ORIGINAL ARTICLE

PREVALENCE OF NOISE INDUCED HEARING LOSS AMONG DENTISTS WORKING IN KARACHI, PAKISTAN

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ABSTRACT

Dentists are exposed to noise of varying intensities while working in dental clinics. This paper discusses the different sources and characteristics of noise in the dental clinics. Questionnaire surveys from three hundred and thirty-three dentists (male and female) were collected for a cross-sectional study conducted in Karachi, Pakistan. The collected data were analyzed using SPSS version 17. The study concludes that noise originating from the dental tools appears to have an effect on the dentists and contributes to their headache, irritation, tinnitus and in some cases hearing damage. Further investigation is required to study the possible risks of induced hearing loss due to these dental tools.

Key Words: *Dental tools, noise, high speed handpiece, tinnitus.*

INTRODUCTION

Although modern dentistry has been placed into the category of one of the least hazardous of all occupations, yet many risks prevail in dental practice which continues to challenge this status. Like other working professionals, dental practitioners are also exposed to occupational hazards which include infectious and communicable diseases, ionizing radiations, hazardous chemicals explosion and noise produced by machining tools. Hearing loss is definitely one of them. Dental professionals could remain at risk because of unpleasant noises produced during working with different dental tools. These noises producing tools could make the dentists susceptible to the development of permanent hearing loss. Hearing loss caused by noise is referred to as noise-induced hearing loss. In simple words noise is defined as unwanted sound by any source. In dentistry, a number of tools are used with varying levels of sound output. Generally, noise is not considered hazardous to the auditory system unless it reaches a designated intensity, frequency, and/or duration.[1]

American College of Occupational and Environmental Medicine has defined Occupational noise-induced hearing loss (NIHL) as a "hearing loss that develops slowly over a long period of time (several years) as the result of exposure to continuous or intermittent loud noise".[2] Studies have shown that noise exposure not only cause sleep disturbance but also the task of the individual. NIHL could have a detrimental effect on the psychological system of the human body. "….Increased heart rate, blood pressure, catecholamines, adrenalin secretion, vasoconstriction of the extremities, and dilation of the pupil of the eye…severe exposure produce or augment the stress reaction of the body and perhaps have an effect on the immune system…"[3]

Not at all like industrial worker who are secured by work related noise regulations, medical or dental professionals are not controlled by any legislative. Although FDA has not forced any regulations on noise. A number of studies have been conducted to determine the impact of noise in the working environment. Some published studies have presented risky levels of noise in the working environment of medical professionals.[2] The common type of exposures in clinics include high-speed turbine hand-pieces, low-speed hand-pieces, ultrasonic scalers, amalgamators, vibrators, model trimmers and

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aspirators.[4] These equipments produce different level of sound ranging from 66dB to 91dB. Sometimes the noise level can reach to 100dB with the use of older high-speed handpiece.[5]

With the advent of high speed turbine in the late 1950s, the dynamic increase in the use of rotational speed had expanded cutting viability and decreased working time of the dental procedures. The high speed supplies have additionally lessened the uneasiness brought on by vibration.[6] However, the increased use of these high speed devices has exposed the dental professionals to certain health related problems. These sharp pitched devices have detrimental effects on the ear. With the advancement of dental practice, the regular utilization of high speed air-fueled handpieces became an everyday affair; resulting to attention of several investigators in the past.[6,7,8]

Mix results have been observed related to noise induced hearing loss studies. Merrell and Claggett study was not certain whether the noise in the dental practice environment causes hearing loss or not.[9] Fabry stated that "if you are working with noisy drills all day, the simple fact is it may make you more susceptible to hearing loss than someone who has a quiet desk job and the same hobby as you do."[10] One survey found that a significant number of dentists reported having tinnitus, and the researcher concluded that the noise that dentists were exposed to (specifically an air turbine handpiece) may have been a contributing element in their hearing loss.[11]

Our hypothesis is that the high speed handpiece and other noise producing dental tools used in clinics is a predisposing factor in noise inducing hearing loss in dental professionals.

