

# Prevalence and Pattern of Dentine Hypersensitivity in a population of patients at MGM Dental College, Navi Mumbai City, India

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## Abstract

**Aim:** The aim of this study was to determine the prevalence of Dentine Hypersensitivity (DH) in an Indian population and to assess the factors associated with this condition.

**Methods:** 4200 subjects were examined in the Out-Patient Department (OPD) at the MGM Dental College, Navi Mumbai City. Patients who complained of dentine hypersensitivity were given the questionnaire to complete, in order to obtain the following information, demographics, dental history, eating habits and DH symptom data, and associated known factors relating to DH. In total 548 questionnaires were completed. Oral examinations assessed DH in participants who reported DH in at least one of their teeth. The subjects also quantified the severity of DH on 10-digit visual analogue scale. The diagnosis of DH was established by a short, sharp pain arising from exposed dentine in response to triple-syringe air blast and explorer probe of the tooth surface.

**Results:** The prevalence of self-reported DH was 13%; and that of clinically diagnosed DH was 8.2%. Numerically more males were examined compared to females although there were no differences in the prevalence of DH between the two groups. DH. The peak prevalence of DH was in the 30-39 years age group. Mandibular central incisors and first molars were significantly the most affected teeth. Cold (89.4%) was the most common cause of DH. Those subjects having moderate sensitivity for  $\leq 6$  months resorted to home remedies of brushing with a desensitizing paste to relieve the problem rather than visit their local dentist. However only 41 (8.8%) of the total participants claimed to have attended a dental practice.

**Conclusion:** The results from the study would suggest that DH is a common prevalent dental condition in India. Although the condition appears to cause a degree of noticeable discomfort, most patients choose to either ignore the condition or simply tolerate it. Therefore, it can be assumed that the condition does not cause a significant effect on the quality of life or life style of the individual complaining of the problem.

**Keywords:** Prevalence; Dentine hypersensitivity; Self-Reported questionnaire; Clinical diagnosis

## Introduction

Dentine sensitivity (DH) is a common condition that's frequently encountered in dental practice [1,2] DH is universally defined as short, sharp pain arising from exposed dentin in response to thermal, evaporative, tactile, osmotic, or chemical stimuli which cannot be ascribed to any other form of dental defect, pathology or disease [3]. The definition emphasizes the importance of a differential diagnosis as DH may be confused with that of fractured teeth, carious teeth or marginal leakage of restorations (4). Previous studies showcase that the majority of patients with DH are usually in the 30-40 years age group [4,5] with the frequency of DH being more in females than in males [6,7]; commonly affecting the incisors and premolars [8-13] and to some extent the first molars on the buccal aspect of the cervical area [8,10,14]. Personal behavioral habits including consumption of highly acidic drinks or food; overzealous dental hygiene and previous dental procedures such as periodontal therapy have been found to be associated with DH [15]. Previous studies on the prevalence of DH have produced diverse frequencies and inconsistent findings which may be as a result of the population under investigation, e.g., home setting, general dental practice, dental hospitals or specialized periodontal clinics [16-19]. These wide ranges were attributed to differences in the sampling methodology. The results of questionnaire dependent studies or those of self-reported DH may therefore exaggerate the prevalence figures. Also, there are relatively few studies that have attempted to 1) determine the size of the problem and 2) investigate factors associated with DH amongst the Indian population. The aim of this study was thus

to determine the prevalence of the DH in an Indian population and to assess the factors associated with this condition.

## Materials and Methods

### Study population

The present study was a questionnaire and clinical examination-based study conducted from December 2015 to February 2016 in the Out-Patient Department (OPD) at the MGM Dental College, Navi Mumbai City. Patients attending the OPD during the college hours were recruited to this study. Adult subjects aged 20 years or older were interviewed and examined by four investigators. The study was approved by the Ethics Committee of the MGM Dental College and informed consent was obtained from each subject. From the general OPD of 4200 patients examined, only 548 of those patients who complained of sensitivity were given the questionnaire to complete.

