OCCUPATIONAL HAZARDS IN AND OF PROSTHODONTICS: A REVIEW

Puja Malhotra[1], Bhupender Yadav[2], Reshu Madan[3], Shefali Phogat[4]
1. Professor, Dept. of prosthodontics, SGT Dental College & Hospital, Gurgaon
2. Reader, Department of Prosthodontics, SGT Dental College and Hospital, Gurgaon
3.Senior Lecturer, Department of Prosthodontics, SGT Dental College and Hospital, Gurgaon
4.Senior Lecturer, Department of Prosthodontics, SGT Dental College and Hospital, Gurgaon

ABSTRACT
Every occupation has its own associated hazards and threats. Illnesses caused due to the working environment and its conditions have been broadly called as occupational hazards. Dental works has its own risks and hazards. They can be minor, severe or even fatal having allergic or/ and systemic effects and which may occur either immediately or later. Therefore, the present article throws light on this very aspect of dental profession – its hazards and their prevention.
Key Words: occupational hazard, prevention

INTRODUCTION

Occupational hazard can be defined as the risk to the health of a person usually arising out of employment. It can also refer to work, material, substance, process or situation that predisposes or itself causes accidents or disease at workplace. The history of occupational hazard awareness can be traced back to the 18th century when Bernadino Ramazzini, who is referred to as the 'Father of Occupational Medicine', recognized the role of occupation in the dynamics of health and diseases [1.]

Dental works has its own risks and hazards. 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.[2] "Risk", by contrast, means the likelihood of causing adverse health effects. An individual's exposure to a hazard determines the degree of risk and associated untoward effects. The main objective of Occupational Safety and Health Administration OSHA is to promote awareness among the employees about work hazard and how to protect themselves.

A Prosthodontist is exposed to a number of provocations which can be classified under occupational hazards , be it exposure to infectious and life threatening agents like HIV or HBV or tubercular infections or more specific stimuli arising from the dental laboratory. A Prosthodontic work place is a volcano ready to explode if adequate and timely care and precautions are not taken. Above and beyond the irritating chemicals that are used, inhalation of vapors, dust particles, injury from high speed rotary equipments and

Corresponding Author: Dr Bhupender yadav Email: drbhupinderyadav@gmail.com

inflammable materials exists. Direct exposure to some of the chemicals commonly used in prosthodontics practice and its adverse effects has been well documented in literature .Thermal injuries from autoclaves, Bunsen burners, and furnaces can happen quite commonly. Allergy to almost any material used in prosthodontics is common and known to happen for eg,Methacrylates, natural rubber latex proteins, and glutaraldehyde are potential allergens that lead to urticaria and occupational asthma in susceptible personnel.[3]

Hence, the hazards in a Prosthodontic practice may be broadly classified as *Physical, Chemical and Biological*. [4]

PHYSICAL

Physical hazards that are commonly seen in a prosthodontic clinic, laboratory or college include direct physical trauma, heat and fire injuries to the face and the scalp particularly to the eye. The direct physical injuries include accidental skin cuts and abrasions due to the usage of blunt or broken instruments or high speed projectile during trimming and polishing denture. For eg the use of chisel where a plaster knife should be used is a common sight in our clinics, labs and college.

Such traumas can act as portal of entry for infections or toxic materials.[4]According to a study, percutaneous injuries occurred at a yearly rate of 3.4% among dentists. Among specialists, prosthodontists had second highest prevalence rate of4.5%, and pedodontists, oral surgeons, orthodontists, endodontists showed 5.5%, 2.6%, 1.9%, 1.3%, respectively.[5]

Similarly the practice of Prosthodontics is synonymous with the use of fire and wax. Therefore, burn or thermal injuries are probably most commonly seen here. For eg hair over fire or burning of rubber gloves is not a rare sight in prosthodontics or for that matter burns due to use of green stick compound especially in learning or a training atmosphere.

Eye injury is another associated hazard that has been attributed to the use of high speed cutting tools used during crown preparation or during finishing and polishing of removable and fixed dentures. This produces projectiles of the speed of 9m/s which are not only capable of damaging the eye but may be infected leading to further complications.[6]

Besides The blue light that is used for curing composite resin during restorations or core build up procedures is also associated with corneal damage and abrasion. Protective shields should always be used while curing composites. Various incidents which have resulted in partial or complete damage to the eyes have been reported. In 1978 American dental association reported 17 such cases of damage to the eye, of which 3 resulted in complete loss of vision[7]. Consequently, all possible precautions should be taken to protect one self, the use of protective apron, protective glasses, goggles and loupes has been advised and advocated for the same.

