

Work Place Related Health Hazards Among Dental Laboratory Technicians In Karachi



Hina Toufique¹

BDS

Nighat Nisar²

MBBS, MCPS, FCPS

Sohail Saadat³

BDS, MDS

BACKGROUND: Every profession has its own workplace related health risks. Dental practice is a profession in which the health care provider, whether dentist, assistant, hygienist or technician, is at multiple risks including exposure to hazardous chemicals, infections, pollution, posture related risks and stress related health issues.

OBJECTIVE: The study aim is to identify work place related health hazards among dental technicians in Karachi.

METHODOLOGY: A cross sectional study was conducted by administering a questionnaire to hundred and thirty two dental technicians selected from the laboratories of teaching hospitals and private dental laboratories in Karachi by visiting them at their laboratories. The data collected were analysed by using SPSS version 22. Percentages, mean and standard deviation were calculated.

RESULTS: Among hundred and thirty two dental technicians, 75.8% were males with mean age was found to be 31.08 ± 8.29 years. The mean years of experience as a dental technician was 8.08 ± 6.90 years. Working environment of both types of laboratories were found satisfactory with good ventilation, sufficient light and wide working space while safety precaution and infection control measures were not according to the measures recommended and only half of the participants were vaccinated. The most common work place related complaints found were factors causing stress (64%), systemic reactions (50.8%) and musculoskeletal problems in hand and neck (43.2%). Stress was found to be most common work place related hazard with contributing factors found were financial worries (57.6%), dealing with customers (56.1%) and time management (43.2%). Headache (33.3%) and pain (35.6%) were found to be the common work place related health hazards of general systemic reactions and musculoskeletal problems respectively.

CONCLUSION: This study concluded that dental technicians suffered from work related problems like job related stress, headache, musculoskeletal problems, time management and dealing with patients. The working environment of both teaching hospitals and private dental laboratories was satisfactory while safety precautions and infection control measures adopted by the technicians were not according to the measures recommended.

KEY WORDS: Dental technicians, Dental laboratories, Occupational hazards, workplace related medical issues, Health hazards, Professional risks, Occupational stress.

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INTRODUCTION

Every profession and occupation has its own occupation related risks and hazards. Dental practice is no exception. In addition to dental health care professionals, dental technologists are also commonly at risk for professional hazard.¹ These include ergonomic, chemical, biological and work place related risks, in addition to usual stress related hazards.² Different working postures in dental work setup causes many unwelcoming hazards to dental health care professionals.

Bernardino Ramazzini et al, the 'Father of Occupational Medicine', first perceived that occupation can be an essential component of wellbeing and diseases.³ The dental work force is exposed to different work related risks like anxiety, unfavourably susceptible responses, higher stress levels, percutaneous injury, radiation hazards, musculoskeletal disorders and lawful risks.^{1,2}

The dental environment is additionally associated to exposing of many danger of different microorganisms.⁴ Irresistible micro organisms found in blood or spit, as an outcome of bacteraemia or viraemia which cause systemic contaminations.^{5,6} Dental patients and dental labourers exposed to these microorganisms by means of blood, oral or respiratory secretions.⁶ The organisms infiltrate the body through a cut on the skin while performing either a medicinal

1. Lecturer in dept. of Community Dentistry, Dow Dental College, DUHS

2. Professor in dept. of Community Medicine, Dow University of Health Sciences

3. Assistant Professor in dept. of Community Dentistry, Dow International College, DUHS

Corresponding author: "Dr. Hina Toufique" < dr.hina95@yahoo.com >

procedure, or a dental strategy, either bringing about an unintentional gnawing or masticatory pressure by the patient, or through a needle wound made while injecting anaesthesia.⁷ Dental technicians exposed to various work related injuries, risks and hazards, many causes reported were presence of different diseases, increase percutaneous presentation rate, infections, radiation, hazardous dental materials, musculoskeletal diseases, dermatitis, respiratory scatters, eye wounds, environmental pollution and mental issues.^{1,2,4,6}

Beside organic dangers and hazards, dental technicians suffered from musculoskeletal diseases, particularly problems of back, neck and shoulders.^{8,9} The work place related dangers can be prevented by embracing and acquiring precautionary measures by dental technicians and improving the work environment condition.⁸ There is an additional requirement for proceeding with dental instruction programs in dentistry so dental technicians can refresh themselves with the most recent and more up to date strategies and materials available.¹⁰⁻¹³ The present study is undertaken to identify different work place related hazards and conditions of dental laboratories among dental technicians in Karachi city.

