

Research Article

Prevalence and Distribution of Cervical Dentin Hypersensitivity in a Greek Population

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Abstract

Background and aims. The aim of the present study was to estimate the prevalence of dentin hypersensitivity in an adult population in Greece.

Materials and methods. Eight hundred patients participated in the present study, including 380 males and 420 females with an age range of 18–64 years. All the subjects answered questions regarding gender, age, educational level, teeth affected and any factor that initiated dentin hypersensitivity. This was followed by a clinical examination involving assessment of sensitive teeth per patient and any buccal gingival recession associated with sensitive teeth. Data were analyzed using descriptive statistics and chi-square test.

Results. Our findings showed that 13.5% of the patients had dentine hypersensitivity. Prevalence of hypersensitivity in females (15%) was not significantly higher ($p=0.465$) than males (11.8%). The mean number of sensitive teeth per patient showed a peak in the 35–44 age group and then reduced slowly in the older and younger cohorts. The teeth most commonly affected by dentin hypersensitivity were the first and second premolars of both jaws followed by the canines of both jaws. The majority (82.5%) of sensitive teeth had at least 1-3 mm of gingival recession. Pain-initiating stimuli frequently observed were the consumption of cold drinks followed by consumption of hot drinks and tooth-brushing. A statistically significant difference was recorded between dentin hypersensitivity and educational level ($p=0.045$).

Conclusions. The prevalence of dentin hypersensitivity in an adult population sample in Greece was 13.5% and the mean number of sensitive teeth per patient was observed to increase with age.

Key words: Prevalence, dentin hypersensitivity, gingival recession, epidemiology.

Introduction

Dentin hypersensitivity (DH) has been defined as a "short, sharp pain arising from exposed dentin response to stimuli typically of thermal, evaporative, tactile, osmotic or chemical nature, which cannot be

ascribed to any other form of dental defect or disease".¹⁻³

DH is a common condition, frequently encountered in dental practice. Several studies have reported a prevalence of 1.34–74% for DH in the general popula-

tion.⁴ This wide variation in prevalence has been presumed to be due to a number of factors, including different methods used to diagnose the condition (clinical examination, questionnaire, etc.), variation in the consumption of erosive drinks, variation in the type of sample population and the type of setting where the study is carried out.³

Data has mostly been collected from questionnaires, with little emphasis on clinical examination.^{8,15}

Most previous studies have mainly been carried out in university hospitals or dental practices,^{3-7,9-13,17,21-24} but these selected sample populations might experience more dental or periodontal diseases than in the general population. Many people with mild tooth sensitivity do not necessarily seek professional advice or dental treatment, making it more difficult to obtain an accurate prevalence rate of DH for the general population than for those in hospitals or clinics.

It has been shown that the aetiology of DH is multifactorial; however, interactions between several factors including stimuli, as well as predisposing factors, may play an important role in initiating this condition.^{18,28-30}

Cold and air stimulation are known to be the most common stimuli,^{20,31} while dietary acid has also been shown to have a significant potential in evoking DH.²³

Among the predisposing factors for DH, gingival recession and abrasion, as well as erosion and attrition, have been considered as important ones.²⁸⁻³⁰

Gingival recession, in particular, can result in exposure of the root surfaces and has been considered a common risk factor or contributing feature for subsequent DH, and previous studies have reported prevalence of DH associated with gingival recession to range from 29.7% to 93%.^{3,9-11,14}

DH is also a common finding in patients with chronic periodontal disease since the root surface may be exposed as part of the disease process. DH prevalence is higher in this group of patients, ranging from 72.5% to 98%.^{11,14,32}

Based on these observations Dababneh et al³² suggested that DH associated with periodontal disease may have a different aetiology, possibly related to bacterial penetration of the dentinal tubules. Adriaens et al³³ reported similar findings. As a result of this possibility, the European Federation of Periodontology (EFP) has recommended the use of the term root sensitivity (RS) to describe the sensitivity associated with periodontal diseases and treatments.¹⁰

Similar studies have not been carried out in Greece; therefore, detailed data was collected from questionnaires and clinical examinations of this condition of subjects who attended a private practice in order to

assess the epidemiology of DH.

