



## Occupational Hazards and Preventive Practices among Dentists in Saudi Arabia: A Cross Sectional Survey

Sandeepa NC<sup>1\*</sup>, Salha Hossien Ali<sup>2</sup> and Tahani Abdullah AL- Qahtani<sup>3</sup>

<sup>1</sup>Assistant Professor, KKU-COD, Abha, KSA

<sup>2</sup>Intern, KKU-COD, Abha, KSA

<sup>3</sup>Intern, KKU-COD, Abha, KSA

\*Corresponding Author: Sandeepa NC, Assistant Professor, KKU-COD, Abha, KSA.

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### Abstract

**Background:** Among the healthcare personnel, dental professionals are at the risk of exposure to various hazards

**Aims:** To assess various occupational hazards experienced and the preventive measures undertaken by the dentists in Saudi Arabia.

**Materials and Methods:** A cross-sectional questionnaire-based survey was conducted among 300 dentists of both private and government clinical practice in various regions of Saudi Arabia. Survey collected information pertaining to demographic details and exposure to physical, chemical, psychosocial hazards, litigation problems and the preventive measures followed in the clinic.

**Results:** Among 300 dentists, 55.3% (n = 166) were male and 44.75% (n = 134) were female with an average age of 34.05 ± 8.19 years. The most frequently encountered physical hazards experienced by the dentists was musculoskeletal pain 73.3% (n = 220). Among the infections, influenza 72% (n = 24), allergies to latex gloves 52% (n = 52), psychological stress during work 61% (n = 183), fatigue 56.7% (n = 170), nervousness and anxiety 34.7% (n = 104), lack of social life 43% (n = 129), and reduced family time 53% (n = 159) were noted. Among the preventive measures followed, 76% (n = 228) had safe system for healthcare waste management in their clinic, 89.3% (268) were vaccinated against Hepatitis B, 46% (138) had a reporting system for occupational accidents and only 24% (n = 72) attended the workshops on occupational hazards.

**Conclusion:** Our study showed that dentists among private and government dental practice suffering from the occupational hazards were high. It is vital to reinforce education programs about various hazard prevention measures to overcome the risks.

**Keywords:** Occupational Hazards; Occupational Safety; Saudi Arabia

### Introduction

Occupational safety and health are generally defined as the science of anticipation, recognition, evaluation, and control of hazards arising in or from the workplace. It has a role in impairing the health and well-being of the workers, taking into account the possible impact on the surrounding communities and the general environment. Occupational health encompasses a large number of disciplines and numerous workplace and environmental hazards [1]. The health of the workers depends on several risk factors at the workplace which makes them prone to develop conditions such as musculoskeletal disease, cancer, respiratory disease, accident, hearing loss, psychosocial disorder, infection and allergies to name a few [2]. The earliest traces of occupational hazard awareness can

be related to Bernadion Ramazzini, who lived in the 18<sup>th</sup> century and is considered as the father of occupational medicine [3].

Among the health personnel, dental professionals are at the risk of exposure to numerous work-related hazards. These hazards include exposure to bloodborne pathogens, chemical agents, abnormal sounds, lights, vibrations, human factors, psychological stress, allergic reactions, radiation exposure, mercury health hazard and workplace violence [4]. Also, it was noted in a study in Chandigarh, India that occupational hazard due to sharps instruments was around 77%, job-related stress contributed to 43%, musculoskeletal problems 39.8%, and allergies 23.8% [5]. In another study done in Queensland, Australia, it was shown that 87.2% reported hav-

ing experienced at least one musculoskeletal disorder symptom in the past 12 months out of which 57.5 percent reported neck pain, 53.7% of the lower back pain and 53.35% of shoulder pain [6].