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Any teeth that were carious, cracked or fractured were excluded from the study. Patients, having difficulty in communicating and/or taking analgesic drugs or tranquillizers were also excluded from the study.

### Examiners Calibration

Four dentists were employed to interview the participants and examine them for the presence of DH. A questionnaire and a clinical examination data sheet was designed for data collection purposes. A visual analogue scale (VAS) was used for the DH response measurements. The nature of the study was explained to the examining dentists in a meeting and the definition of DH prevalence was clearly explained to them. The examining dentists were shown a demonstration on the procedure of DH intraoral tests. Patients quantified the resulting pain response on the VAS sheet following a brief introduction into how the experienced pain will be recorded on the VAS. The examiners were calibrated by examining 15 volunteers during a one-week period until 95% inter-and intra-examiner reliability was achieved.

### The Questionnaire

Subjects were interviewed during their visit to the Dental Hospital (Clinic). Participants were questioned about the presence of sensitivity in their teeth. The initial part of the questionnaire was designed to elicit the demographic characteristics of participants that included name, age, gender and occupation. The second part had questions directed to obtain reasons as potential causes for DH that comprised of systemic conditions like stomach problems, heartburn and vomiting (e.g., intrinsic erosive components); oral hygiene habits such as tooth brushing and tooth whitening history or the use of any whitening toothpaste or both; personal habit history of juices intake and duration of DH; the periodontal health status of each participant including recent scaling history within the last three months prior to the interview and orthodontic treatment in the last 3 months. Patients were also asked about their previous use of desensitizing toothpaste and any professional treatment of DH by their Dentist. The patients who were clinically diagnosed DH were asked to report the stimuli type that initiated their DH response. The stimuli included cold air, water, hot food or drinks, tooth brushing or sweet.

### Interviews and Intraoral Test Procedures

Subjects who reported DH were tested clinically to confirm the presence of DH. DH was diagnosed based on a short, sharp pain arising from exposed dentine in response to evaporative and tactile stimuli on the exposed dentine of the tooth. To produce evaporative stimuli, a 1 second air blast was delivered using the dental unit triple syringe, blowing a short blast (45 psi pressure) of room temperature air (19-23°C), being held perpendicular and 2 mm away from the tooth surface, whilst shielding the adjacent teeth with fingers or cotton rolls. Tactile stimulation was determined using a periodontal probe passed perpendicular to the tooth surface with apical sweeps and the pressure was gradually increased until the subjects responded. The teeth were examined to rule out any other causes of sensitivity for example; Cracked tooth syndrome/Fractured restorations/Chipped teeth/Dental caries/Gingival inflammation/Post-restorative sensitivity/Marginal leakage/Pulpitis and sensitivity to both non-surgical and surgical procedures.

### DH Measurement on Visual Analogue Scale

The VAS assessment sheet was presented to the participants to quantify their response to DH. The VAS was a 10 cm horizontal line with 10 digits (0-10). Patients with discomfort due to DH in one of

their teeth were requested to quantify their perception of the pain magnitude of the most sensitive tooth by placing a vertical mark on the VAS sheet. Marks designated between the digits were as follows: 0-1 were considered as having no pain; between >1- ≤ 4, mild pain; between >4- ≤ 7, moderate pain; and between >7-10 severe pain.

### Data Analysis

Data were analyzed using statistical software SPSS 22.0 for Windows, IBM, Portsmouth, UK. Results are presented in the form of frequency distribution tables, charts and figures.

### Results

Prior to the commencement of the study and following a period of training, four examiners were calibrated by examining 15 volunteers during a one-week period until 95% inter-and intra-examiner reliability was achieved.

This study was conducted from December 2015 to February 2016 and during this period 4200 patients were examined in the OPD. Patients who complained of DH were given the questionnaire to complete and agreed to have a clinical examination, 548 questionnaires were completed, 38 datasets were removed due to duplication or incomplete information, 510 (12.1%) datasets from the questionnaire and clinical assessments were entered and analyzed using SPSS software (v.22) (IBM Portsmouth, UK) (Table 1).