The present cross-sectional study was designed to estimate the prevalence of DH in an adult population sample in Greece.

Materials and Methods

Subjects

Study population consisted of 800 subjects, 380 males and 420 females, 18–64 years of age (mean age 45.4 ± 6.2 years) who visited a private dental practice in Patra, one of the biggest cities in Greece.

Subjects with less than 24 teeth or those who had undergone periodontal therapy or were on antibiotic or anti-inflammatory therapy within the past six months were excluded from the study.

The present study ran from June to November 2010 and all examinations were performed by the author of the present study. The subjects were in good general health as estimated by a health questionnaire.

The study population was divided into 5 groups according to the age range: group I. 18 to 24 years: 185 subjects (84 males, 101 females); group II. 25 to 34 years: 180 subjects (78 males, 102 females); group III. 35 to 44 years: 155 subjects (70 males, 85 females); group IV. 45 to 54 years: 170 subjects (85 males, 85 females); group V. 55 to 64 years: 110 subjects (63 males, 47 females).

Ethical considerations

Ethical committee approval for questionnaire-based surveys is not mandatory in Greece. Hence, only a signed informed consent was obtained from patients who agreed to participate in this study.

Inclusion criteria

The selection criteria of the participants comprised an age range of 18–64 years and a mean number of 20 natural teeth, since large numbers of missing teeth might have interfered with the results of the present study. More than 12 missing teeth can cause problems with eating, speech, and other basic activities that might worsen with time. Eventually, the remaining teeth in the jaw shift in an attempt to fill the gap left by a missing tooth. That situation can cause other oral diseases, including periodontal disease (pathologic migration, mobility) temporo-mandibular joint (TMJ) disorder, dental caries, etc. and might lead to over- or underestimation of the prevalence of DH.³⁴

Questionnaire

Before the clinical examination all the subjects filled in a questionnaire regarding data such as gender, age, educational level (primary, secondary, college, uni-

versity), teeth affected by hypersensitivity, any factor that initiated the sensitivity (cold/hot drinks cold/hot food, sour stimuli, toothbrushing) and the last visit to the dentist.

Clinical Examination

The participants were clinically examined by the author of the study. Initially, the teeth and gingiva were dried with compressed air gently and the patients were asked if they had any sensitivity. An observation of dentin hypersensitivity was made considering both patient’s indication of the problems well as the clinical findings. In case the response was positive the diagnosis of DH was confirmed using a blast of air from a syringe of dental unit. In cases the response was doubtful a piece of cotton moistened in cold water was used to confirm the definitive diagnosis of DH.

In order to estimate the apico-coronal width of recession, linear measurements were obtained from the CEJ up to the gingival margin in teeth presenting with gingival recession. A William’s mm probe (PCP10-SE, Hu-Friedy Mfg. Co. Inc., Chicago, IL, USA) was used for the purpose and the mid-facial buccal surfaces of all teeth were examined except for the third molars.

In cases where the CEJ was covered by calculus, hidden by a restoration or loss due to caries or wear lesions the location of such junction was estimated on the basis of the adjacent teeth.³⁵ Teeth with cervical caries or abrasions were included in the study in order to estimate the apico-coronal width of recession but were excluded from the assessment of DH prevalence, as all teeth with carious lesions or abrasions at any tooth surface.

Statistical Analysis

The individual was the statistical unit in order to estimate the prevalence of DH. Methods of descriptive statistics and chi-squared test were employed to analyse data. Data analysis was performed using the statistical package of SPSS 17.0 (SPSS Inc., Chicago, IL, USA). Statistical significance was defined at $p < 0.05$.

Results

A total of 348 teeth were diagnosed with DH in 108 patients giving an overall prevalence rate of 13.5% (11.8% in males and 15% in females, with no statistically significant differences, $p = 0.465$). Forty-five subjects with DH were males (41.67%) and 63 were females (58.33%), giving an overall male-to-female ratio of 1:1.4 ($p = 0.102$).

