure to chemical fumes/vapors was seen in 120 participants (15%), whereas exposure to agricultural dust/biomass smoke was seen in 90 participants (11.2%). The lowest percentage of exposure was mixed exposure, seen in 70 participants (8.7%) (Table 2).

Chronic obstructive pulmonary disease (COPD) was the most prevalent disease, with 270 people (33.7%) having this condition. Occupational asthma was the second most prevalent, with 180 people (22.5%) having this disease. Pneumoconiosis, including silicosis, affected 140 people (17.5%), while hypersensitivity pneumonitis affected 100 people (12.5%). Other chronic respiratory diseases were also prevalent, with 110 people (13.7%) having this condition. It is clear that COPD and occupational asthma were predominant in this study population (Table 3; Figure 1).

Discussion

In this study, the pattern of occupational exposure and its association with respiratory diseases were evaluated in a

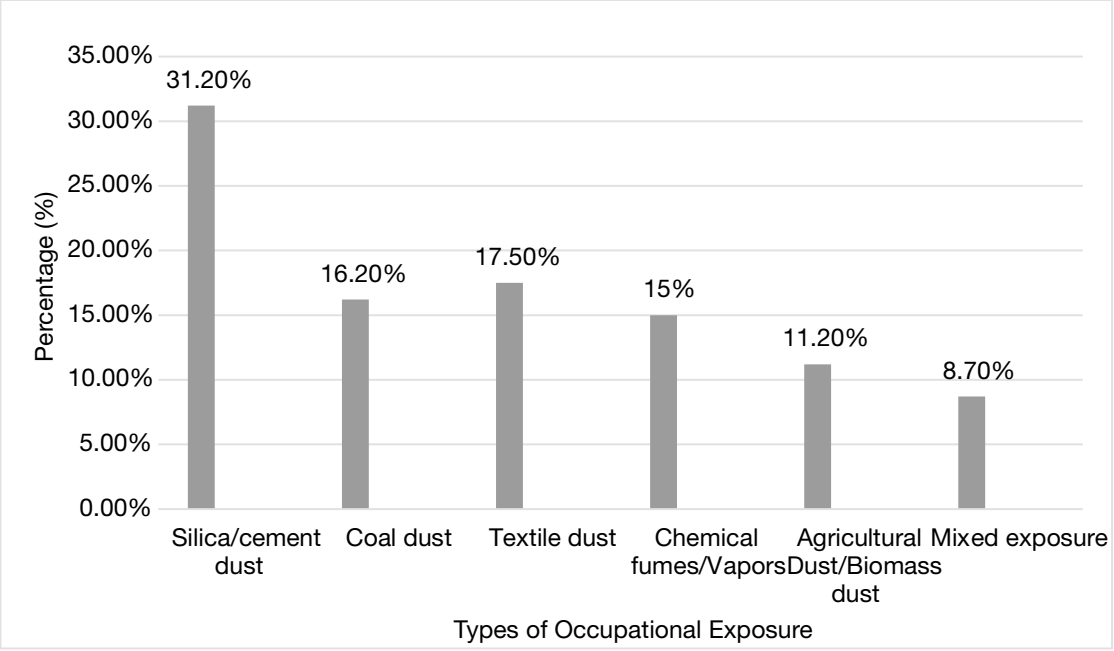

Figure 1. Distribution of Occupational Exposure Types among Participants

tertiary care hospital in Peshawar. Occupational exposure is a risk factor for chronic respiratory disease, and it is not commonly recognized in many parts of the world, especially in developing countries where work safety is not properly regulated. The results of this study show a high prevalence of occupational respiratory disease in people exposed to dust, fumes, and industrial pollutants.

