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### **Awareness of noise induced hearing loss and audiometric hearing assessment among dentists in DakshinaKannada region-A pilot study.**

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#### **ABSTRACT**

Noise is present in different environments of human society, including the workplace, and may cause irreversible damage to the human body. Studies have shown that the noise levels in dental settings are close to the limit of risk of hearing loss. This study aimsto assess the awareness of noise induced hearing loss and to quantitatively evaluate the hearing ability using pure tone audiometric analysis among dentists in Dakshina Kannada region. A questionnaire-based survey was conducted among practicing dentists with bachelor's degree in dental surgery or masters in dental surgery. Auditory tests were performed using pure tone audiometer for dental practioners of age group 25 to 50 years. Based on the data collected, prevalence of hearing loss was found to be more among the dentists who had work place noise exposure for more than 5 years. Conservative dentists and Prosthodontists have a more probability of being prone to noise related hearing impairments.

**KEYWORDS:**Noise induced hearing loss, dentists, endodontists, Audiometer, Dakshinakannada

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## **INTRODUCTION**

Sound is regarded pleasant or unpleasant depending on the subjective experience of a person.<sup>1</sup>Noise is present in different environments of human society, including the workplace, and may cause irreversible damage to the human body.<sup>2</sup>American College of Occupational and Environmental Medicine has defined Occupational noise-induced hearing loss (NIHL) as “hearing loss that develops slowly over a long period of time (several years) as a result of exposure to continuous or intermittent loud noise”.<sup>3</sup> Studies have concluded noise levels in dental settings to be close to the limit of risk of hearing loss (85 dB(A)). Hence dental professionals become one among the professional groups who are at risk of noise induced hearing impairment in the work place.<sup>4,5,6,7</sup>

Todate studies concerning relationship between perceived hearing impairment in an individual assessed via questionnaires, and true hearing impairment are few.<sup>8,9</sup>Relation between self reported hearing loss and elicited hearing ability in a distinct study population is vague in literature. Hence,aim of this study was to assess the awareness of noise induced hearing loss and to quantitatively evaluate the hearing ability using pure tone audiometric analysis among dentists in Dakshina Kannada region.

## **MATERIALS AND METHOD**

In the present study,questionnaire-based survey was conducted among practicing dentists with bachelor’s degree in dental surgery or masters in dental surgery. A total of 150 questionnaires was distributed. Information regarding the study was given to all participants and informed consent was obtained from each of the participants involved in the study. The study was initiated subsequent to approval of the Institution Ethics Committee. Response sheets once collected were examined to ensure they were properly filled and the consent form duly signed. The knowledge and attitude of the respondents were evaluated anonymously.

For audiometric test, dental practitioners of age group 25 to 50 years were included.Dentists were grouped into two based on the number of years of exposure to work place related noise as, Group A: Less than five years of exposure to work place related noise, Group B: More than five years of exposure to work place related noise. Auditory tests were performed by an experienced audiologistusing pure tone audiometer in the department of audiology, KVG medical college and hospital, Sullia DK. An audiogram was constructed for each test subject in both the ears. Hearing performance was compared between the groups.

## **DATA ANALYSIS**

The data collected was analyzed with IBM SPSS (version 20, for windows), quantitative data wassummarized using frequencies, percentages and chartsto determine relationship between

variables. A level of 0.05 was used for evaluating statistical significance (95% Confidence interval). Independent sample t test was used to compare the mean hearing thresholds of left and right ears of both the groups.

## **RESULT**

One hundred twenty four positive responses were obtained among the 150 questionnaires distributed, constituting a response rate of 82%. Three questionnaires were incorrectly filled and had to be discarded. Thus a total of 121 responses were analysed in this study.

Among the dentists who participated in the study, 57% had a practice of 6 to 10 years. Fifty seven percent of the respondents practiced general dentistry along with specialty practice. More than half of the dentist population, worked for an average of 6 to 8 hours a day.

### ***Distribution of subjects in relation to department of specialization***

Endodontics and conservative dentistry-19.35%, Orthodontia-11.29%, Periodontia-10.48%, Prosthodontia-8.06%, Paedodontia-11.29%, Oral and maxillofacial surgery-4.8%, Oral medicine-2.4%, Public health dentistry-0.8%, General dental practitioner-31.45%.