Table 1 presents the distribution of patients by gender/age group and male/female ratio by gender/age

group in subjects with DH.

Figure 1 shows the overall prevalence and the prevalence of DH by gender and age group.

Figure 2 presents the distribution of DH by tooth type. It is observed that the most affected teeth were the premolars and canines of both jaws. The mean number of sensitive teeth per patient is shown in Figure 3. It is clear that the mean number showed a peak at 3.36 in the 35–44 year-old age group and then decreased slowly in the older and younger cohorts.

Figure 4 presents the distribution of gingival recession associated with sensitive teeth by gender. The majority (82.5%) of sensitive teeth had at least 1–3 mm of gingival recession.

Table 1. Distribution of study samples by gender, age group and M/F ratio (concerned patients with sensitive teeth)

Age group	Total	Males	Females	M:F ratio (for patients with sensitive teeth)
18-24	185	84	101	1:2
25-34	180	78	102	1:1.25
35-44	155	70	85	1:1.2
45-54	170	85	85	1:1.27
55-64	110	63	47	1:1.58
Total	800	380	420	1:1.4

Table 2. Distribution of subjects with and without sensitive teeth according to their educational level

	Subjects with DH	Subjects without DH
Primary Education	38*	182
Secondary Education	20	168
College	18	175
University	32*	167
Total	108	692

* $p = 0.045$

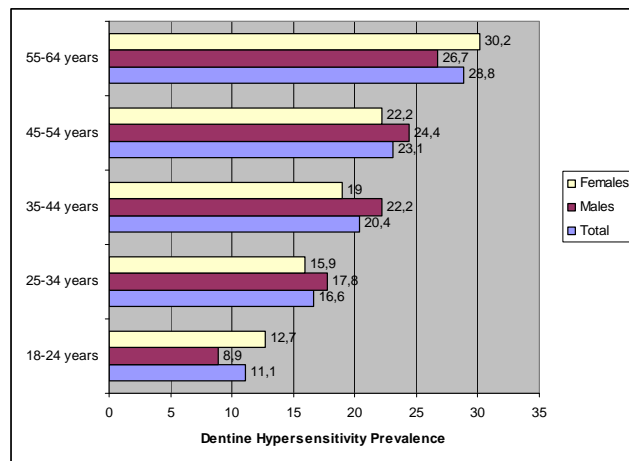


Figure 1. Prevalence of dentin hypersensitivity by gender and age group.

Initiating factors of DH are shown in Figure 5. The most common stimuli were the consumption of cold drinks followed by consumption of hot drinks and toothbrushing.

The distribution of patients with sensitive teeth according to educational level of the sample is shown in Table 2. It is clear that subjects with higher (university) and lower (primary) educational levels showed more sensitive teeth than those who had secondary or

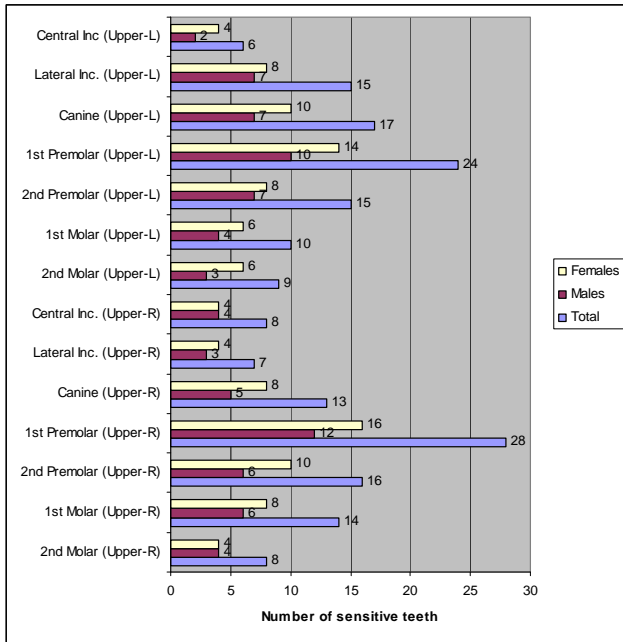


Figure 2. Dentin hypersensitivity by tooth type in maxilla.