In this current study, it was found that a larger number of participants were in the range of 31–40 years of age group (25%), which was considered as a productive age group, followed by 41–50 years (22.5%) of age group. Such a finding in terms of age distribution is also seen in various studies carried out on occupational health, where middle-aged people are found to have the largest proportion of occupationally exposed people, as they are more likely to have been employed for a longer duration and thus more likely to be exposed to hazardous substances in their work environment. Whereas in a study carried out by Vinnikov et al., (2019), it was found that the role of age in the prevalence of COPD could not be overlooked. In people aged 40+ years, 5.6% of people were found to be affected by COPD, where men were more affected than women (8.7% vs 3.4%).[8]

A dominance of male participants was noted in the study. A majority of the participants in the study were male (68.7%). This is in line with the studies carried out in the occupational setting where the dominant workforce in industries such as mining, construction, and manufacturing is male. According to Heimann and his colleagues (2023), in their study on industrial mining work, the workforce in industrial settings is dominated by men due to the masculine culture of the work environment.[9]

From the distribution of occupational exposure, our study revealed that the most common occupational exposure to dust and other particles was silica and cement dust (31.2%), followed by textile dust and coal dust (17.5% and 16.2%, respectively). These findings are consistent with the occupational status of the region, where construction activities, brick kilns, and textile industries are the main sources of employment. Occupational exposure to silica dust has also been reported as one of the major occupational hazards and occupational diseases, particularly silicosis and chronic obstructive pulmonary disease. According to the study by Poinen-Rughooputh and colleagues (2016), the occupational exposure to crystalline silica dust increases the risk of lung cancer among workers with silicosis and workers in the mining industry.[10] However, according to the study by Rathebe (2023), the occupational exposure to silicon dioxide dust among workers involved in the cement industry increases the risk of chronic respiratory symptoms, particularly chronic cough, phlegm, wheezing, and shortness of breath. It has also been revealed that the workers exposed to silicon dioxide dust

Table 1. Demographic Characteristics of Study Participants

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18–30	170	21.2 %
31–40	200	25 %
41–50	180	22.5 %
51–60	160	20 %
>60	90	11.2 %
Gender		
Male	550	68.7 %
Female	250	31.2 %
Smoking Status		
Smoker	320	40 %
Non-smoker	480	60 %

Table 2. Distribution of Occupational Exposure Types

Type of Occupational Exposure	Frequency (n)	Percentage (%)
Silica/Cement Dust	250	31.2 %
Coal Dust	130	16.2 %
Textile Dust	140	17.5 %
Chemical Fumes/Vapors	120	15 %
Agricultural Dust/Biomass Smoke	90	11.2 %
Mixed Exposure	70	8.7 %

have lower lung function than the controls.[11]

On the other hand, another study by Omidianidost et al., (2019) found that exposure to cement dust, particularly respirable dust containing crystalline silica above safe limits, impairs the pulmonary function of the worker. The study found that exposure to cement dust reduces the peak expiratory flow (PEF).[12] While one of the studies, as revealed by Ahmad (2023), also found that exposure to cement dust causes an increase in the total and differential count of white blood cells. The longer the exposure to cement dust, the more the WBC changes.[13] Studies carried out among construction and mining workers have shown a strong association between the long-term exposure of the worker to silica dust and the development of chronic lung diseases.

Likewise, exposure to textile dust has also been linked to various respiratory diseases such as byssinosis and chronic inflammation of airways. According to a research study carried out by Hinson et al., (2016), the results showed that workers exposed to cotton dust in the textile industry reported a higher incidence of respiratory symptoms such as chronic cough, dyspnea, chronic bronchitis, and byssinosis compared to those who were not exposed.[14] However, according to a research study carried out by Khan (2022), the results showed that female textile workers in Faisalabad and Lahore reported a higher incidence of byssinosis and respiratory symptoms. The results also showed that the longer the working hours, the higher the incidence of the disease.[15] According to another research study carried out by Poole et al., (2021), exposure to organic dust in the workplace, especially in agriculture, can cause various airway diseases such as acute and chronic airway diseases. This type of dust contains a complex mixture of biological materials that can cause inflammation in the airway, which can increase the risk of diseases such as asthma, COPD, and byssinosis.[16]

In the present study, the most common diagnosed respiratory diseases were chronic obstructive pulmonary diseases, which affected 33.7% of the population. This is in accordance with the evidence that has been established globally that occupational exposure is a major contributor to the development of COPD. Various studies have been conducted to estimate that around 10-15% of the population of people with COPD globally is due to occupational exposure to dust, fumes, and chemical vapors. As a study conducted by Murgia (2022) stated that occupational exposure to vapours, gases, dusts, and fumes has been reported to significantly contribute to the development and progression of COPD with a population attributable fraction of 14%.[17] Another study conducted by Minov (2022) stated that occupational exposures to dusts, gases, fumes, and vapors significantly contribute to the development of COPD.