When asked to identify the region of the mouth where they were experiencing DH; a higher proportion of subjects (188 (36.9%)) indicated their discomfort was in the lower anterior region followed by 161 (32%) of subjects indicating that their discomfort was in the lower left region (Figure 1).

161 (31.6%) of subjects indicated that the discomfort was on the inner (palatal/lingual) surfaces of their teeth whereas 228 (44.7%) indicated that their discomfort was on the outside (facial/buccal/labial) surfaces of their teeth. 121 (23.7%) of subjects did not respond to the question. When asked if they had their teeth recently cleaned (Scale and Polish), only 112 (22%) of subjects stated that they had a recent cleaning. Of those subjects (103 (20.2%)) who responded to question 16 (15.5%) indicated that they had no discomfort from the scaling procedures based on a 0-10 Visual Analogue Scale (VAS) whereas 87 (84.5%) indicated that they experienced some degree of discomfort based on a 0-10 Visual Analogue Scale (VAS) (Figure 2).

Only 17 (3.3%) subjects indicated that they have any periodontal surgery undertaken by their Dentist and the subjects indicated that they experience discomfort up to 8 weeks post-operative (Figure 3).

S.no	Variable	Category	Data
1	Age (Range from 23-75 years)		38.28 ± 12.98 years (mean)
2	Gender	Male	265 (52%)
		Female	245 (48%)
3	Educational status	School	74 (25%)
		College	113 (38.2%)
		Post-graduate	8 (2.7%)
		Other	101 (34.1%)
		Missing value	214 (42%)
4	Occupation	Housewife	85 (16.7%)
		Service Industry	41 (16.9%)
		Business	11 (2.2%)
		Student	25 (10.3%)
		Missing values	267 (52.4%)

**Table 1:** The demographic data of the population.

### Causes of Dentine Hypersensitivity

When asked about the cause of their discomfort 44 (8.6%) subjects did not respond, 134 (28.8%) did not know, of the other factors recorded by subjects 97 (20.8%) indicated ‘periodontal disease’ (gingivitis), 200 (42.9%) tooth brushing; 21 (4.5%) restorative materials; 7 (1.5%) professional cleaning; 4 (0.9%) orthodontic treatment; 2 (0.4%) Bleaching and one subject (0.2%) vomiting (Figure 4). Of the total responses for the Question (L) on stimuli causing DH, ‘cold food/drink’ was considered the most prevalent stimulus (n=456, 89.4%) followed by ‘hot food/drink (n=175, 34.3%) (Figure 5).

Of the responses to the Question on the discomfort experienced during the daily activities such as eating, drinking, oral hygiene measures using a VAS score, 131 (34.4%) subjects recording mild discomfort (1-3), 231 (60.6%) subjects recording moderate discomfort (4-7) and 19 (5%) subjects recording severe discomfort (8-10) (Figure 6).

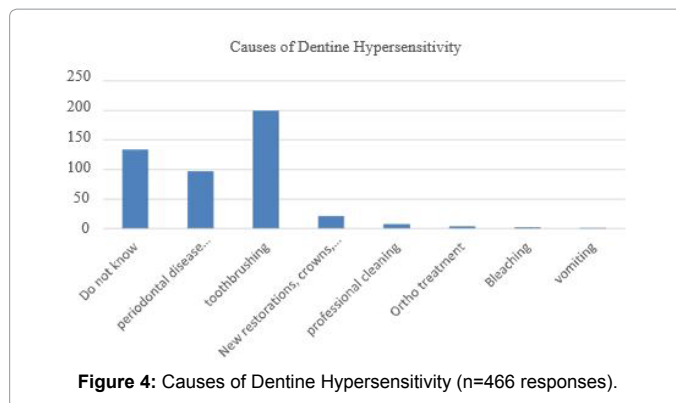


Figure 4: Causes of Dentine Hypersensitivity (n=466 responses).