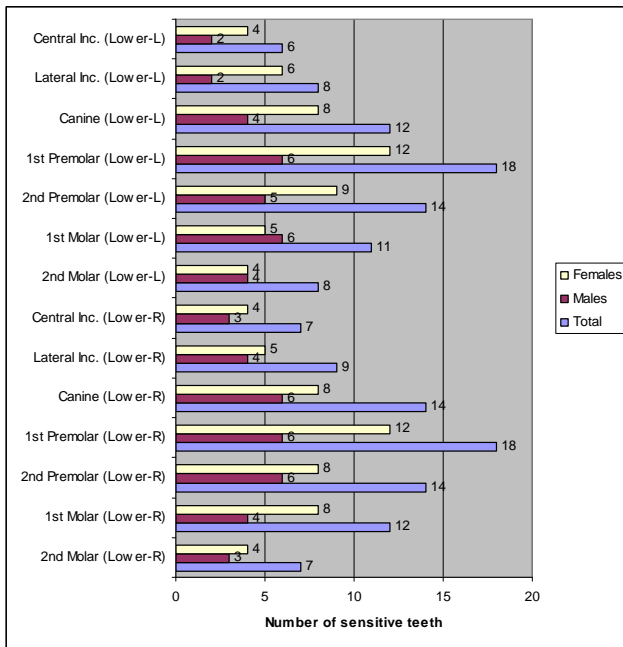


Figure 3. Dentin hypersensitivity by tooth type in mandible.

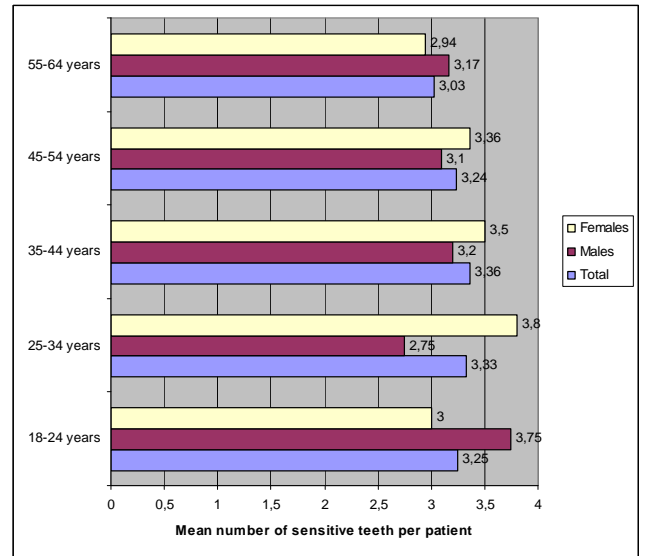


Figure 4. Mean number of sensitive teeth per patient by gender and age group.

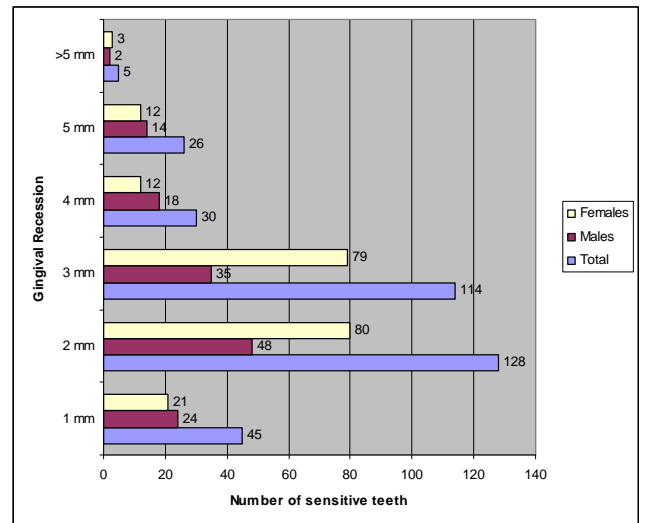


Figure 5. Gingival recession associated with sensitive teeth.