Studies have shown that pathological microorganisms present in blood or saliva or respiratory secretions such as cytomegalovirus, hepatitis B virus (HBV), hepatitis C virus (HCV), herpes simplex virus, human immunodeficiency virus (HIV), Mycobacterium tuberculosis and other viruses and bacteria, are important hazardous infectious agents [7]. The risk of HIV transmissions ranges from 0.2 to 0.3% for parenteral exposures and 0.1% or less for mucosal exposure. The percutaneous exposure to HBV is also high among dentists. Also, HCV, a fatal viral hepatitis infection has a transmission risk of 1.8% among dentists [8]. Other than physical hazards, psychological stresses like work place anxiety, depression, emotional exhaustion are also known to affect the health of dentists. A study in US, of more than 3500 dentists found that 38% suffered from anxiety issues, 34% felt emotionally or physically exhausted and 26% suffered from backaches [9] Mercury exposure in dental offices have resulted in visual constrictions. Noise-induced hearing loss, allergic reactions to latex products in dental offices, use of nitrous oxide gas regularly can also produce several health issues [8].

According to Myers, *et al.* (2004) awareness with respect to the professional hazards is key to physical wellbeing and is known to have a psychological connect [10]. A similar study performed in India by Reddy, *et al.* (2015) noted various occupational hazards among the dentists [11]. There is a need to educate and make the dentists aware of the hazards around them and develop methods of prevention of these hazards in their working environment.

Only a few studies have been conducted in Saudi Arabia among dentist regarding occupational hazards, more commonly musculoskeletal symptoms were focused. By knowing the occupational hazard status, it will help to develop recommendation and prevention strategies.

Hence, this study was aimed at finding the status of occupational hazards and preventive measures carried out by the dentists in various part of Saudi Arabia.

## Materials and Methods

A cross-sectional questionnaire-based survey was conducted among 300 dentists who were working in both private and government clinical practice in various regions of Saudi Arabia including Aseer, Dammam, Jeddah, Najran, Riyadh, Qasim and Makkah.

Dentist were contacted by either Email, phone or personally and questionnaire was given. The intention was to record demographic status, types of occupational hazards encountered, and status of measures used for their prevention. The study was conducted after obtaining clearance from Institutional Ethics Committee of King Khalid University-College of Dentistry. The study was conducted for the duration of 6 months.

The questionnaire was divided into two sections. The first section included demographic questionnaire regarding gender, age, work duration and acquired specialization. Section two recorded the physical, chemical, psychosocial experiences, litigation problems and the preventive measures followed in the clinic. Questionnaire was checked for validity and it was structured in sequence, first section was focused on hazards experienced followed by preventive measures taken by them There was no stipulated time given to complete the questionnaire and most of the participants completed it in less than 15 minutes.

The data collected were then tabulated and demographic data were analysed and represented as mean + standard deviation while the data from hazard related questionnaire was analysed and presented as the percentage. Chi -square test was used to analyse the result and software was SPSS version 21.

## Result

Among the 300 dental practitioners 55.3% (n = 166) were male and 44.75% (n = 134) were females' dentists. The maximum number of dentists participating in the study were general practitioners 51.7% (n = 155). A majority (n = 117) were in dental practice for < 5 years (Table 1). The age distribution of the dental surgeons ranged from 23 to 60 years with the average age - 34.05±8.19. The number of patients examined by the dentists was in the range of 2- 200.

In our study, it was found that 44% of dentist believed occupational hazards affect their general health and 49.3% think that long working hours affect their wellbeing (61% were experiencing stress and fatigue (56.7%) due to their work. Lack of social life and reduced family time were reported by many dentists (Table 2).

It was also observed that 50% of the dental practitioners have the thoughts of changing career, out of which 76 were female and 74 were males.