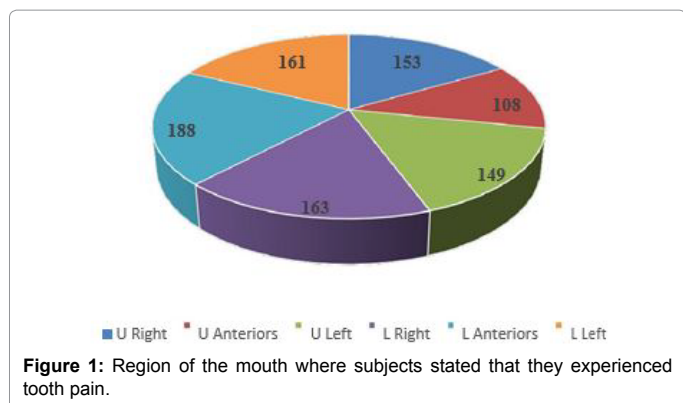


Figure 1: Region of the mouth where subjects stated that they experienced tooth pain.

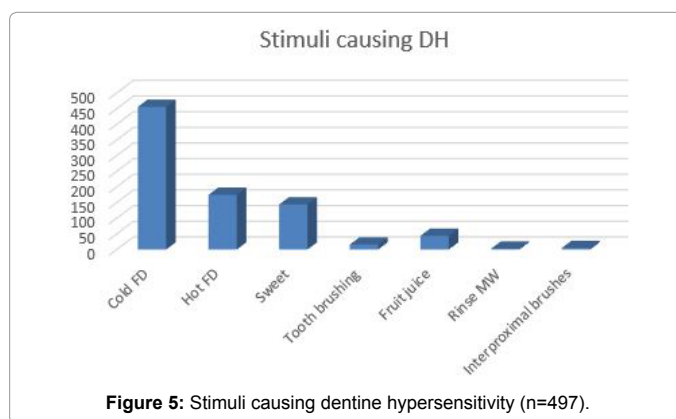


Figure 5: Stimuli causing dentine hypersensitivity (n=497).

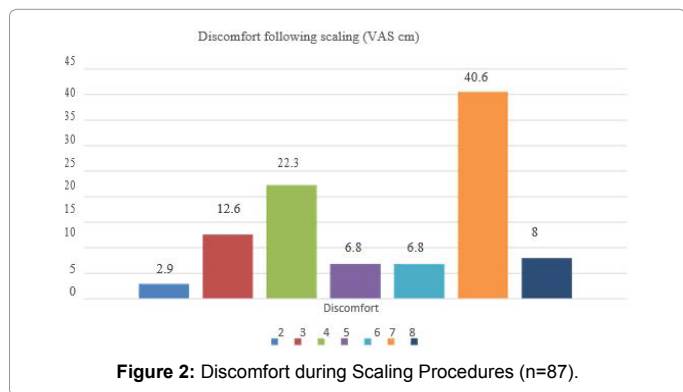


Figure 2: Discomfort during Scaling Procedures (n=87).

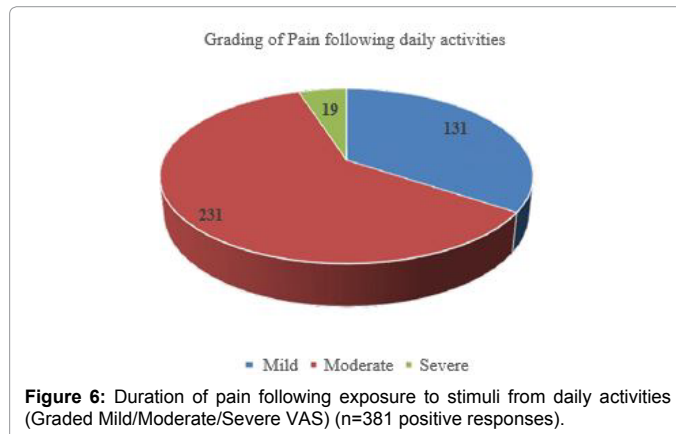


Figure 6: Duration of pain following exposure to stimuli from daily activities (Graded Mild/Moderate/Severe VAS) (n=381 positive responses).