METHODOLOGY

A cross sectional study was conducted among hundred and thirty two dental technicians in Karachi. The technicians were selected from the seven laboratories of teaching hospitals (Dow University of Health Sciences, Altamash Institute of Medical and Dental Sciences, Jinnah Sind Medical University, Jinnah Medical Dental College, Ziauddin University, Baqai University, Civil Hospital) and sixteen private dental laboratories of Karachi by visiting them at their laboratories through convenience sampling.

The sample size was calculated using online sample size calculator for the prevalence of the commonest occupational hazard among dental laboratory technicians in Alexandria city as 78.71% reported by Hamida et al, with margin of error at 5% and confidence level at 95%, it was calculated to be 132.¹ A questionnaire was administered to the participants to collect socio-demographic and other work place related information. The variables included were, working experience in years, information related to working environment; lighting, ventilation, space, safety precautions and infection control measures.

The self reported symptoms among dental technicians were also recorded regarding Systemic reactions (headache, vertigo, nausea, fatigue, blood pressure, migraine, trauma, indoor Climate, noise, infection, sinusitis), musculoskeletal problems in hand and neck (rigidity, pain, reduced mobility in the muscle, repeated grinding, wax work, prolonged

wrong postures, vibration of the hand piece), neurological and vasomotor fingers reactions (numbness, tingling, pricking, reduced holding power and finger spasm), respiratory tract reactions (nose, throat, lung and sinuses), eye, dermal, hearing reactions, and work related stress like time related pressure and managements, deadlines, financial worries, interpersonal relationships and dealing with customers and staff. All participants were assured that responses would remain anonymous and confidential.

Data entry and analysis was done using Statistical Package for Social Sciences (SPSS) version 22. Means and standard deviations were calculated for continuous variables, while frequency and percentages were calculated for categorical variables. Bar charts were used for graphical display of studied variables.

RESULTS

Among hundred and thirty two dental technicians, hundred were males with the mean age of the participants was 31.08 ± 8.29 years. The mean year of work experience as a dental technician was found to be 8.08 ± 6.90 years (Table 1). Working environment of the laboratories (private and teaching hospitals dental laboratories) were found to be

Table-1: Socio-demographic Characteristics of Dental Laboratory Technicians

Characteristics		Results	
		Mean	Standard Deviation
Age		31.08	8.29
Years Of Practice		8.08	6.90
		Count	Percentage(%)
Sex	Male	100	75.8
	Female	32	24.2

Table-2: Work Environment And Safety Precaution Measures in Dental Laboratories

Work Environment And Safety Precaution Measures		Count	Percentage(%)
Ventilation	Air Vacuum	12	09.1
	Air Condition	89	67.4
	Windows	31	23.5
Light	Good	112	84.8
	Poor	20	15.2
Space	Wide	82	62.1
	Confined	48	36.4
Instruments /Equipment's Condition	Good	93	70.5
	Fair	33	25.0
	Poor	06	4.5
Safety Precaution Measures	Fire Pump	80	60.6
	High vase electricity	09	06.8
	Warning Alarm	42	31.8

satisfactory as 67% participants reported good ventilation, 85% participants reported sufficient light system, 62% and 70% participants reported wide working space and good conditioned instruments and equipments in the laboratories

respectively (Table 2) while safety precautions measures were not found according to the measures recommended. Only 60.6% dental laboratories had fire pump facilities and very less dental laboratories had warning alarms for emergency purpose (Table 2).