S. No	Variable	Responses	Frequency (%)
1.	Sample Size (n)		300
Demographic and Biographic Data Related to Sample			
2.	Age (Mean $\pm$ SD; Minimum; Maximum; Range; SEM)	34.05 $\pm$ 8.19; 23; 60; 37; 0.47	
3.	Gender	Male	166 (55.3)
	Expressed as - n (%)	134 (44.7)	
4.	Nationality	Non Saudi	128 (42.7)
	Expressed as - n (%)	172 (57.3)	
5.	Duration of Work	< 5 Years	117 (39)
	Expressed as - n (%)	103 (34.3)	
	5 – 10 Years	64 (21.3)	
	10 -20 Years	16 (5.3)	
	> 20 Years		
6.	Region	Northern	6 (2)
	Expressed as - n (%)	132 (44)	
	Southern	58 (19.3)	
	Eastern	66 (22)	
	Western	38 (12.7)	
7.	Level of specialization	Intern	4 (1.3)
	Expressed as - n (%)	155 (51.7)	
	General Practitioner		
	Oral Basic Clinical Sciences (OBCS)	8 (2.7)	
	Preventive dental Sciences (PDS)	61 (20.3)	
	Restorative Dental Sciences (RDS)	32 (10.7)	
	Oral and Maxillofacial Rehabilitation (OMR)	38 (12.7)	
8.	Type of Practice	Government	128 (42.7)
	Expressed as - n (%)	86 (28.7)	
	Private	56 (18.7)	
	Academic sector	10 (3.3)	
	Own Private Clinic	20 (6.7)	
9.	Average number of Patients/ Week	36.01 $\pm$ 24.45; 2; 200; 198; 1.41	
	(Mean $\pm$ SD; Minimum; Maximum; Range; SEM)		

**Table 1:** Descriptive Statistics.

Further, in the study it was found that among the physical hazards experienced by the dental practitioners, 73.3% suffered from musculoskeletal pain, eye injury in 12% (n = 36) and sharp instrument injury – 48%. The infections acquired during the dental prac-

tice were influenza- 72%, herpes and hepatitis- 6% (. In our study, it was also observed that 17% allergies experienced by dentists were attributed to latex gloves, 4% to disinfectants, 2.7% to monomers and 2% to mercury.

	Question	Responses {n (Percentage)}	
Q.1	List the problems you face due to your work schedule		
	Response	No	Yes
	Occupational hazards affect your general health	168 (56)	132 (44)
	Long working hours affect general health	152 (50.7)	148 (49.3)
	Stressed because of work	117 (39)	183 (61)
	Nervousness & anxiety after work	196 (65.3)	104 (34.7)
	Fatigue	130 (43.3)	170 (56.7)
	Tension before work	246 (82)	54 (18)
	Job related awakenings at night	272 (90.7)	28 (9.3)
	Lack of social life	117 (57)	129 (43)
	Reduced family time	141 (47)	159 (53)
Q 2	Have you ever had bad thoughts like suicide due to hard times you went through in working as a dentist?	YES	NO
		38 (12.7)	262 (87.3)
Q 3	Have you ever thought of giving up your profession or career change?	YES	NO
		150 (50)	150 (50)
Q.4	Have you ever experienced any of the following physical hazards due to your work?		
	Response	No	Yes
	Musculoskeletal pain	80 (26.7)	220 (73.3)
	Eye injury	264 (88)	36 (12)
	Sharp instrument injury	156 (52)	144 (48)
	No, I've not	260 (86.7)	40 (13.3)
Q.5	Have you ever experienced allergies/adverse reaction to the following in clinic?		
	Response	No	Yes
	Latex gloves	248 (82.7)	52 (17.3)
	Monomer	292 (97.3)	8 (2.7)
	Nitrous oxide	300 (100)	0 (0)
	Xray chemicals	296 (98.7)	4 (1.3)
	Disinfectants	288 (96)	12 (4)
	Mercury	294 (98)	6 (2)
	No, I've not	74 (24.7)	226 (75.3)
Q.6	Have you ever infected with the following disease due to the occupation?		
	Response	Present (Yes)	
	Herpes infection	6 (2)	
	Influenza	72 (24)	
	Hepatitis	6 (2)	
	No, I've not	216 (72)	