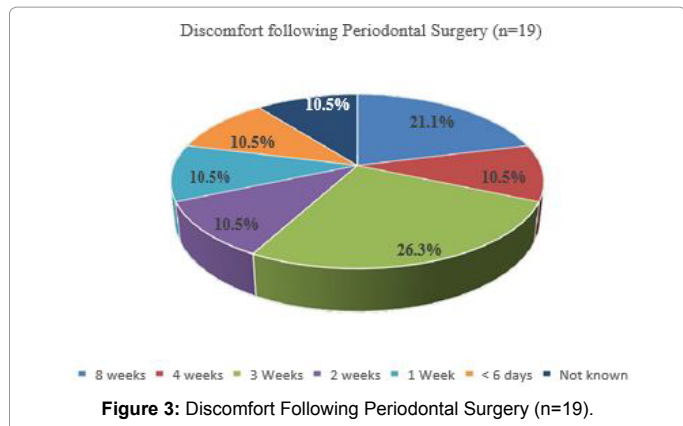


Figure 3: Discomfort Following Periodontal Surgery (n=19).

When asked about the duration of discomfort they had experienced from DH (Question M) 350(70%) subjects recorded that their discomfort lasted for less than six months, 121 (24.2%) of subjects between 6 months and one year (Figure 7).

When asked about the usage of desensitizing toothpaste for their discomfort only 59 (12.2%) of subjects claimed that they had used a desensitizing toothpaste with 425 (87.8%) claiming not to have used any desensitizing toothpaste. The main branded toothpaste (n=54; 10.6%) used by the subjects was ‘Sensodyne’ (n=27; 50%) followed by ‘Colgate’ (n=16; 29.6%) (Figure 8).

Most of the subjects indicated that they did not attend a dental practice 424 (91.2%). Of those who attended a dental practice only 11 (2.8%) claimed to be undergoing treatment. Of those subjects who

claimed to have had dental treatment (n=6; 1.2%), two individuals received endodontic treatment, one individual received restorative treatment, one individual received orthodontic treatment, one individual received treatment for migraine and one individual was provided with a desensitizing toothpaste (Colgate Sensitive).

On examining the subjects' teeth, the Dentists were asked to rule out any conflicting conditions that may have a similar pain profile to that of DH on the tooth in question (Differential Diagnosis). 156 subjects (30.6%) were identified as having a diagnosis other than DH; 354 (69.4%) subjects did not have a differential diagnosis for the tooth in question. Of those conditions that were identified, 83 subjects (53.2%) were diagnosed with dental caries and three subjects (1.9%) had an unknown diagnosis (Figure 9).

Of the teeth not diagnosed with any other condition, 120 subjects (23.5%) responded to the air blast test. When the pain scores (VAS) of 119 subjects (23.3%) were analyzed in respect to the severity, 55 subjects (46.2%) responded in the 'mild' category, 61 subjects (51.3%) in the 'moderate' category and 3 subjects (2.5%) in the 'severe' category (Figure 10).

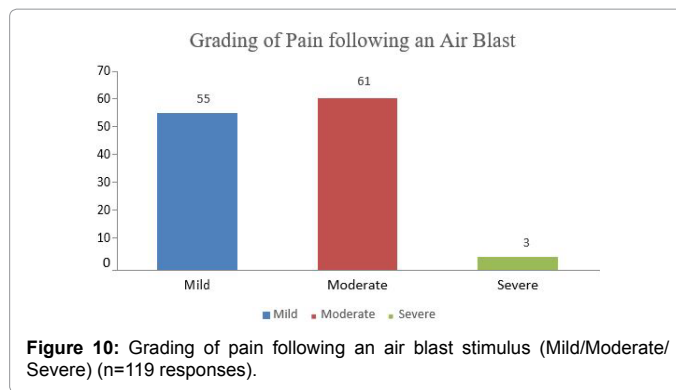


Figure 10: Grading of pain following an air blast stimulus (Mild/Moderate/Severe) (n=119 responses).

