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Review Article

Dentistry and idiopathic pulmonary fibrosis: Occupational hazards for dentists

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ABSTRACT

Dental practice is associated with several occupational hazards. This can sometimes be avoided or minimized by taking precautions to reduce the risk of exposure. Occupational hazards can be categorized as risk of infection, disease transmission and exposure to physical, chemical injury and toxic materials. In dentistry, Idiopathic pulmonary fibrosis (IPF) could be a lethal lung disease.

1. Introduction

Pulmonary fibrosis is a lung disease that occurs when lung tissue becomes damaged and scarred.[1,2] This thick, hard tissue makes it difficult for the lungs to function properly. As pulmonary fibrosis worsens, shortness of breath becomes more frequent. Scarring associated with pulmonary fibrosis is caused by a variety of factors. However, in most cases, doctors cannot identify the cause of the problem. If no cause is found, the condition is called idiopathic pulmonary fibrosis. The Centers for Disease Control and Prevention (CDC) has identified work-related risks for dentists and dental hygienists in the United States.[3] Data from tertiary care hospitals included 894 cases of idiopathic pulmonary fibrosis between 2000 and 2015 involving 8 dentists. Patients were of 64 years of age, survival time was 3 years from the initial diagnosis and 7 out of 9 patients died.

Idiopathic pulmonary fibrosis (IPF) is a progressive lung inflammation that involves lung scarring and fibrosis due to collagen deposition in the cells lining the bronchial alveolar spaces. The etiology of IPF is not fully understood, but this disorder is associated with exposure to viral infections, cigarette smoke, metal, coal dust, and agriculture.[4] IPF is a chronic condition with a median survival of 3-5 years.[5]

In dentistry, IPF is first known among dentists. There is a 23-times increase in the incidence of population and number of dentists in a locality. However, the report notes that dentists and others in the profession are exposed to environmental hazards in which they may live, which may pose a significant risk of developing IPF if workers do not have protective equipment and other safety measures. Although lung damage from pulmonary fibrosis cannot be repaired, medications and treatments can relieve symptoms and improve quality of life. Lung transplantation may also be appropriate.

2. Signs and Symptoms of Pulmonary Fibrosis Include[6]

Dyspnea (shortness of breath), dry cough, fatigue, unexplained weight loss, muscle and joint pain. The severity of the symptoms varies greatly from person to person. Some people get sick very quickly from

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serious illnesses. Some people have moderate symptoms that slowly worsen over months or years. Some people experience a rapid worsening of symptoms (acute exacerbation), such as severe shortness of breath lasting days to weeks. People with acute exacerbations can be put on a ventilator. Doctors may also prescribe antibiotics, corticosteroids, or other drugs to treat acute exacerbations. Pulmonary fibrosis causes scarring and thickening of tissue around and between the air sacs (alveoli) of the lungs.[7] This makes it harder for oxygen to enter the bloodstream. Damage can be caused by a variety of factors, including long-term exposure to certain toxins, certain medical conditions, radiation therapy and some drugs.Occupational and Environmental Factors.[8] Pollutants and toxins long-term exposure can affects the lungs. Asbestos fibers, radiation therapy, dust of silica hard metal, grain, coal, bird and animal droppings

2.1. Primary treatment of radiation therapy:[9]

Many medications can damage the lungs, especially drugs such as: Chemotherapy drugs. Drugs designed to kill cancer cells, such as methotrexate and cyclophosphamide, can also damage lung tissue. Some drugs used to treat arrhythmia, such as amiodarone, can damage lung tissue. Some antibiotics such as nitrofurantoin and ethambutol can damage the lungs. Anti-inflammatory agents like rituximab and sulfasalazine, can damage the lungs.

Disorders[10] Researchers have several theories about what causes idiopathic pulmonary fibrosis, including viruses and cigarette smoke. Additionally, some forms of idiopathic pulmonary fibrosis occur within families, and heredity may play a role in idiopathic pulmonary fibrosis. Many people with idiopathic pulmonary fibrosis may also have gastroesophageal reflux disease (GERD). This is a condition that occurs when stomach acid backs up into the esophagus. Ongoing studies are investigating whether GERD is a risk factor for idiopathic pulmonary fibrosis or whether GERD may lead to more rapid disease progression. However, further studies are needed to determine the association between idiopathic pulmonary fibrosis and GERD.