Q 7	Have you ever faced legal problems during your clinical practice?	YES	NO	
		18 (6)	282 (94)	
Preventive Measures				
Q 8	Hold X ray film in patient's mouth while taking radiograph?	Always	Sometime	Never
		22 (7.3)	156 (52)	122 (40.7)
Q 9	Hold radiographic tube during exposure?	10 (3.3)	102 (34)	188 (62.7)
Q.10	Do you follow the mentioned radiation protection measures in the clinic?			
	Response	No	Yes	
	Stand behind a suitable barrier or wall during exposure of the film.	265 (88.3)	35 (11.7)	
	Follow the position distance rule (6 feet away and 90/135degree to the central X-ray) when not leaving the room /barrier is not used	274 (91.3)	26 (8.7)	
	Wear radiation exposure detection device in clinic	169 (56.3)	131 (43.7)	
	Wear Gloves for every Exposure	68 (22.7)	232 (77.3)	
Q.11	List the infection control measures you follow in the clinic			
	Response	No	Yes	
	Ensure instrument sterilization	17 (5.7)	283 (94.3)	
	Use of protective eyewear	118 (39.3)	182 (60.7)	
	use of facemask	84 (28)	216 (72)	
	change gloves between patients	96 (32)	204 (68)	
	wash hands before and after gloving	30 (10)	270 (90)	
	Wash hands with antimicrobial agent	38 (12.7)	262 (87.3)	
	Wear protective aprons during work	142 (47.3)	158 (52.7)	
Q 12	Do you regularly carry out the following in the clinic?			
	Response	No	YES	
	Use indirect vision while treating maxillary teeth	128 (42.7)	172 (57.3)	
	Bend your neck or back when carrying out patient treatment	128 (42.7)	172 (57.3)	
	Have some simple office exercises	268 (89.3)	32 (10.7)	
	None	260 (86.7)	40 (13.3)	
	Others	264 (88)	36 (12)	
Q 13	Have you done vaccination against hepatitis?	YES	NO	
		268 (89.3)	32 (10.7)	
Q 14	Do you have safe system for health care waste management and disposal in your clinic?	YES	NO	Don't Know/ Not Aware
		228 (76)	34 (11.3)	38 (12.7)
Q 15	Previous attendance to workshop about "occupational hazards"	YES	NO	
		72 (24)	228 (76)	
Q 16	Is there a system of reporting occupational accidents or health problems in the dental clinic you work?	Yes	No	Don't Know/ Not Aware
		138 (46)	80 (26.7)	82 (27.3)

**Table 2:** Descriptive Statistics of Questions.

During their dental practice, 7.3% of dentists would always hold the X-ray film in patient's mouth while taking radiograph, 3.3% would always hold radiographic tube during exposure (Table 2).

The use of indirect vision while treating maxillary teeth was practiced by 57.35% of dentists, 57.3% bend their neck and back while treating patients, 89.3% did not follow any simple office exercises. Among the dental practitioners, 32% did not have the vac-

ination against Hepatitis. Among radiation protection measures followed, 88.3% did not stand behind a suitable barrier or wall during exposure of the film, 91.3% did not follow position distance rule, 56.3% did not wear radiation exposure detection device in the clinic and only 22.7% wear Gloves for every exposure (Table 2).

While taking infection control measures, 94.3% followed instrument sterilization, 60.7% wore protective eye gear, 72% used the face mask, 87.35 washed hands with antimicrobial agents and 52.7% wore apron during work (Table 2).

Among the preventive measures undertaken by the dental practitioners, 76% had safe system for healthcare waste management and disposal in their clinic. 46% agreed on having a system of reporting occupational accidents or health problems in the dental clinic. 76% attended the workshops on occupational hazards Hepatitis vaccination was taken by 89.3%.

The result obtained was correlated with various demographic variables and it was noted that psychosocial hazards, legal hazards and some preventive practices were statistically significant relation with factors like gender, nationality, specialization and region of work.