## Discussion

One of the problems when evaluating the true prevalence figures for DH was that there is a wide range of values depending on whether the studies included a questionnaire, a clinical evaluation or a combination of both methods. In general, the prevalence of DH was lower following a clinical examination, compared to the prevalence figures from a questionnaire study.

According to the Canadian Consensus Document [3], DH has been defined as 'pain derived from exposed dentin in response to chemical, thermal, tactile or osmotic stimuli which cannot be explained as arising from any other dental defect or disease [20]. As a result, it provides a very useful clinical description of the condition and as such encourages dentists to exclude other forms of tooth pain or sensitivity. In other words, the definition of DH is one of exclusion. Several investigators [21,22] have also suggested that clinicians should distinguish between those individuals complaining of DH who have relatively healthy mouths with those who complain of DH as a result of periodontal disease and/or its treatment. In this regard, root sensitivity or root dentin sensitivity (RDS) or root dentin hypersensitivity has been used to describe sensitivity arising from periodontal disease and its treatment [23]. However, currently, most of the reported prevalence studies fail to distinguish between DH and RDS, and so far, there are limited data on the differences between the two conditions.

A review of the prevalence of tooth sensitivity or DH in adult populations indicated that 8–35% of subjects reported DH, depending on the population studied and the methodology used [24,25]. In this study, the prevalence of self-reported DH was (13%) more than that of clinically diagnosed DH (8.2%) following the clinical examination. The higher prevalence may be attributed to patients being unable to differentiate between DH and sensitivity due to other causes including dental caries and cracked tooth syndrome [6,10]. Other studies have also reported similar lower results of DH such as 25.5% and 32.6% in Chinese populations (26-27), 25% and in a Brazilian population [7]. Similar lower prevalence figures of DH were also reported in a Greek population e.g., 9.1% [26-28] which may be attributed to differences in the diet and consumption pattern of the different populations under investigation [29]. Although self-reported DH figures are useful and should not be ignored, the results from the present study indicated that clinical tests are a more reliable method for determining the prevalence of DH. Interestingly the DH prevalence, as reported in the present study in a general practice population setting (12.14%), was considerably lower than that observed by Gillam et al using the same questionnaire [30].

In the present study, more males were examined compared to

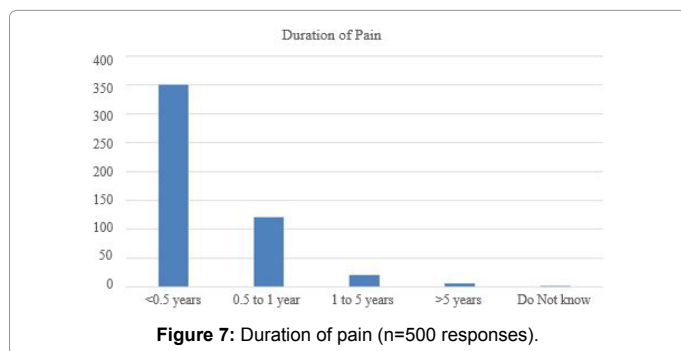


Figure 7: Duration of pain (n=500 responses).

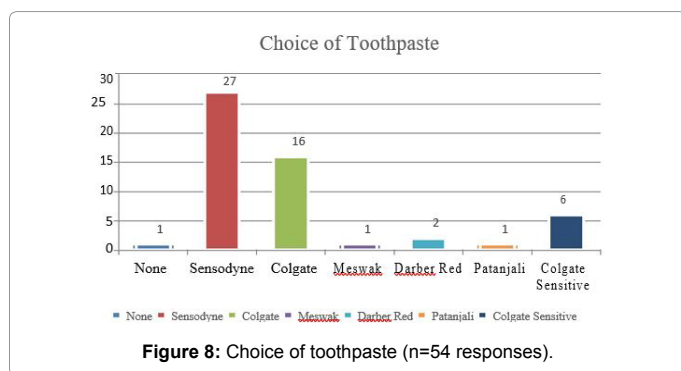


Figure 8: Choice of toothpaste (n=54 responses).