Use of face masks and gloves were the only most commonly used infection control measures by the dental technicians, very less participants were using face shields, protective glasses and white coats (Table 3). Half of the

Table-3: Infection Control Measures Among Dental Laboratory Technicians

Infection Control Measures		Count	Percentage(%)
Face Mask	No	21	15.9
	Yes	111	84.1
Face Shield	No	107	81.1
	Yes	23	17.4
Gloves	No	17	12.9
	Yes	115	87.1
Protective Glasses	No	70	53.0
	Yes	62	47.0
Hepatitis B Vaccination	No	69	52.3
	Yes	63	47.7
Washing Hands With Disinfectant Soap	No	44	33.3
	Yes	88	66.7
Autoclave Sharps	No	79	59.8
	Yes	53	40.2
Wearing White Coat	No	77	58.3
	Yes	55	41.7

Table-4: Work Place Related Complaints of Dental Laboratory Technicians

Nature of Complaints		Count	Percentage(%)
Systemic Reactions	No	65	49.2
	Yes	67	50.8
Musculoskeletal Problems In Hand And Neck	No	75	56.8
	Yes	57	43.2
Neurological And Vasomotor Fingers Reaction	No	94	71.2
	Yes	38	28.8
Respiratory Tract Reactions	No	99	75.0
	Yes	33	25.0
Mucosal Reaction	No	111	84.1
	Yes	21	15.9
Eye Reactions	No	104	78.8
	Yes	28	21.2
Dermal Reactions	No	96	72.7
	Yes	36	27.3
Hearing Reactions	No	118	89.4
	Yes	14	10.6
Factors causing stress / Stressor	No	47	35.6
	Yes	85	64.4

Table-5: Distribution Of Work Place Related Complaints, Hazards and Contributing Causes Among Dental Laboratory Technicians

Complaints	Percentage (%)	HAZARDS	Percentage (%)	CONTRIBUTING CAUSES	Percentage (%)
Factors causing stress/ Stressors	64.4	Stress	64.4	<ul style="list-style-type: none"> Financial worries Dealing with customers Time management 	57.6 56.1 43.2
Systemic effect	50.8	Headache	35.6	Work load stress	35.6
Musculoskeletal problem in hand and neck	43.2	Pain	33.3	Stress due to heavy work load	25.8

Fig 1: Most common work place related hazard and its contributing causes

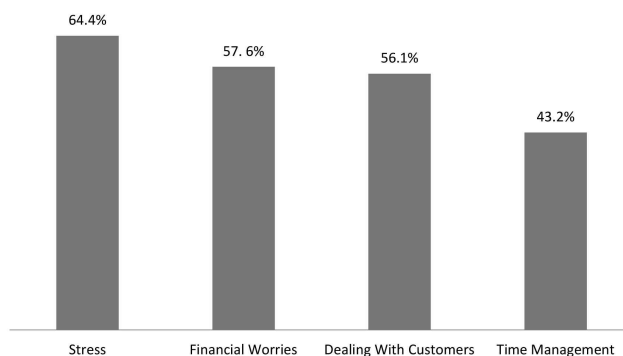


Fig 2: Second common work place related complaint, hazard and its contributing cause

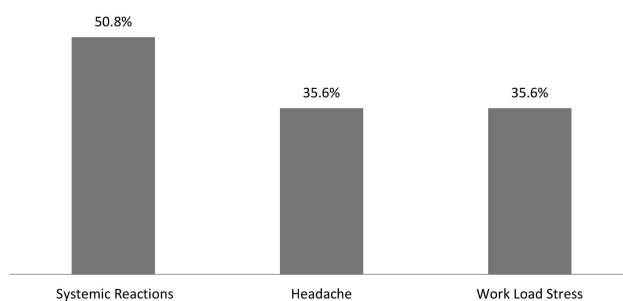
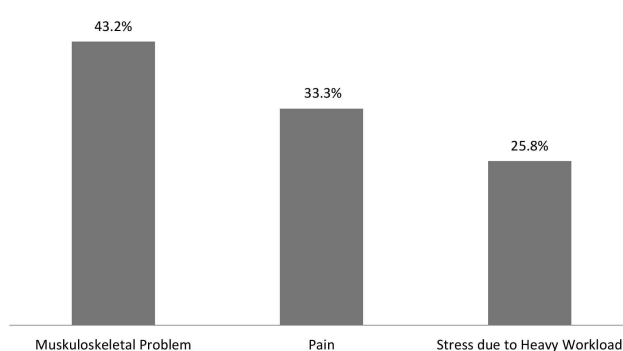


Fig 3: Third common work place related complaint, hazard and its contributing cause



participants were not vaccinated, did not use autoclaves for sharps and were not washing their hands with anti bacterial soap (Table 3). For hand washing, only tap water was in use.