### ***Self assessment of hearing ability***

Thirty six percentage of Endodontists and Conservative Dentists assessed themselves as having some hearing difficulty, followed by general practitioners (22%).

### ***Awareness of potential for work related hearing loss***

Maximum number of respondents who were aware of the ear protection options available were Endodontists and Conservative Dentists (30.77%), Prosthodontists (30%) followed by the practitioners of specialty of Paedodontics (28%).

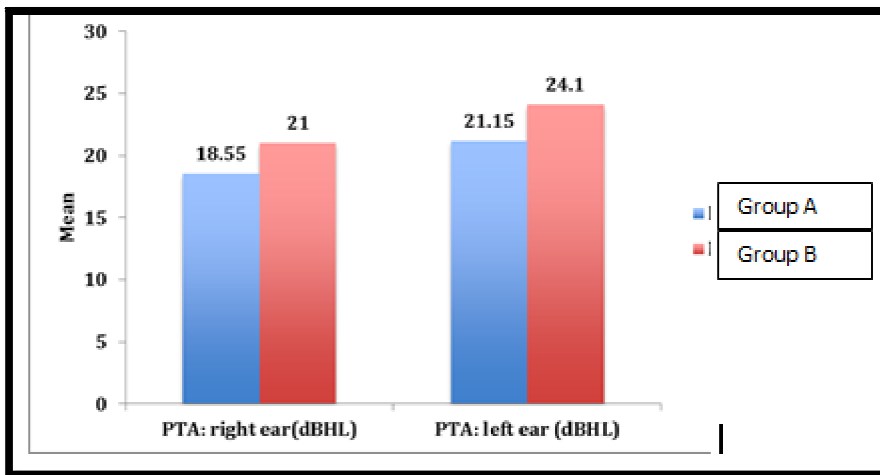
Sixty four percentage of dentists who participated in the survey were not aware of studies regarding higher prevalence of hearing problems among dentists. Seventy three percent of the participants thought they could work more efficiently if noise was less in the work environment.

More than 93% of dentists were aware that daily maintenance of dental machinery and its supporting parts prevented its premature wear off. Only 71% percent of the respondents knew that daily maintenance of machineries can help in reducing noise level in dental clinic. The survey reported that 11.4% of dentists use hand pieces and machinery with noise reduction components in them which can help in reduction of NIHC. Almost 36% of the dental professionals were aware of availability of ear protection devices and methods. Among the respondents, 2.4 % reported using some means of ear protection during their practice.

**Table 1: Difference in hearing thresholds among the two groups based on Pure Tone Audiometric analysis in right and left ears.**

	Experience	Number of samples	Mean	p-value
PTA: right ear (dBHL)	Less than 5 years (Group A)	20	18.55	0.06(NS)
	More than 5 years (Group B)	21	21.00	
PTA: left ear (dBHL)	Less than 5 years (Group A)	20	21.15	0.06(NS)
	More than 5 years (Group B)	21	24.10	

Independent sample ttest (\*p<0.05 Statistically Significant, p>0.05 Non Significant, NS)



**Graph 1: Illustration of the mean hearing thresholds of left and right ears of both the groups as evaluated by a pure tone audiometer**

The mean hearing threshold was slightly raised in Group B when compared to Group A. (Table 1)

According to Good man’s scale, 45% subjects in Group B and 25% of subjects in Group A showed slight to mild hearing impairment in left ear. Twenty percent of subjects in both Group A and Group B showed similar findings.

Hearing threshold of left ear was found to be higher than that of right ear in both the groups. (Graph 1)

**DISCUSSION**

According to National Institute for Occupational Safety and Health (NIOSH), exposure of 6h per day at 92 dB, or up to 20 h per week at 88dB is the maximum noise exposure allowed in the workspace. Literature reports that sound pressure levels produced by dental equipments varies between 56 dBA and 94 dBA.<sup>10,11</sup>

The questionnaire used in this study addressed issues related to perception and knowledge on noise and its effects amongst both general dental practitioners and specialized dental practitioners. One hundred and fifty questionnaires were distributed of which one hundred and twenty four response sheets were available and eligible to be assessed in this survey to discern the awareness of noise induced hearing loss among dentists in Dakshina Kannada region.