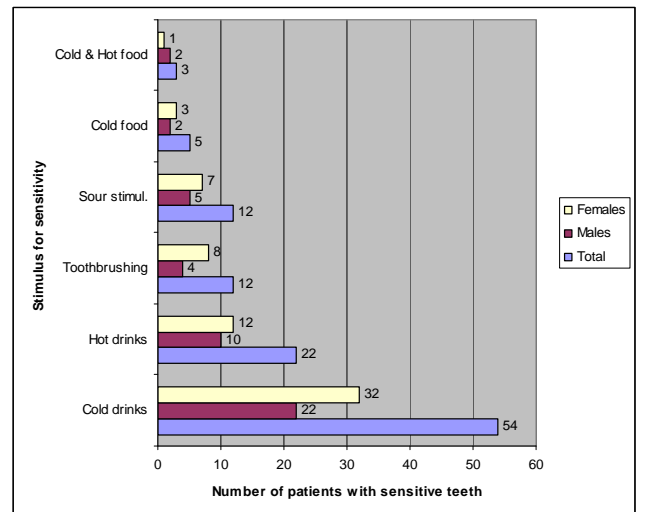


Figure 6. Distribution of pain-initiating stimulus.

college education with statistically significant differences. ($p=0.045$).

Discussion

This cross-sectional study revealed that the total prevalence of DH was 13.5% according to the results of the questionnaire and clinical examination. Previous studies conducted in dental practice have reported varying prevalence rates from 2.8% to 57.2%.^{3,4,9,10,15,17,22,24} Most subjects investigated in these studies were under 50 years of age. Studies conducted in university clinics in which the diagnosis of DH has been confirmed using clinical examination, have reported high prevalence rates of >30%.^{6,9,11,12,14,16,21,23} This might be a reflection of the smaller sample sizes and sample populations from the periodontology departments at these universities.

The wide variation in the prevalence of DH may also be attributed to other factors. Some of these studies have used questionnaires without concomitant clinical examinations to assess prevalence of DH. This methodology is likely to overestimate the prevalence of DH since the sensitivity recorded could be attributed to other factors such as dental caries.³⁶

In the present study the diagnosis of DH was confirmed based on the positive response of the patients followed by clinical examination in which an air blast from a dental air syringe was used as a stimulus test (and a piece of cotton impregnated in cold water, in difficult cases, as mentioned above). Previous studies have used only an air blast stimulus to clinically diagnose DH,^{3,9-12} while other studies have used evaporative and tactile stimuli in which Fischer et al.⁷ and Liu et al.¹⁶ reported that 95% and 92% of sensitive subjects were sensitive to an air blast stimulus.

It is obvious that the results of the present study are not comparable to those of previous studies because the diagnosis of DH was confirmed using different methodology. However, the above observations highlight the main reason for the high prevalence rate of DH.

It is believed that DH occurs more frequently in females.^{3,5,7,13,17,21,22,26,27,32} There is only one study where men have a higher prevalence than women.²³ The male-to-female ratios found by the clinical examination in all age groups are consistent with the above-mentioned observations. The reasons for difference between the two genders regarding the prevalence of DH are not yet clear. It has been attributed to the fact that women have better overall health care and oral hygiene awareness, which would make them more sensitive to DH.³⁷

It is also known that the prevalence of DH varies

with age. Previous studies have reported the peak prevalence at ages 20–25 years old,⁶ 20–29 years old,³⁸ 25–29 years old,⁴ 30–39 years old,^{3,9,38} 31–40 years old,¹³ 30–39 years old,^{17,18,22} 40–45 years old,¹² 40–49 years old,¹⁰ and 50–59 years old.^{16,19} The present study showed the highest prevalence (28.8%) occurring in the 55–64 year-old age group. It is important to notice that in the present study less elderly subjects were included than in other age groups. The results of the present study seemed to be more pertinent than some previous studies because tooth abrasion and periodontal disease become more common with aging.³⁹

Declining hypersensitivity symptoms after the age of 60 may be due to the development of secondary or sclerotic dentin,⁷ and previous studies have not necessarily included large numbers of subjects over 50 years of age due to extensive tooth loss, particularly in the posterior region, or having teeth that were excluded from testing due to heavily restored teeth.