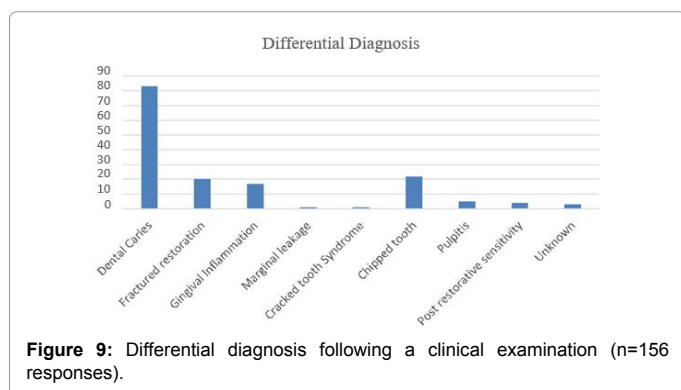


Figure 9: Differential diagnosis following a clinical examination (n=156 responses).

females although there was no difference in the prevalence of DH between the two groups which was at variance with previous reports who reported that DH was more prevalent in females [7,9]. Furthermore, the mean age of the subjects was 38 years of age; the greatest prevalence of DH was observed between the third and fourth decades, which is reasonably consistent with previous studies in the general population [25,31,32]. Rees [33] reported that the peak prevalence of DH was in the age range of 30-39 years. Mandibular incisors were observed to be the more vulnerable to DH with the upper facial/buccal regions being the second most affected sites in this study which were consistent with the previous results in the published literature [11,34]. According to several investigators the first molar and premolar regions could also be the most common sites for DH due to toothbrush abrasion [33,35].

The results of the present study demonstrated that both cold air and cold drinks produced the maximum provoking effects of DH (89.4%). This finding was consistent with several previous reports [5,34] although a recent study by Sood et al. [36] reported that sweet and heat were the most cited responses. In another study (11), tooth brushing was reported as the most severe provoking factor which was in agreement with the findings in the present study (42.9%). Gingivitis (21%) was also associated significantly with DH, which was supported by Taani et. Al [14]. With regard to the frequency of DH, most of the subjects in the present study rarely experienced DH, which was similar to the study by Colak et al. [37] in which 87% of subjects stated that they occasionally experienced DH, 11% experienced DH most of the time and as little as 2% subjects experienced DH continuously.

Subjects in the present study did not perceive DH to be a severe problem and consequently did not seek treatment as 87% claimed not to have used any desensitizing toothpaste, which was similar to the finding reported by Gillam et al. [32] where only one in four U.K. patients claimed to use a desensitizing dentifrice. The perception of DH in both populations appeared to be similar, namely that DH was perceived as a low-grade pain, of slight concern, and occasionally lasting for >6 months. It was also evident from the responses that discomfort from DH was not perceived as sufficiently severe to either self-treat or seek professional help. These results were consistent with the results by Sood et al. [36] and Kehua et al. [38].

Other factors that may have a bearing on the awareness of individuals in either self-treating or seeking professional treatment include age, gender, education, diet, periodontal condition and locality [36]. Therefore, it is important for clinicians to provide different management strategies to educate their patients about the causes, effects and treatment of DH with the objective of providing preventative measures to improve the overall wellbeing of those individuals seeking treatment.

## Conclusion

In conclusion, the results from the present study indicated that the prevalence of self-reported DH in the dental college was more than that of clinically diagnosed DH. The prevalence and factors responsible for DH reported in the present sample of Indian population was generally consistent with the current scientific consensus on DH as reported by various other studies globally conducted on similar lines. Generally speaking, DH was not considered as a major problem by most patients and would suggest that the condition does not have a major impact on their day to day activities.

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