Risk Factors Factors that predispose to pulmonary fibrosis include:

1. Age: Although pulmonary fibrosis has been diagnosed in children and infants, the condition is more common in middle-aged and older adults.
2. Gender: Idiopathic pulmonary fibrosis tends to affect men more than women.
3. Smoking. Smokers and ex-smokers develop pulmonary fibrosis much more often than never smokers. Pulmonary fibrosis can occur in patients with emphysema.
4. Specific Occupations. If patient work in mining, farming, or construction, or if exposed to pollutants known to damage the lungs, then at a higher risk of developing pulmonary fibrosis.
5. Treatment: Radiation to the chest and use of certain chemotherapy drugs may increase the risk of pulmonary fibrosis.
6. Genetic factors. Some types of pulmonary fibrosis run in families and genetic factors may be a component.

2.2. Risk of infection by microorganisms and infectious diseases

Risks of exposure to microorganisms in the dental setting include diseases affecting the lungs. A 1987 study in Australia concluded that dental professionals were at high risk of Legionella infection.[11] Studies conducted after 1998, a meta-analysis of 7 studies showed an increased risk of Legionella infection for dental workers and there was no evidence of differences by municipality water supply.[12] American Dental Association Health Screening Program which was conducted between 2002 to 2012[13] coincide with the findings and risk levels among population.

3. Other Lung Disorders

Occupational lung disease is more common in dental technicians than in dentists.[6] Lung diseases affecting dental technicians include asthma, emphysema, silicosis, asbestosis, granulomatosis, and pneumoconiosis.[6] This is associated with a lack of protection (e.g dust mask) from chromium. - against the effects of cobalt-molybdenum solutions, beryllium, silicon, asbestos, acrylic dust and other materials. CDC report from 1994 to 2000, when exposure to the silica dust, in 9 dental laboratory technicians from different parts of the United States, silicosis was confirmed.[7] Asbestos and berylliosis were also diagnosed in one of the cases.

In 2017, six elderly dentists in the United States were reported to have been diagnosed with malignant mesothelioma, linked to brief exposure to asbestos-containing dental tape used to fill rings in the 1970s. In 2017, 4 cases of dental mesothelioma were reported in Italy and one previous case was published. These are few accidents, but with proper precautions, they can be avoided.

3.1. Lung disease is identified as an occupational hazard in dental professionals and staff

As an occupational hazard, lung disease is identified as not uncommon among dental professionals. These are IPF, pneumoconiosis, asthma, asbestosis, granulomatosis, silicosis, malignant mesothelioma and beryllium. Respiratory sensitivity has been reported among dentists and dental hygienists. In Finland, 62 cases were diagnosed between 1989 and 1998, compared to 2 cases between 1975

and 1989. By 1995, the prevalence of respiratory sensitivity was twice that of the general population.[12] Twenty-eight cases of rhinitis and asthma were reported, out of these 24 resulting from exposure to methacrylates. Among 800 dental assistants, daily exposure to methacrylates doubled the risk of asthma in adults, and increased the risk of nasal sensitivity or cough / phlegm by 37% and 69%, respectively.[14] The risk of asthma increased by more than 300% among individuals.[14]

3.2. Complications of pulmonary fibrosis include:[15]

1. High blood pressure in the lungs (pulmonary hypertension). Unlike systemic hypertension, this condition affects only the pulmonary arteries. It begins when the smallest arteries and capillaries are compressed by scar tissue, increasing resistance to blood flow in the lungs. Some forms of pulmonary hypertension are serious, progressively worsening and sometimes fatal conditions.
2. Right heart failure (cor pulmonale). This serious condition occurs when the heart's lower right chamber (ventricle) must pump harder than usual to move blood through a partially blocked pulmonary artery.
3. Respiratory failure. This is often the final stage of chronic lung disease. It occurs when blood oxygen levels become dangerously low.
4. Lung cancer. Long-term pulmonary fibrosis also increases the risk of developing lung cancer.
5. Pulmonary complications. As pulmonary fibrosis progresses, complications such as lung clots, collapsed lungs, or lung infections can occur.