METHODOLOGY

Registered dental surgeons (N = 412) who practice in Karachi city were either approached personally or by telephone. They were requested to be the part of this large scale cross-sectional qualitative study. Data were collected by face-to-face interviews, telephonic interviews and by mailing questionnaire to the participants. The Sampling frame was the Karachi city and sampling method was non-random convenience sampling. A questionnaire was developed to target dentists and was divided into two parts. The questions of first part were related to demographic information such as name, age, gender and clinic's location; and the second part, that had 10 questions in all, was pertaining to dentist's feelings towards noise in the clinic; determining common source of noise in dental clinic, total working time, use of any hearing protection by the dentist, and the symptoms associated with noise. Questions were posed to assess the opinion as to if these instruments could cause hearing loss, symptoms that might accompany use of certain hand-pieces, exposure background, and current use of hearing protection. The collected data were analyzed using SPSS version 17.

RESULTS

Among 333 collected questionnaires, 141 were of male dentists and 192 of females. 79 dental surgeons didn't participate. The geographic distribution of the respondents is dominated by Gulistan-e-Johar area. Which is not strange as this area is a densely populated area and majority of the dentists practice in this area. So it was more convenient to collect the questionnaire from this area. The survey result of question 1 which was about the number of working hours is given in self-explanatory Table 1. Because of the importance of question 2, 3 & 4 the respondents' answers are presented in figure 1, 2 and 3 respectively. Question 5 was "is there any other noise that disturbs you at the working place". 18 males and 3 female participants responded positively and when asked about that particular noise that disturbs at the working place in question 6 majority of them complained about the "electric generator" and some of them were of the opinion that patients' noises in waiting room annoy them. The next question that was directed to respondents was: "After work do you feel tired and exhausted due to noise pollution in the clinic?" The choices provided in this close ended question were never, rare, often, frequent and always. Almost all of the participants responded either "never" or by circling "rarely". The next question came in line was regarding hoarseness and speech disturbance due to noise? Only 8 male participants and 22 female participants answered "yes" to this question. None of the dentists reported any noise protection measures when asked about the use of any protection measures. The last question was "Have you noticed the hearing loss with the passing of time? 8 females and one male participants responded positively to this query. The demographic details of the responding dentists are summarized in Table 1.

With the summarization of the results we fail to reject the hypothesis of this study.

TABLE 1: DEMOGRAPHIC INFORMATION OF THE PARTICIPANTS

Gender	**Male**	**42.3%**
	Female	**57.7%**
Area of Practice	Clifton	4.5%
	Nazimabad	13.5%
	Gulshan-e-Iqbal	8.2%
	Gulistan-e-Johar	49.5%
	Defence	4.5%
	Gulshan-e-hadeed	3.6%
	F.B Area	10.8%
	Saddar	5.4%
Clinical experience	< 5years	60.4%
	> 5years	39.6%
Type of practice	Individual	27.7%
	Group	72.3%
Time in practice	Full-time	67%
	Part-time	33%

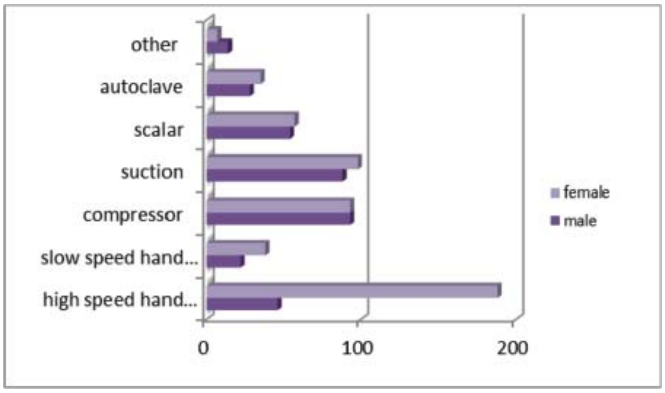

Fig 1: Results of question: Source of noise pollution in your working place?