On the other hand, the least number of subjects reporting hypersensitivity symptoms was in the 18–24 year-old age group (DH prevalence: 11.1%). The mean number of sensitive teeth per patient showed a peak at 3.36 in the 35–44 year age group and then decreased slowly in the older and younger cohorts.

In males the mean number of sensitive teeth per patient showed a peak at 3.75 in the 18–24 year age group, while in females the peak is shown at 3.8 in the 25–34 year age group. The findings of previous studies are not consistent with the findings of the present study based on different age groups. For example Rees³ showed that the mean number of sensitive teeth per patient reached a peak at 3.7 in the 40–49 year age group and then decreased slowly in the older cohorts while for the age group 30–39 year the mean number was 3.4.

A statistically significant difference ($p=0.045$) was observed between DH and educational level. Subjects with higher (university) and lower (primary) educational level showed more sensitive teeth than those who had secondary or college education. These findings are consistent with the findings of other studies.^{9,19}

The above-mentioned observations might be attributed to factors such as the fact that more educated subjects have realized the value and importance of preventive dentistry and oral hygiene, have adopted proper habits and standards of oral hygiene, have used the available means for dental plaque control and have followed a regular dental follow-up. However, previous studies have reported that gingival abrasion, recession and mechanical trauma were associated with

frequency,⁴⁰⁻⁴³ duration,⁴² toothbrushing technique (especially horizontal scrub technique)⁴²⁻⁴⁴ and use of hard toothbrushes.^{35,40,45,46} Poor oral hygiene awareness and consequential periodontal disease may be primary reasons for increased levels of dentin hypersensitivity in the subjects with lower educational levels.

The teeth most often affected by DH were the first premolars of both jaws followed by second premolars and canines of both jaws according to the results of the present study due to their position in the dental arch. Other studies have reported premolars and/or first molars as the most common sensitive teeth,^{3,6,7,9,10,17,19,21,23,25-27,32,38} and canines,^{13,21,25,38} while Taani et al,¹¹ Taani & Awartani,²¹ and Rees et al¹² reported that lower incisors were one of the tooth types that were mainly affected. In addition, the first premolar was one of the teeth most frequently affected by gingival recession.^{39,47}

In the present study, all sensitive teeth also showed some degree of gingival recession. Most sensitive teeth (82.5%) had at least 1-3.0 mm of gingival recession, which is similar to the average recession of 2.5 mm reported by Addy et al⁴⁸ in their sample of sensitive teeth.

The major stimulus that caused DH was cold drinks followed by hot drinks, toothbrushing and sour stimuli. Those observations are consistent with findings of previous studies.^{2,3,6,15,17,18,22,23,27,38} Regarding the mechanism which acts and causes DH, it is known that erosive foods (fresh fruits such as apples, citrus fruits and grapes) fruit juices and beverages can remove the dentinal smear layer and increase the patency of the dentinal tubules, thereby exacerbating DH.

Oral hygiene instructions including correct toothbrushing techniques as well as a regular dental follow-up could play a significant role in prevention of dentine hypersensitivity.

Conclusion

The prevalence of dentin hypersensitivity in a private practice was 13.5%. The most affected teeth were the premolars and canines of both jaws while the mean number of sensitive teeth per patient showed a peak in the 35-44 year age group and then decreased slowly in the older and younger cohorts. The majority (82.5%) of sensitive teeth had at least 1-3 mm of gingival recession while extensive gingival recession (≥ 4 mm) concerned 17.5% of sensitive teeth. The most common pain-initiating stimuli were the consumption of cold drinks, followed by consumption of hot drinks and toothbrushing.

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