ACOUSTIC INJURIES

Noise Pollution is of extreme importance, the constant noise produced by the various appliances and equipment's used in prosthodontics are a menace for the practitioner. Prosthodontists and clinicians

should protect themselves with adequate ear wear so as to provide protection from not only the constant whirring noise produced because of the use of airotors, micromotors, vibrators ,trimmers ,polishing units but also against the flying missiles from the dental laboratory eg broken burs.

POSTURE AND ENTANGLEMENT

Musculoskeletal problems are by far the most common problem associated with a restorative dentist be it a prosthodontist or an endodontist. While sitting dentistry has gained significant acceptance over the years nevertheless, standing dentistry is still preferred by some clinicians. This leads to unnecessary strain on the muscles of the back and spine, this constant standing may lead to lordosis and kyphosis of the back muscles. Prolonged upright working can lead to venous pooling and varicosities of the veins of legs and feet.[8]Alternating between sitting and standing dentistry and stretching exercises in between the patients should be adopted in order to avoid postural and back problems. Carpal tunnel syndrome is an entrapment syndrome which is commonly seen in dentists who are involved in repetitive movements of the hands and the wrist while using an airotor[9].Fixed prosthodontics procedures were cited as the dental activity most likely to produce musculoskeletal pain.[10]

Entanglement is another very common but very avoidable complication seen in dental clinics. Loose hair, loose clothes, loose ties etc getting entangled in various equipment like lathes and leading to fatal accidents is common.[11]

CHEMICAL HAZARDS:

Prosthodontics deals with the use of newer and newer materials. A wide variety of materials are available and used in dentistry today. The adverse effects of various materials like amalgam, alloys,resins,polymers, alginates, and ceramics have been well documented. These materials may not be an issue as far as the patients are concerned but it does create a problem for the personnel involved in handling these materials. Infact these materials have been known to have deleterious effects when accidently ingested or inhaled. Mercury toxicity and its hazards have been very well documented in history .These chemicals can have not only superficial injuries but can also lead to deeper genetic mutations and further they have also proved to be carcinogenic. For instance, Beryllium and nickel are common constituents of metal alloys used for the fabrication of metallic denture bases and framework of PFM restorations nevertheless both are known carcinogens. Metal dust liberated during the grinding, trimming, polishing and finishing of these materials is especially dangerous and risky. The use of protective mouthmasks, eyewear, powerful suctions etc becomes mandatory to reduce the potential hazards of these materials. Grinding and polishing inside the mouth should be avoided because the metal dust so created will again be harmful to the patient as well as the operating dentist.

Similarly, kaolin type ring liners are recommended over the use of asbestos type ring liners as again asbestos vapours and fumes are carcinogenic and should be avoided.[12, 4.]

Components of other materials like tissue conditioners acrylic resins, latex of latex

gloves, dental waxes, various impression materials like eugenol in zinc oxide eugenol, polyethers are known for their allergic reactions.

BIOLOGICAL HAZARDS

The biological, physical and chemical hazards are quite overlapping for eg allergy due to eugenol can be a chemical as well as a biological hazard similarly chronic back pain associated with dentistry can be put under physical as well as biological categories. As a result in biological hazards we will deal exclusively with contaminations and cross contaminations in a dental clinic.

These hazards obviously relate to the contamination and ineffective sterilization leading to not only infection of the dental personnel but also cross infection of innocent patients who come for dental treatments. The chief portals of entry of infection for a dentist comprise of epidermis of hands, oral and nasal cavities. History has revealed the spread of HIV and HBV in a dental set up which has been attributed to improper and ineffective sterilization. Mycobacterium Tuberculosis is another infection which is common in this context; this organism remains active for a long time exposing the dental personnel and dental team to TB. The spread of infection in a dental clinic or college is not only from contaminated aerosols but also from contaminated instrument and impressions. Therefore, sterilization and disinfection is of utmost important this is true not only for the various instruments used but also for impressions etc recorded. Casts poured from these impressions also get contaminated, further spreading the circle of infection to the dental technicians in the dental lab.McNeill *et al*. stated that impression material can act as a vehicle for the transfer of both pathogenic bacteria and viruses and cause cross contamination in the clinic and from the clinic to the laboratory.[13]OSHA guidelines have suggested that all body fluids should be considered potentially infectious. Hence, all impressions should be properly sterilized prior to sending to the laboratory.

