

## **Evaluation of Aptitude and Knowledge of Occupational Hazards among Dental Practitioner in India: A Cross Sectional Study**

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### **Abstract**

**Introduction:** Every occupation has its own hazards and risks. Occupational hazard is defined as a risk to a person in his working environment. It can be a fatal accident, minor to severe injuries, allergic and systemic effects. Besides these consequences which occur immediately, there are those that appear at a latter period.

**Aim & Objective:** To evaluate of aptitude and knowledge of occupational hazards in India among dental practitioner.

**Materials & Methods:** A quick online cross-sectional study was conducted among Dentists in India with approval sought from IEC. The questionnaire was sent to 410 Dentists in India, out of those 335 responded. Chi square test was employed. P value ( $<0.05$ ) was considered statistically significant.

**Results:** 77.8% Dental professionals responded that occupational hazard is risk to a person in a working environment. 64.8% dentists want to know about occupational hazards to protect ourselves & our colleagues from occupational hazards.

**Conclusion:** Several occupational hazards and risks remain a serious concern in a Dental practice, particularly Musculoskeletal disorders, contact dermatitis, high speed projectiles and bio-aerosols.

**Keywords:** Occupational hazards, Dental practitioners, Dentistry, Dental professionals.

**Introduction:** Every occupation has its own hazards and risks. Occupational hazard is defined as a risk to a person in his working environment. It can be a fatal accident, minor to severe injuries, allergic and systemic effects. Besides these consequences which occur immediately, there are those that appear at a latter period. According to World Health Organization the term "hazard" refers to an inherent property of an agent, or situation having the potential to cause adverse effects when an organism, system, or population is exposed to that agent.(1) Approximately 70% of the population in the western world become infected with the herpes simplex virus type 1 (HSV-1) by the second decade of life. This review discusses the role of the HSV-1 as a potential occupational hazard for dental workers, focusing on herpes labialis, herpetic whitlow and keratitis.(2)

The most conscientious physicians are at especially high risk for being stuck by a contaminated needle. Those who continue to work even when they are very fatigued, who push themselves to draw blood from the "hardstick" patient or perform the extra procedure when they should be resting, are highly susceptible to needle injuries.(3)

The formation of a deep arch anteriorly at the wrist by the carpal bones and the flexor retinaculum is called the carpal tunnel . Medially, the pisiform and the hook of the hamate form the base of the carpal arch, while laterally it is formed by the tubercles of the scaphoid and trapezium. The carpal arch becomes the carpal tunnel when the flexor retinaculum, which is a thick connective tissue ligament, bridges the space between the medial and lateral sides of the base of the arch.(4)

Occupational health hazards are common in many sectors and are on the increase. Musculoskeletal disorder (MSD) is one obvious hazard and is significant and costly workplace problem. It is characterized by the presence of discomfort, disability or persistent pain in the joints, muscles, tendons and other soft parts, caused or aggravated by repeated movements and prolonged awkward or forced body postures.(5) The oropharynx is the primary site of colonization of potential respiratory pathogens and oral biofilm acts as a reservoir for these pathogens.(6)

Alzheimer disease (AD) is the most common dementing illness in the world. Neuro inflammation is recognized as a fundamental response of the central nerve system (CNS) not only to acute injury, but also to chronic neurodegenerative disease. Neuro inflammatory changes in AD include the robust activation of microglia and astrocytes, and the release of proinflammatory cytokines, cell adhesion molecules and chemokines.(7)

In recent years, ergonomics applied in dentistry has gained increasing relevance. This is mainly due to the constantly rising numbers of dentists, who have expressed work-related pain pathologies, especially in the neck, shoulder and/or back area.(8)