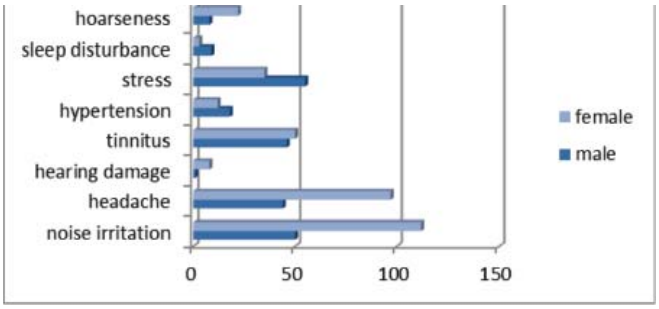

Fig 2: Showing the results of question: Have you ever felt any of the following symptoms?

DISCUSSION

There is no doubt about it that the degree of risk to the dental practitioner depends upon the factors like intensity of loudness, frequency of vibration, length of exposure, the interval between exposure and susceptibility to exposure.[12,13]

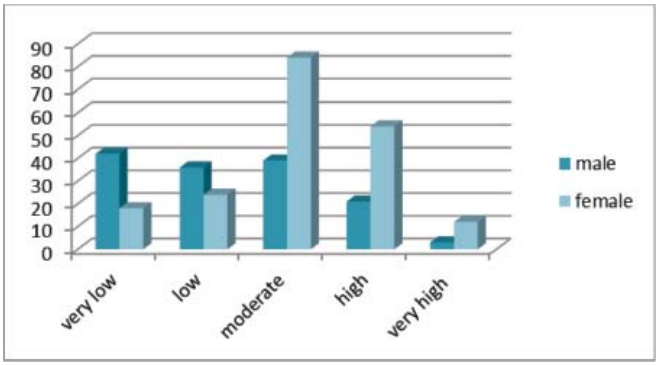

Fig 3: Results of question: Grade the level of noise irritation in your clinic?

In this study opinions of the dentists working in different localities of Karachi city were collected and judged. About 70% of the dentists were of the opinion that high speed hand-pieces were the source of noise in the clinic. The male to female ratio of noise irritation from high speed handpiece was almost 1:3. The higher ratio of females complaining about noise irritation could be because of their sensitivity level as compared to male practitioners. Aspirators, autoclaves, Scalers and compressors were the other sources of noise to be concerned about. Again the female practitioners dominated in complaints as compared to male practitioners. A new thing that came up in this study is the use of electric generators that is also a source of noise in dental setup. The working environment should be modified to decrease the effect of noise, particularly of the generators.

Although 70% of the participants complained about the annoyance or disturbance at work due to the noise produced by dental devices, particularly high speed hand piece yet none of the dentists encompassed in this study reported they use any kind of hearing protection while using dental tools.

The dentists ought to use high quality devices. These devices should be inspected and maintained periodically according to the instructions of the manufacturer. The increasing sound absorbance of the dental office may also have a 4-7dB decrease in the noise level. These precautions would help in the prevention of noise induced hearing loss.[14] While working on a patient, a proper distance should be maintained by the operator to lessen the sound volume produced by these high speed rotary devices. Kilpatrick suggests the maintenance of at least 14 inches from the dentist's eye to

the patient's mouth.[15,16] It is also advised that a dentist should have his audiometry checkups periodically and as a precautionary measure all the dentist should have hearing protection devices e.g. earplugs.

The participants of this study complained about different symptoms associated with the use of dental related equipments such as irritation, headache, tinnitus, hypertension, hoarseness and most importantly hearing damage. Those who complained about the hearing damage were having more than 15 years of clinical experience. This study couldn't conclude whether the hearing damage is due to use of dental tools. Further investigation is needed in order to conclude. A significant number of participants reported having tinnitus. It seemed that female professionals are more prone to different symptoms associated with noise except hypertension, sleep disturbance and stress which were found more in male practitioners.