In the present study, 38% of dentists conveyed to have lack of awareness related to prevalence of work related NIHL (noise induced hearing loss) among dentists. This result was in agreement with a study conducted by Gonçalves et al (2012) on dentists with over 10 years of experience and those with less than 10 years, in which 81% of dentists participated in the survey did not receive any information regarding noise in the work place.

Sixty four percent of the participants were not aware of any ear protection devices and methods available for dentists. A sheer 2.4% of dentists reported to using some form of ear protection devices. This is in agreement with the study by Schettini et al (2017) who reported that 59.2% professionals knew about noise prevention methods in dental work place, although they did not use them. Ignorance of impact of work place noise on health and quality of life, probable discomfort, lack of motivation and anticipation of interference of communication with staffs and patients could be the probable reasons for avoiding ear protection devices.

A pure tone audiometer determines the faintest tone a person can hear at selected frequencies from low to high and is appropriate to plan intervention. The auditory thresholds show a classic sign of NIHL in the audiometric notch at the frequencies in the range between 3 and 6 KHz.<sup>12,13</sup> In the present study, pure tone audiometer was used to evaluate the hearing thresholds of the subjects. It was found that hearing thresholds were slightly elevated in practitioners with more than 5 years of experience (group B). This is in agreement with a cross-sectional study conducted on 38 dentists from different specialties where 15.8% of the dentists and 2.6% of the control group had some hearing loss.<sup>14</sup>

In the present study, 51% of dentists practicing for more than five years and 30% of dentists practicing for less than five years reported to have slight to minimal hearing loss when assessed using an audiometer. The result was in agreement with a study by Gonçalves et al (2012), who found that 15% dentists had hearing impairment and dentists working for longer than 10 years had worse tonal hearing thresholds at high frequencies. Another study concluded that general dental practitioners who initiated practice ten years ago experienced more hearing impairment when compared to general practitioners having similar years of experience.<sup>15</sup>

When both ears were compared within the groups of dentists, left ear showed slightly increased threshold level of hearing. This finding is in accordance with a study conducted by Frieda

Gijbels(2006)where the data obtained from a questionnaire survey along with a pilot experimental study among dentists showed a hearing loss at 4,000 Hz for the left ear. This could be probably because of the proximity of the left ear of a right handed operator to thecontinuous sounds produced by dental machineries such as hand pieces and suction devices.

When self(subjective) assessment of hearing using questionnairewas done in the present study, 55.8% of dentists practicing for more than five years and 40% of dentists practicing for less than five years assessed themselves as having some hearing loss. This subjective assessment was found to be similar to the results obtained by objective analysis using audiometer.

The 45% of the subjects who reported of mild hearing loss in group B informed of having a practice inclusive of procedures which require continuous use of high speed handpiece, compressor and suction devices, irrespective of their specialty.Considering the fact that certain specialities in dentistry such as Conservative dentistry and Prosthodontics require consistent use of these machineries, there is necessity for more studies regarding hearing impairment among dentists belonging to these specialities.

Noise induced hearing loss has an insidious onset. It can be well advanced by the time it gives rise to noticeable disability. Early detection of such loss through audiometry may assist in prevention, and recognition of prevailing loss.<sup>13</sup>Prevention can be achieved by maintaining appropriate distance of at least 14 inches from patients along with better posture while working,self limitation from high or continuous sounds from other sources,periodic maintenance of dental equipments, installation of noise less compressors, using hearing protection devices, using adequate acoustic projectsand sound proofing systems in the dental office. Literature states that the increasing sound absorbance of the dental office results in 4-7dB decrease in the mean noise level of the dental office.<sup>16</sup>Periodic hearing evaluationis indicated.Studies have to be conducted on larger population over larger period of time.

## **CONCLUSION**

Participants in the study showed less awareness regarding NIHL in dental profession, and are less inclined to protect themselves from hazards caused by continuous noise exposure. Prevalence of hearing loss was more among the dentists who had work place noise exposure for more than 5 years.Conservative dentists and Prosthodontists are more prone to noise related hearing impairments. Questionnaire surveys are significant tools for screening of hearing ability independently or along with audiometric tests.

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