Dental health education can be delivered to groups of people in a broad scope through dental practices, at schools, the workplace, day care and residential settings for older adults. Oral health education aims to improve overall knowledge, which may lead to the adoption of favourable oral health behaviours that in return lowers oral health morbidity.(9) Minimal research exists evaluating respiratory-related occupational hazards associated with dentistry in the United States. In the 1990s, malignant mesothelioma secondary to asbestos exposure from asbestos-containing paper used for molds in casting was identified in dentists.<sup>1</sup> Cases of pneumoconiosis among dental personnel are believed to be due to exposure to dust and respirable material from dental prostheses and supplies.(10) Dental practitioners are exposed to different occupational hazards during the course of their professional activity, such as physical, chemical, biological, ergonomic factors. The ergonomic hazards, caused by strained posture and prolonged repetitive movements, can induce musculoskeletal disorders. It occurs in 54–93% of dental professionals and involve the spine, shoulder and hand-wrist tract.(11)

Dentists are at risk of physical hazards during dental work. Eye fatigue, eye pain may occur due to poor illumination. Moreover use of suction, high-speed turbines and ultrasonic scalar results in temporary or permanent hearing loss. Musculoskeletal disorders are a common health problem among dentists. Stress, professional burnout, anxiety and depression are common psychological hazards that can occur during dental work.(12) In all societies, the burden and cost of non-communicable diseases (NCDs) are increasing rapidly as advances in sanitation, public health measures and clinical care result in changes in demography. Most, if not all, economies are struggling to deliver modern health care effectively. Budgets will continue to be challenged with the move towards universal health coverage as demand increases and newer, more expensive technologies become available.(5)

Dental anxiety and fear are common, and estimates of prevalence range between 15% and 35% in the literature, depending on the study population and tool used for measuring anxiety and fear. Clinicians have attempted a wide range of antianxiety approaches to managing patients, albeit with varying success or added risks of adverse events.(13) Dental prosthesis laboratories (DPLs) are among the workplaces where predominantly manual production takes place. In such working environments, during the manual manufacturing process, which involves fine smoothing and polishing of dental prostheses, fine particulate matter is released into the ambient air. In this study, the particulate matter (PM) concentrations and elemental content of the fine particles in the working ambient air were identified in six DPLs in Kocaeli, Turkey.(14)

Acid mist can suspend in the air and enter the body via skin contact, the respiratory tract, or even oral intake, which pose various health hazards. Previous studies have shown that occupational exposure to acid mist or acidic solutions is a major risk factor for oral diseases. However, the findings are inconsistent and do not consider individual factors and lifestyles that may cause the same oral diseases.(15) Dental care has been revolutionized due to information

explosion and technical advances, as a result of these advances quality care can be provided to the population but while doing so, dentist and their teams exposed to a number of hazards peculiar to this profession leading to various ailments specific to the profession that develop and intensify with years.(16)

Therefore the present study is carried out to evaluate the aptitude and knowledge of occupational hazards in India among dental practitioner

### **Population & Method:**

A quick online cross-sectional study was conducted among Dentists in India with approval sought from IEC. The questionnaire was sent to 410 Dentists in India, out of those 335 responded. The study objective and questionnaire were sent to Dentists via “Google Forms”. A questionnaire was prepared and validated. The close ended questions were sent to participants to collect response. There was an active participation from all the Dentists. Data was obtained from the participants using a semi-structured self administered and validated questionnaire which included details on knowledge, attitude and practice towards Occupational hazards in India. (Table 1,2)

### **Statistical analysis:**

Statistical analysis was done by using descriptive statistics using frequency and percentages and software used in the analysis was SPSS 22.0 version. Chi square test was employed. P value ( $<0.05$ ) was considered statistically significant.

### **Results:**

75.9% dentists knows that hazard refers to an inherent property of an agent, or situation having the potential to cause adverse effects when an organism, system, or population is exposed to that agent. 77.8% Dental professionals responded that occupational hazard is risk to a person in a working environment. 64.8% dentists want to know about occupational hazards to protect ourselves & our colleagues from occupational hazards. 61.1% dentists from India state that infectious, non-infectious, ergonomics, psychosocial are types of occupational hazards related to dentistry.