The dental practitioners of southern region with 5-10 years of experience had more thoughts on career change than others. Among the 12.7% having thoughts of suicide due to the hard experiences while working as dental practitioners, 24 were females and 14 were males (Table 3). These thoughts of suicide were also high among Saudi nationals (n = 30) than in Non-Saudi dentist (n = 8). General practitioners experienced more incidences of thoughts of suicide (73.7%) and career change (61.3%). It was also noted that only 6% (n = 18) of dentists faced legal issues during their practice, out of which 16 were Saudi nationals. Legal problems faced were seen more in Saudi dentist.

Question	Gender	Nationality	Duration of Work	Region	Specialization	Type of Practice
Have you ever had bad thoughts like suicide due to hard times you went through in working as a dentist?	0.01* Female 18%	0.004€ Saudi 17.4%	0.21	0.29	0.000¶ GP 73.7%	0.30
Have you ever thought of giving up your profession or career change?	0.03* Female 57%	0.35	0.03* 5-10 years 60%	0.000¶ Eastern 59%	0.001€ GP 61.3%	0.001€ Government (40%)
Hold X ray film in patient's mouth while taking radiograph?	0.07	0.01* Saudi (66%)	0.001€ Less than 5 yrs (70%)	0.000¶ Northern (100%)	0.000¶ GP (64%)	0.000¶ Government (59%)
Hold radiographic tube during exposure?	0.15	0.000¶ Saudi (45%)	0.001€	0.000¶ Northern (66%)	0.02* GP (45%)	0.000¶
Have you done vaccination against hepatitis?	0.52	0.03* 93.75%	0.19	0.000¶ Central (100%)	0.000¶ Government (50.4%)	0.10
Have you ever faced legal problems during your clinical practice?	0.31	0.005€ Saudi (9.3%)	0.47	0.01* Northern (33%)	0.86	0.58
Do you have safe system for health care waste management and disposal in your clinic?	0.51	0.000¶ Non Saudi (88%)	0.53	0.04* Northern (100%)	0.01* GP (46%)	0.03* Government (38.6%)
Previous attendance to workshop about " occupational hazards "	0.02* Male (29%)	0.45	0.19	0.29	0.06	0.03* Government (53%)
Is there a system of reporting occupational accidents or health problems in the dental clinic you work?	0.07	0.88	0.45	0.001€ Northern (66%)	0.28	0.000¶ Government (43.5%)

**Table 3:** Inferential Statistics of Question with Single Possible Response. Comparative Evaluation of Questions between various Parameters.

Significant results are shown in Bold with the following special charters and different p value

\* = p value = p<0.05; € = p value = p<0.01; ¶ = p value = p<0.001



Preventive measures were correlated with various recorded variables. Hepatitis B vaccination in dentist had shown significant correlation to nationality, region and specialization.

Hepatitis B vaccination was seriously taken care in central part of Saudi Arabia whereas some dentist in other parts of country had not taken the vaccination.

The improper practice such as holding film during exposure and holding X-ray tube exposure was more seen among Saudi nationals of the southern region than non-Saudis. The dentists with less than 5 years of experience sometimes would show risky behaviours during their practice such as holding film or radiographic tube during the exposure. Among the general practitioners, 72.7% would always, 60.3% sometimes hold film during exposure which is higher than among other specialties. The similar bad practice of holding x-ray tube during exposure was observed among 45% general practitioners (Table 3).

## Discussion

Dental personnel while performing their functions are exposed to a variety of hazards. This is in turn dependent on several factors and variables that the dental practitioners encounter in day to day practice and include different type of services offered, the type of patients, and finally the work imparted. The different types of exposure are stress, allergic reactions, higher noise levels, percutaneous exposure incidents, radiation, musculoskeletal disorders, infectious pathogens and legal hazards.

In the present study, among the physical hazard, musculoskeletal pain contributed to 73.3%, eye injury in 36%, and sharp instrument injury – 48% (. Similar findings were observed in several studies which have shown that around 80% of dental practitioners suffered from musculoskeletal pain, eye pain around 45%, psychological stress in 42% and allergy was 12.3% [12,13].