In addition to cigarette smoking, long-term exposure to work-related pollutants has also been identified as a major risk factor for airflow limitation and chronic respiratory symptoms.[18]

Occupational asthma was the second most prevalent condition in the present study, with a prevalence of 22.5%. Similar results have been obtained in the studies concerning the prevalence of occupational respiratory diseases in industrial workers. Occupational asthma is believed to be one of the most common occupational respiratory diseases and may be responsible for a significant percentage of adult-onset asthma. Exposure to chemical fumes, textile fibers, and other sensitizing substances in the workplace is believed to be a major cause of airway hyper-responsiveness and asthma symptoms. According to the results of the study by Jaakkola et al., (2021), occupational exposure may be related to different subtypes of adult-onset asthma. Jobs in the chemical industry, metal work, agriculture, and electronics industry may increase the risk of atopic asthma, non-atopic asthma, and asthma-COPD overlap syndrome (ACOS).[19]

In this study, it was found that pneumoconiosis, including silicosis, was diagnosed in 17.5% of the participants. This is an indicator of the continued burden of dust-related lung diseases in developing countries. Other studies

Table 3. Respiratory Diseases Diagnosed Among Participants

Respiratory Disease	Frequency (n)	Percentage (%)
Chronic Obstructive Pulmonary Disease (COPD)	270	33.7 %
Occupational Asthma	180	22.5 %
Pneumoconiosis (including silicosis)	140	17.5 %
Hypersensitivity Pneumonitis	100	12.5 %
Other Chronic Respiratory Diseases	110	13.7 %

among miners and construction workers found similar correlations with dust exposure in the workplace. The study by Su (2023) found that the incidence of pneumoconiosis among occupational workers worldwide is about 9.3%. The main risk factors for developing the diseases include being male, being a smoker, older age, and longer dust exposure.[20] The diseases continue to be prevalent among workers due to inadequate workplace safety measures, inadequate dust control, and lack of health surveillance. Moreover, hypersensitivity pneumonitis was found among 12.5% of the study population in our study, and this may be related to exposure to organic dusts, agricultural materials, and biomass smoke.

The results of the present study highlight the need for better workplace safety regulations, regular health screening of the employees, and the use of PPE in high-risk jobs. Increased awareness among the employees and employers regarding the occupational hazards and symptoms of respiratory diseases is also necessary for the prevention of the disease. Better occupational health policies and the implementation of effective preventive measures may help in the prevention of occupational respiratory diseases in Pakistan and other developing countries.

Conclusion

The present study has emphasized the importance of the impact of occupational respiratory diseases in patients exposed to various occupational hazards in Peshawar. Exposure to dust, fumes, and chemical substances, including silica and cement dust, is a major occupational hazard for many workers. Chronic obstructive pulmonary disease and occupational asthma are the most commonly occurring occupational respiratory diseases, followed by pneumoconiosis and hypersensitivity pneumonitis. The results of the present study emphasize the need for better safety regulations and the need for effective dust control measures and the importance of health screening of all workers and the use of personal protective equipment. Awareness of the importance of occupational hazards is necessary for the prevention of the impact of occupational respiratory diseases.