Dentists state that 79.6% hazards are infectious and dangerous to dentistry. 84.3% Dentists knows about vibration syndrome. 81% of dentists consider that physical and chemical both are most common non infectious hazards. 57 % dentists says that the direct physical trauma includes accidental skin cuts and abrasions due to the usage of blunt or broken instruments or high speed projectile during trimming and polishing denture. The direct physical trauma includes fatal skin cuts and abrasions due to the usage of sharp or broken instruments or low speed projectile during trimming and polishing denture.

54% dentists consider that potential that can act as portal entry for infections or toxic material. Definitive act as portal entry for infections or toxic material. Majority of dentists says that the most common physical injuries in the decreasing order in dental practice are Burns from Bunsen burners, injuries to the eye from needles and blades. Common causes of sharps injuries were from cleaning of probes in the sterilizing room, two 84 % of dentists knows that vibration syndrome causes vibration in hands. 79 % of dentists knows that vibration syndrome causes narrowing of arteries in fingers and hands and damage to the ends of the nerves.

| SR.N<br>O. | QUESTION                                                            | OPTIONS                                                                                                                                                                         | FREQ<br>UENC<br>Y(n) | PERCE<br>NTAGE<br>(%) |
|------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------|
| 1.         | According to WHO what is hazard?                                    | Hazard refers to an inherent property of an agent, or situation having the potential to cause adverse effects when an organism, system, or population is exposed to that agent. | 254                  | 75.9                  |
|            |                                                                     | Hazard refers to not an inherent property of an agent, or situation having the potential                                                                                        | 37                   | 11.1                  |
|            |                                                                     | Hazard refers to an inherent property of an agent, or situation having the potential to cause death when an organism, system, or population is exposed to that agent.           | 37                   | 11.1                  |
|            |                                                                     | None of the above                                                                                                                                                               | 7                    | 1.9                   |
| 2.         | What is occupational hazard?                                        | Risk to a person in a working environment.                                                                                                                                      | 261                  | 77.8                  |
|            |                                                                     | Risk to a person in a locality of working environment.                                                                                                                          | 59                   | 17.6                  |
|            |                                                                     | Risk to a object in a working environment                                                                                                                                       | 13                   | 4                     |
|            |                                                                     | None of the above.                                                                                                                                                              | 2                    | 0.6                   |
| 3.         | Why do the dentist need to know about occupational hazards?         | To protect ourselves & our colleagues from occupational hazards.                                                                                                                | 217                  | 64.8                  |
|            |                                                                     | To protect organization from occupational hazards.                                                                                                                              | 62                   | 18.5                  |
|            |                                                                     | To protect environment from occupational hazards.                                                                                                                               | 47                   | 13.9                  |
|            |                                                                     | None of the above.                                                                                                                                                              | 9                    | 2.8                   |
| 4.         | What are various types of occupational hazard related to dentistry? | Infectious, Non-infectious, Ergonomics, Psychosocial                                                                                                                            | 205                  | 61.1                  |
|            |                                                                     | Infectious, Non-infectious, Ergonomics, Psychological                                                                                                                           | 71                   | 21.3                  |
|            |                                                                     | Infectious, Non-infectious, Ergonomics, Psychological                                                                                                                           | 56                   | 16.7                  |
|            |                                                                     | None of the above                                                                                                                                                               | 3                    | 0.9                   |
| 5.         | Which hazards are most dangerous to                                 | Infectious,                                                                                                                                                                     | 267                  | 79.6                  |
|            |                                                                     | Non-infectious,                                                                                                                                                                 | 15                   | 4.5                   |
|            |                                                                     | Ergonomics,                                                                                                                                                                     | 31                   | 9.3                   |