Observing the results, the most common work related complaints found were factors causing stress (64%), systemic reactions (50.8%) and musculoskeletal problems in hand and neck (43.2%) (Table 4). The most commonest work related complaints was factors causing stress whether personal, occupational, due to heavy work load or financial worries (Table 5).

Result highlighted that stress was found to be most common work place related hazard with contributing factors found were financial worries, quality requirement in relationship and dealing with customers and time related pressure and management (Table 5, fig 1). Headache and pain were found to be the common work place related health hazards of general systemic reaction (Table 5, fig 2) and musculoskeletal problems (Table 5, fig 3) respectively.

DISCUSSION

Occupationally related medical issues in dental speciality have been reported in literature. The study findings showed that work place related occupational hazards are fairly common among the dental technicians, basic facilities to prevent occupational risks and injuries like air vacuum, fire pumps, warning alarms, use of face shields, protective glasses and vaccinations were lacking among dental laboratory technicians.

Common work place related hazards reported by dental technicians were job related stress, headaches, and pain. Most of the technicians reported their workplace conditions with the stress they face while on work. These finding are in consistent with the findings reported from other parts of the world.^{1,2}

Regarding the conditions of workplace, 36.4% participants reported that they have confined space to work in the dental laboratory. This confinement of space alone can lead to many physical as well as psychological hazards including miss-handling of hazardous material and technicians exposure to harmful chemicals and infected human tissue. Similar findings have been reported by other studies conducted in India, USA, Canada and UK.^{8,14}

Technicians exposure to material intended for their safety can also lead to health related problems.¹⁵ Almost 13% of the dental technicians reported that they didn't wear latex gloves due to allergic reactions or irritation. Similar reports were made regarding use of paper masks and face shields.^{10,12,13,16}

In addition, infectious diseases are also very common among dental technicians due to dealing with a variety of patients, some of whom carry different infections.¹⁷⁻²⁰ In our study we found that more than half of the dental technicians were not vaccinated against Hepatitis B. This is an alarming situation given the high burden of the diseases in our community.

Dentistry related professions were frequently seen as unpleasant and various reviews focused on mental stress and stress-related wellbeing issues in the dental health care professionals. A strict time plan and work load were found

to be major stressors.²¹

The condition of equipments, reported by technicians were fairly good. However, presence of safety precautions like fire extinguishers and emergency exit signs were very rare in the private dental laboratories as well as dental laboratories of teaching hospitals of Karachi. This puts both dental practitioners including dentists, dental technicians and patients at life threatening risk in case of any emergency.

CONCLUSION

This study concluded that dental technicians suffered from work related problems like job related stress, headache, musculoskeletal problems, time management and dealing with patients. The working environment of both teaching hospitals and private dental laboratories was satisfactory while safety precautions and infection control measures adopted by the technicians were not according to the measures recommended.

RECOMMENDATIONS

Based on the findings of this study it is recommended that work place environment should be improved in terms of providing safety precaution measures to dental technicians. They should be instructed that all the work related problems among them can be avoided if they use the safety measures in the dental laboratories. All the personal protection measures must be available for the technicians. Attention should be given to reduce stress by improving their salaries to deal financial stress and by giving sufficient working time to avoid work load on them. They should be trained for communication skills to develop interpersonal skills in dealing with patients.