4. Implications for Dentistry

Appropriate personal protective equipment is essential to prevent and reduce injury, the spread of disease, and exposure to chemicals and other hazardous materials. Additional measures needed to reduce pathogen exposure and infection risk include following good hand hygiene, vaccination, personal protective equipment, and other infectious disease prevention and control measures.

The need for respiratory protection is emphasized by the CDC report, and respirators approved by the National Institute for Occupational Safety and Health (NIOSH) are recommended.[4] People with sensitivities or allergies to specific materials and chemicals should avoid use. Chemicals and materials must be handled and stored in accordance with the manufacturer's recommendations, instructions for use and regulations. Safety and health requirements must be observed. Safety data sheets should provide detailed information on chemicals, hazards, exposure routes, and care.

5. Conclusion

Dental technicians, dentists and dental hygienists should be aware of the inhalation hazards and occupational risks associated with dentistry. To avoid the injury risk, dental professionals including dental technicians and dental hygienists are required to meticulously follow the prevention guidelines, and control the infection, the spread of microorganisms and disease, and exposure to toxic substances.

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7. Conflict of Interest

None declared.

References

1. Saccucci M, Ierardo G, Protano C, Vitali M, Polimeni A. How to manage the biological risk in a dental clinic: current and future perspectives. *Minerva Stomatol*. 2017;66(5):232–9. doi:10.23736/S0026-4970.17.04087-0.
2. Bârlean L, Dănilă I, Săveanu I, Balcoş C. Occupational health problems among dentists in Moldavian Region of Romania. *Rev Med Chir Soc Med Nat Iasi*. 2013;117(3):784–8.
3. Nett RJ, Cummings KJ, Cannon B, Cox-Ganser J, Nathan SD. Dental personnel treated for idiopathic pulmonary fibrosis at a tertiary care center - Virginia. *MMWR Morb Mortal Wkly Rep*. 2000;67(9):270–3. doi:10.15585/mmwr.mm6709a2.
4. Kuehn B. Dentists at risk of lung disease? *J Am Med Assoc*. 2018;319(16):1650. doi:10.1001/jama.2018.4585.
5. Richeldi L, Collard HR, Jone MG. Idiopathic pulmonary fibrosis. *Lancet*. 2017;389:1941–52.
6. Meltzer EB, Noble PW. Idiopathic pulmonary fibrosis. *Orphanet J Rare Dis*. 2008;3:8. doi:10.1186/1750-1172-3-8.
7. Centers for Disease Control and Prevention (CDC). Silicosis in dental laboratory technicians–five states, 1994-2000. *MMWR Morb Mortal Wkly Rep*. 1994;53(9):195–7.
8. Markowitz SB, Moline JM. Malignant mesothelioma due to asbestos exposure in dental tape. *Am J Ind Med*. 2017;60(5):437–2.
9. Ryu JH, Moua T, Daniels CE, Hartman TE, Yi ES, Utz JP, et al. Idiopathic pulmonary fibrosis: evolving concepts. *Mayo Clin Proc*. 2014;89(8):1130–42. doi:10.1016/j.mayocp.2014.03.016.
10. Raghu G. The role of gastroesophageal reflux in idiopathic pulmonary fibrosis. *Am J Med*. 2003;115(3A):60–4. doi:10.1016/s0002-9343(03)00195-5.
11. Reinthaler F, Mascher F, Stünzner D. Legionella pneumophila: seroepidemiologic studies of dentists and dental personnel in Austria. *Zentralbl Bakteriol Mikrobiol Hyg B Umwelthyg Krankenhaushyg Arbeitshyg Prav Med*. 1987;185(1-2):164–70.
12. Petti S, Vitali M. Occupational risk for Legionella infection among dental healthcare workers: meta-analysis in occupational epidemiology. *BMJ Open*. 2017;7(7):e015374.
13. Estrich CG, Gruninger SE, Lipman RD. Rates and predictors of exposure to Legionella pneumophila in the United States among dental practitioners: 2002 through 2012. *J Am Dent Assoc*. 2017;148(3):164–71.
14. Varga J, David A, Brenner SH, Phan. Pulmonary Fibrosis. *Fibrosis Research*. 2005;117:3–44.
15. Cano-Jiménez E, González FH, Peloche GB. Comorbidities and Complications in Idiopathic Pulmonary Fibrosis. *Med Sci (Basel)*. 2018;6(3):71. doi:10.3390/medsci6030071.

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