Aerosolization or aerosols produced due to the use of high speed rotary cutting instruments form another possible risk seen in dental clinics. Contaminated aerosols besides being a source of airborne infection have the tendency to settle in the alveoli leading to lung problems. Other possible sources of infectious contamination are dental unit waterlines DUWL, hand pieces, saliva ejectors and suctions.[14]

Contact with X-ray an ionizing radiation is capable of initiating and producing damage to body cells, as well as carcinogenic and genetic changes. Casual dentists who tend to hold the dental X-ray films inside the patient's mouth for obtaining better quality of image are at risk for developing radiation dermatitis on hands, or on a long run squamous cell carcinoma of the fingers. For protection from radiation hazards, principles and means of radiation protection should be strictly followed and used during radiation exposure.

Specific to Prosthodontics, Zinc containing denture adhesives are a matter of concern. Zinc when used as adhesives gets swallowed and thus absorbed leading to an increased absorption of zinc and consequent decrease in the absorption of

copper and eventually neuropathy. Some marketed denture adhesive creams, including certain Fixodent and Poli-Grip formulations, contain zinc at levels of about 17 to 34 mg/g.[15] This exposes habitual denture adhesive users to levels of zinc that were significantly higher than the USDA recommended daily allowance .Consequently, Various companies have removed zinc from their composition and replaced it with calcium or magnesium or sodium.

Stress, is another factor which contributes to the biological hazards related to dentistry. Although not a disease it plays a significant role in the well-being of the individual. Stress in dental practice may result from communication and dealing with the patients, realization of professional abilities.

CONCLUSIONS:

Prosthodontic team i.e, the doctor, the technician, the assisting personnel all are highly susceptible to a number of occupational hazards. A thorough knowledge of these hazards is necessary to avoid further complications. Therefore, continuous education is probably the only way to prevent such accidents. Although, a dental clinic will probably never be free of these threats and dangers however, appropriate steps can be taken to minimise these problems and hence, this issue of occupational hazards in a dental clinic is of extreme importance.

REFERENCES

1. Adebola FA, Owotade FJ. Occupational hazards among clinical dental staff. J Contemp Dent Pract 2004; 5: 134-52.
2. Jacobsen N, Aasenden R, Hensten-Pettersen A. Occupational health complaints and adverse patient reactions as perceived by personnel in public dentistry. Community Dent Oral Epidemiol 1991;19:155- 9
3. Hamann CP, Rodgers PA, Sullivan KM. Occupational allergens in dentistry. CurrOpin Allergy ClinImmunol 2004;4:403-9.
4. GhaniF , Weller B,. Occupational health hazards and the practice of prosthetic dentistry. JPMI 1993; vol 7, no2: 6-12.
5. Siew C, Chang SB, Gruninger SE, Verrusio AC, Neidle EA. Self-reported percutaneous injuries in dentists: implications for HBV, HIV, transmission risk. J Am Dent Assoc 1992; 123: 36-44.
6. Farrier SL, Farrier JN, Gilmour AS. Eye safety in operative dentistry - A study in general dental practice. Br Dent J 2006; 200:218-23.
7. Hartley JL, Eye and facial injuries resulting from dental procedures. Dent Clin N Am. 1978; 223:505.
8. Wagner B. Optimal working Posture. Quintessence Int 1984; 15:77.
9. Nadiger R, Shaikh S, Abichandani SJ. Carpal tunnel syndrome: An occupational hazard. Indian J Oral Sci 2012; 3:138-44
10. Fish DR Morris-Alien DM Musculoskeletal Disorders in Dentists.NY State Dent J 1998; 64:44-48

11. StampsJT and Muth ER. Reducing Accidents and Injuries in the dental Environment.Dent Clin N Am, 1978; 223:389
12. Brunne D, Beitesbrekke H. Levels of methylmethacrylate, formaldehyde and asbestos in dental workroom air. Scand J Dent Res 1981; 89:113.
13. McNeill MR, CoulterWA, Hussey DL.Disinfection of irreversible hydrocolloid impressions – A comparative Study. Int J Prosthodont1992; 5:563-7
14. Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deithman SD. Hospital Infection Control Practices Advisory Committee. Guideline for infection control in health care personnel, 1998. Am J Infect Control 1998; 26:289-354.
15. Nations SP, Boyer PJ, Love LA, Burritt MF, Butz JA, Wolfe GI, et al.Denture cream: an unusual source of excess zinc, leading to hypocupremia and neurologic disease. Neurology.2008; 719:639-43.