References

1. Nishida C, Yatera K. The impact of ambient environmental and occupational pollution on respiratory diseases. Int J Environ Res Public Health. 2022;19(5):2788. DOI:10.3390/ijerph19052788.
2. Cullinan P, Muñoz X, Suojalehto H, Agius R, Jindal S, Sigsgaard T, et al. Occupational lung diseases: from old and novel exposures to effective preventive strategies. Lancet Respir Med. 2017;5(5):445-455. DOI:10.1016/S2213-2600(16)30424-6.
3. Yasmeen R, Hafeez F. Occupational exposure of the emissions on the respiratory system of the workers belonging to different industries. Arch Respir Res. 2023;2(1).
4. Baur X, Sanyal S, Abraham JL. Mixed-dust pneumoconiosis: Review of diagnostic and classification problems with presentation of a work-related case. Sci Total Environ. 2019;652:413-21. DOI:10.1016/j.scitotenv.2018.10.083.
5. Hoy RF, Chambers DC. Silica-related diseases in the modern world. Allergy. 2020;75(11):2805-17. DOI:10.1111/all.14202.
6. Tiotiu AI, Novakova S, Labor M, Emelyanov A, Mihaicuta S, Novakova P, et al. Progress in occupational asthma. Int J Environ Res Public Health. 2020;17(12):4553. DOI: 10.3390/ijerph17124553.
7. Dao A, Bernstein DI. Occupational exposure and asthma. Ann Allergy Asthma Immunol. 2018;120 (5):468-75. DOI:10.1016/j.anai.2018.03.026.
8. Vinnikov D, Raushanova A, Kyzayeva A, Romanova Z, Tulekov Z, Kenessary D, et al. Lifetime occupational history, respiratory symptoms and chronic obstructive pulmonary disease: results from a population-based study. Int J Chron Obstruct Pulmon Dis. 2019;3025-34. DOI:10.2147/COPD.S229119.

9. Heimann S, Johansson K, Franklin WT. Gender in industrial mine work and organizations. A review of an expanding research field. Extr Ind Soc. 2023;16: 101371. DOI:10.1016/j.exis.2023.101371.

10. Poinen-Rughooputh S, Rughooputh MS, Guo Y, Rong Y, Chen W. Occupational exposure to silica dust and risk of lung cancer: an updated meta-analysis of epidemiological studies. BMC Public Health. 2016;16(1):1137. DOI:10.1016/j.exis.2023. 101371.

11. Rathebe PC. Occupational exposure to silicon dioxide and prevalence of chronic respiratory symptoms in the cement manufacturing industries: A review. J Public Health Res. 2023;12(4). DOI:10. 1177/22799036231204316.

12. Omidianidost A, Gharavandi S, Azari MR, Hashemian AH, Ghasemkhani M, Rajati F, et al. Occupational exposure to respirable dust, crystalline silica and its pulmonary effects among workers of a cement factory in Kermanshah, Iran. Tanaffos. 2019;18(2): 157-162.

13. Ahmad R, Akhter QS, Haque M. Occupational cement dust exposure and inflammatory nemesis: Bangladesh relevance. J Inflamm Res. 2021:2425-44. DOI:10.2147/JIR.S312960.

14. Hinson AV, Lokossou VK, Schlünssen V, Agodokpessi G, Sigsgaard T, Fayomi B. Cotton dust exposure and respiratory disorders among textile workers at a textile company in the southern part of Benin. Int J Environ Res Public Health. 2016;13(9): 895. DOI:10.3390/ijerph13090895.

15. Khan M, Muhmood K, Noureen S, Mahmood HZ, Amir-ud-Din R. Epidemiology of respiratory diseases and associated factors among female textile workers in Pakistan. Int J Occup Saf Ergon. 2022;28(1):184-98. DOI:10.1080/10803548.2020.1751973.

16. Poole JA, Quirce S, Siracusa A, Carmona MJ, Johnson AN, Malo JL, et al. Airway diseases due to organic dust exposure. Asthma in the Workplace 2021;293-302. CRC Press.

17. Murgia N, Gambelunghe A. Occupational COPD—The most under-recognized occupational lung disease?. Respirol. 2022;27(6):399-410. DOI:10.1111/resp.14272.

18. Minov J. Occupational chronic obstructive pulmonary disorder: prevalence and prevention. Expert Rev Respir Med. 2022;16(4):429-36. DOI:10.1080/17476348.2021.2011722.

19. Jaakkola MS, Lajunen TK, Heibati B, Wang YC, Lai CH, Jaakkola JJ. Occupation and subcategories of asthma: a population-based incident case–control study. Occup Environ Med. 2021;78(9):661-8.

20. Su X, Kong X, Yu X, Zhang X. Incidence and influencing factors of occupational pneumoconiosis: a systematic review and meta-analysis. BMJ Open. 2023;13(3):e065114. DOI:10.1136/bmjopen-2022-065114.