Musculoskeletal pain is a major occupational health risk in dental professionals and is attributed to postural variations such as twisting and contorting the body, long hours of work with similar posture, varicosity etc. Along with this, the mechanical vibrations produced by some dental equipment also contribute to the physical damage experienced by dentists [14,15].

In our study, regarding chemical hazard, 82% dental practitioners experienced allergic reactions to various components in their dental clinic with latex as the main factor in 17%. In several studies, the allergies among dental practitioners have ranged from 12%-75% [12,16]. Latex gloves are the main cause of allergic skin reaction in the dental office. Other dental materials that act as allergens are detergents, lubricating oils, solvents and x-ray processing chemicals.

It was observed from our study that suicide thoughts were statistically related to gender (24 out of 134 female), nationality (30 out of 172 Saudi dentist) and specialisation (28 out of 155 GP dentist) A number of studies on dental practitioners have provided valuable information on psychological stress and stress-related health problems in the dental population which affects their productivity and efficiency [17].

The main stressors here were varying time schedule, anxiety and fear among patients, unanticipated emergency situations, application of meticulous procedure etc. In our study it was found that 61% of dental practitioners experience psychosocial stress related to work of which nervousness and anxiety was 34.7%, tension before work was 18%, job-related sleeplessness was 9.3%, lack of social life was 43% and lack of family time was 53%.

Since the dental professionals are exposed to a variety of hazards while performing their functions, a number of preventive measures are undertaken to prevent, and control occupation induced hazards. In the present study, 76% (n = 228) had safe system for healthcare waste management and disposal in their clinic, 89.3% were vaccinated against hepatitis which is better when compared to other studies [18] and 46% agreed on having a system of reporting occupational accidents or health problems in the dental clinic, and 76% attended the workshops on occupational hazards. Among the preventive measures followed, 94.3% followed instrument sterilization, 60.7% wore protective eye gear, 72% used to face mask, 87.35 washed hands with antimicrobial agents and 52.7% wore apron during work similar to study conducted at Lahore [19].

But during this study we also observed several unsafe practices by the dental practitioners such as 7.3% (n = 22) of dentists would always hold and the x-ray film in patient's mouth while taking ra-

diograph, 3.3% (n = 10) would always hold radiographic tube during the exposure. Among radiation protection measures followed, 88.3% did not stand behind a suitable barrier or wall during exposure of the film, 91.3% did not follow position distance rule, 56.3% did not wear radiation exposure detection device in a clinic and only 22.7% wear gloves for every exposure. According to Paul Abbott, it is important for the dentists to adopt safe practices for protection from radiation at all times without which there are an increased risk of developing diseases that are radiation-induced [20].

Use of indirect vision while treating maxillary teeth was practiced by 57.35% of dentists, 57.3% bend their neck and back while treating patients, 89.3% did not follow any simple office exercises. Among the dental practitioners, 32% were still not vaccinated against Hepatitis.

This substantiates the need of personal protective measures such as proper history taking/ clinical examination, following mandatory vaccination schedule against fatal diseases, proper waste disposal during the dental procedure, forming and following certain protocol in the dental set up to reduce the incidences of hazards [18-21].

Inclusions of small sample size with respect to each region have been the limitation of our study. Increased awareness needs to be created among the dentists to prevent the hazards. All the dentists should follow a healthy, safe behaviour during their dental practice. Attending regular workshops and seminars on occupational hazards from time to time will be very useful to reduce the dental hazards.

As our study shows wide and many occupational related issues, this has to be addressed and the next level should include understanding the system and establishing the strategies. This can be initiated in the dental organization level and the result and report should be handed over to the higher authorities if major pit falls are found and need to be solved.

## Conclusion

The study showed that the number of private and government dental practitioners suffering from the occupational hazards were very high. Backache, occupation-related stress and fatigue were experienced by many dental practitioners. Radiation protection measures were not followed by majority. Also, incorrect posture was carried out by many dentists during patient treatment. Based

on the results, it was observed that 50% of dentists had thought of giving up the profession or change of career. There is a need of analysing the present situation and to set up programmes to improve the scenario.

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