|     |                                                                               |                                                                                                                                                                                        |     |      |
|-----|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|
|     | dentist?                                                                      | Psychosocial                                                                                                                                                                           | 22  | 6.6  |
| 6.  | What are the different types of non-infectious hazards                        | Physical                                                                                                                                                                               | 37  | 11.1 |
|     |                                                                               | Chemical                                                                                                                                                                               | 8   | 2.5  |
|     |                                                                               | Both a and b                                                                                                                                                                           | 270 | 80.6 |
|     |                                                                               | Biological                                                                                                                                                                             | 19  | 5.8  |
| 7.  | What is physical hazard?                                                      | Direct physical trauma, heat and fire injuries to the face and the scalp particularly to the eye.                                                                                      | 99  | 29.6 |
|     |                                                                               | Indirect physical trauma, heat and fire injuries to the face and the scalp particularly to the eye.                                                                                    | 9   | 2.6  |
|     |                                                                               | Both a and b                                                                                                                                                                           | 214 | 63.9 |
|     |                                                                               | None of the above.                                                                                                                                                                     | 13  | 3.9  |
| 8.  | What is direct physical trauma?                                               | The direct physical trauma includes accidental skin cuts and abrasions due to the usage of blunt or broken instruments or high speed projectile during trimming and polishing denture. | 118 | 35.2 |
|     |                                                                               | The direct physical trauma includes fatal skin cuts and abrasions due to the usage of sharp or broken instruments or low speed projectile during trimming and polishing denture.       | 12  | 3.5  |
|     |                                                                               | Both a and b                                                                                                                                                                           | 189 | 56.5 |
|     |                                                                               | None of the above.                                                                                                                                                                     | 16  | 4.8  |
| 9.  | What are consequences of physical trauma ?                                    | Potential that can act as portal entry for infections or toxic material.                                                                                                               | 106 | 31.5 |
|     |                                                                               | Definitive act as portal entry for infections or toxic material.                                                                                                                       | 35  | 10.5 |
|     |                                                                               | Both a and b                                                                                                                                                                           | 180 | 53.7 |
|     |                                                                               | None of the above.                                                                                                                                                                     | 14  | 4.3  |
| 10. | The most common physical injuries in the decreasing order in dental practice? | Burns from Bunsen burners, injuries to the eye from needles and blades. Common causes of sharps injuries were from cleaning of probes in the sterilizing room, two                     | 92  | 27.4 |
|     |                                                                               | Injuries to the eye from needles and blades, burns from Bunsen burners common causes of sharps injuries were from cleaning of probes in the sterilizing room, two                      | 98  | 29.2 |
|     |                                                                               | Both                                                                                                                                                                                   | 88  | 26.4 |
|     |                                                                               | None of the above                                                                                                                                                                      | 57  | 17   |
| 11. | What is vibration syndrome or vibration white finger?                         | Effect of vibration on hand.                                                                                                                                                           | 282 | 84.3 |
|     |                                                                               | Effect of vibration on legs                                                                                                                                                            | 17  | 5.2  |
|     |                                                                               | Effect of vibration on abdomen.                                                                                                                                                        | 17  | 5.2  |
|     |                                                                               | None of the above.                                                                                                                                                                     | 17  | 5.2  |
| 12. | What are symptoms of                                                          | Narrowing of arteries in fingers and hands and damage to the ends of the nerves.                                                                                                       | 264 | 78.7 |

|  |                     |                                                                              |     |     |
|--|---------------------|------------------------------------------------------------------------------|-----|-----|
|  | vibration syndrome? | Narrowing of arteries in legs and toes and damage to the ends of the nerves. | 32  | 9.5 |
|  |                     | Narrowing of arteries supplying to sternocleidomastoid muscle.               | 15  | 4.4 |
|  |                     | None of the above.                                                           | 285 | 7.4 |

## Discussion

Majority of dentists knows that hazard refers to an inherent property of an agent, or situation having the potential to cause adverse effects when an organism, system, or population is exposed to that agent. Needle sticks are not uncommon in our line of work. The risk of acquiring HIV from a chance exposure affects us all to some degree.(5) Dental professionals are notably affected with musculoskeletal diseases in their career. The potential manifestations include various musculoskeletal disorders (MSD) that are characterized by the presence of discomfort, disability or persistent pain in the joints, muscles, tendons and other soft parts.(1) Needle sticks are not uncommon in our line of work. The risk of acquiring HIV from a chance exposure affects us all to some degree.(5)