CONFLICT OF INTEREST

None declared

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Questionnaire

Demographic data:

Name: _____ Sex: _____ Age: _____ Years of practice: _____
 Name of Laboratory: _____ Private _____ Teaching Hospital _____

Work environment:

(1) Ventilation : ☐ Air vacuum ☐ Air condition ☐ Windows ☐
 (2) Light ☐ Good ☐ Poor ☐
 (3) Space ☐ Wide ☐ Confined ☐
 (4) instruments/ equipment condition ☐ good ☐ fair ☐ poor ☐
 (5) safety precaution measures ☐ fire pump ☐ high vase electricity ☐ Warning alarm ☐

Infection control measures:

☐ Paper mask ☐ Face shield ☐ gloves ☐ Wearing white
☐ Protective glasses ☐ Hep B vaccination ☐ Washing hands with disinfectant soap
☐ Proper handling of sharps ☐ Dry heat oven ☐ Autoclave

Nature of complaints :

Systemic reactions: ☐ Yes ☐ No ☐
 Headache ☐ Vertigo ☐ Nausea ☐ Fatigue ☐

Contributing Causes :

☐ Work load stress ☐ Musculoskeletal problems ☐ Blood pressure ☐ Migraine
☐ Trauma ☐ Indoor climate ☐ Noise ☐ Infection
☐ Sinusitis ☐ Methyl methacrylate (MMA)

Musculoskeletal problems in the neck & hand : ☐ Yes ☐ No ☐

☐ Tension ☐ Rigidity ☐ Pain ☐ Reduced mobility in the muscle

Contributing Causes :

☐ Repeated grinding, sawing & wax work ☐ Prolonged wrong posture & heavy work
☐ Stress due to heavy work load ☐ Vibration of the hand piece
☐ Work related unspecified

Neurological & vasomotor finger's reaction:

Yes ☐No ☐☐ Numbness☐ Tingling, prickling sensation☐ Reduced holding power☐ Cold☐ Whiteness☐ Finger spasm☐ Failing contraction of thumb

Contributing Causes :

☐ Work related in general☐ Prolonged grinding & polishing☐ Vibration of hand piece☐ Work related stress☐ Plastic related work

Respiratory tract reactions:

Yes ☐No ☐☐ Nose☐ Throat☐ Lung☐ Sinuses

Mucosal reactions:

Yes ☐No ☐☐ Running nose☐ Impaired sense of smell

Contributing Causes of respiratory and mucosal reactions:

☐ Indoor climate☐ General allergy☐ Welding☐ Disinfectants☐ Infections☐ Increased sensitivity to strong odors☐ Grinding dust☐ Asbestos☐ Acrylic resin monomer

Eye reactions:

Yes ☐No ☐☐ Conjunctiva eye reaction(dry or running eye)☐ Functional disturbance

Contributing Causes of eye reactions & functional disturbances:

☐ Sensitivity to strong light☐ Exposure to aerosol from rotatory instrument☐ Unspecified allergies

Dermal reactions (finger & nail border):

Yes ☐No ☐☐ Itching☐ Redness☐ Reduce sense of tactility☐ Blisters☐ Desquamation☐ Fissures & bleeding

Contributing Causes :

- | | |
|--|---|
| <input type="checkbox"/> Wet-work, disinfectants, plaster | <input type="checkbox"/> Work related unspecified |
| <input type="checkbox"/> Indoor climate | <input type="checkbox"/> General allergy |
| <input type="checkbox"/> Impression material components | <input type="checkbox"/> Eczema |
| <input type="checkbox"/> MMA, ceramic, metallic processing | |

- Hearing reactions: : Yes ☐ No ☐
- ☐ Impaired hearing ☐ Increased noise sensitivity

Contributing Causes :

- ☐ Laboratory related factors ☐ By age

- Factors causing stress / Stressors:
Do you think that your work is stressful Yes ☐ No ☐

Contributing Causes:

- | | | |
|--|--|--|
| <input type="checkbox"/> Time related pressure | <input type="checkbox"/> High case loads | <input type="checkbox"/> High concentration levels |
| <input type="checkbox"/> Deadlines | <input type="checkbox"/> Running behind schedule | |
| <input type="checkbox"/> Financial worries | <input type="checkbox"/> Poor working condition | |
| <input type="checkbox"/> Feeling undervalued by the dentist | | |
| <input type="checkbox"/> Quality requirements in their relationship with their customers | <input type="checkbox"/> Staff problems | |
| <input type="checkbox"/> Psychological reactions due to model of larger laboratories. | | |