According to this survey, main noise source in dental clinics is high-speed hand pieces. Though it seems that the risk of damage to the dentists' hearing due to dental turbine noise is insignificant and below the limit of risk of hearing loss for the personnel 17 but it could be the cause of concern for the dentists and could have long term effects on the health of the professionals.

CONCLUSION

To sum up this study, we would say "prevention is better than cure". Although the noises emit from dental tools are less than the permissible limits yet it is advisable that dentists using high-speed drills should have to have periodic hearing tests for safer side. As stated in the introduction section, hazardous auditory output is affected by intensity, duration and frequency. Further research needs to be completed in regards to the frequency output of dental handpieces. It is also recommended to minimize non-occupational noise exposure particularly of electric generators. These could have a profound effect on the hearing loss of the dentists. To ensure that the effects of noise are diminished, using a hearing protection device when exposed to noisy dental equipment may prevent the occurrence of noise-induced hearing loss. A natural extension to this study is to study the possible risks of induced hearing loss due to these dental tools.

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REFERENCES

1 Leggat PA, Kedjarune U, Smith DR. Occupational health problems in modern dentistry: a review. Ind Health. 2007 Oct; 45(5): 611-21.

2 ACOEM (2002). ACOEM evidence-based statement: noise-induced hearing loss. Retrieved April 16, 2006, from http://www.acoem.org/guidelines/pdf/noiseinduced-hearing-loss-10-02.pdf

3 Ward W, Royster J, Royster L. (2000). Auditory and Nonauditory Effects of Noise. In: Berger E ed. The Noise Manual. Fairfax: American Industrial Hygiene Association, 123-47.

4 Garner, G.G., Federman, J., Johnson, A. Noise induced hearing loss in the dental environment: An audiologist's perspective. J Georgia Dent Assoc, 2002: 17-19.

5 Hyson, J.M. The air turbine and hearing loss. Are dentists at risk? J Am Dent Assoc, 2002; 133: 1639-1642.

6 Coles RRA and Hoare NW. Noise-induced hearing loss and the dentist. Br Dent J, 159: 209-218, 1985.

7 Franco BF, Abramson AL and Stein T : High-speed drill noise and hearing: audiometric survey of 70 dentists. JADA, 1978: 97: 479-82.

8 Hopp ES: Acoustic trauma in high-speed dental drills. Laryngoscope, 72:821- 827, 1962.

9 Merrell, H.B., Claggett, K. Noise pollution and hearing loss in the dental office. The Dental Assistant, 1992; 61: 6-9.

10 Fabry, D.A. Hearing loss as occupational hazard. Northwest Dentistry, 1995; 74: 29-32.

11 Gullikson, J.S. Tinnitus and the dentist. J Oregon Dent, 1978; 47: 8-9.

12 Kumar PR, Sharma P, Kalavathy N, Kashinath KR. Hearing Damage and it's Prevention in Dental Practice. Journal of Dental Sciences and Research, 2011: 2 (2) Pages 1-5.

13 Daud MK, Noh NF, Sidek DS, Abd Rahman N, Abd Rani N, Zakaria MN. Screening of dental staff nurses for noise induced hearing loss. B-ENT. 2011; 7(4): 245-9.

14 Sampaio Fernandes JC, Carvalho AP, Gallas M, Vaz P, Matos PA. Noise levels in dental schools. Eur J Dent Educ 2006 Feb; 10(1): 32-37.

15 Kilpatrick HC. Decibel ratings of dental office sounds. J Prosthet Dent 1981, 45, 175-78.

16 Willershausen B, Wolf TG, Ehlers V, Scholz L, Wolf D, Callaway A, Letzel S. Hearing assessment in dental practitioners and other academic professionals from an urban setting. Head Face Med. 2014 Jan 18; 10(1): 1. [Epub ahead of print]

17 Kumar P, Goel R, Kumar A, Singh HP. Noise pollution in dental office: Are we sheltered?. Int J Health Allied Sci 2012; 1: 207-08.