Abnormal postures, including muscle imbalances, muscle necrosis, trigger points, hypomobile joints, nerve compression and spinal disk herniation or degeneration may result in serious detrimental physiological changes in the body. These changes often result in pain, injury or musculoskeletal disorder.(4) Most of the Dental professionals responded that occupational hazard is risk to a person in a working environment. Dentistry is a high risk profession for the development of MSDs as it requires high visual demands which result in the adoption of fixed postures.(5)

Majority of dentists want to know about occupational hazards to protect ourselves & our colleagues from occupational hazards. Ultrasonic scaling produces the greatest amount of aerosol and splatter, which can be disseminated to a considerable distance from the operating site. An in vitro study showed that an ultrasonic scaler without a coolant still produced a significant amount of aerosol and splatter with small amount of liquid placed in the operating site to simulate blood and saliva.(6)

Most of the dentists from India state that infectious, non-infectious, ergonomics, psychosocial are types of occupational hazards related to dentistry. The dentist's level awareness of occupational hazards was remarkably high. However, the high level of awareness was not reflected in the number of dentists that had attended workshops on occupational hazards, only 46.5% had attended workshops on occupational hazards. Education is one of the important strategies for the prevention of occupational injuries and diseases.(12) The average body posture of the subjects was characterized by neck flexion and neck twisting, shoulder abduction and excessive forward trunk bending. In the course of a kinematic anamnesis, potential work hazards

in dentistry regarding static postures as risk factors for musculoskeletal disorders can be registered that are associated with work-related tasks.(8)

Majority of Dentists states that hazards are infectious and dangerous to dentistry. In clinical prosthodontic practice and in the laboratory, a number of synthetic and naturally occurring chemicals which include eugenol-containing materials, alloys, polymer materials, acrylic resins, ceramics, cements, sealers, etchants, hypochlorite, waxes, and elastomeric impression materials are used.(1)

Most of the Dentists knows about vibration syndrome. The dental environment is associated with a significant risk of exposure to various microorganisms. Many infectious agents may be present in blood or saliva as a consequence of bacteremia or vermil associated with systemic infections. Dental patients and dental health care workers may be exposed to a variety of microorganisms via blood or oral or respiratory secretion.(6) It is really important to use of a modern workstation with appropriate ergonomic supports. Among the preventive ergonomic measures, literature has widely recognized the role of physical activity and of a neutral and balanced posture.(11)

Rhinitis and asthma multimorbidity can be used as a model for chronic diseases since there is a broad agreement on the 'gold standard' of care.(17) 81% of dentists consider that physical and chemical both are most common non infectious hazards. Majority of dentists says that the direct physical trauma includes accidental skin cuts and abrasions due to the usage of blunt or broken instruments or high speed projectile during trimming and polishing denture. The direct physical trauma includes fatal skin cuts and abrasions due to the usage of sharp or broken instruments or low speed projectile during trimming and polishing denture.

Most of dentists consider that potential that can act as portal entry for infections or toxic material. Definitive act as portal entry for infections or toxic material. Majority of dentists says that the most common physical injuries in the decreasing order in dental practice are Burns from Bunsen burners, injuries to the eye from needles and blades. Common causes of sharps injuries were from cleaning of probes in the sterilizing room. Majority of dentists knows that vibration syndrome causes vibration in hands. Most of dentists knows that vibration syndrome causes narrowing of arteries in fingers and hands and damage to the ends of the nerves.

## **Conclusion**

Several occupational hazards and risks remain a serious concern in a Dental practice, particularly Musculoskeletal disorders, contact dermatitis, high speed projectiles and bio-aerosols. Understanding the various risks will educate the professional for a better work practice and care of personal health. A mere knowledge of such hazard and familiarity with its

characteristics is not sufficient for an individual to assess the potential threat. An understanding of the extent of exposure to the hazard, and strategies for minimizing the effects of occupational hazards and risks should be followed for a safe and healthy practice.

### Conflict Of Interest

Authors declare that there is no any conflict of interest.

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