

Prevalance And Risk Factors of Dentine Hypersensitivity Among Turkish Adults in Konya, Turkey

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Abstract

Objectives: There is limited data on dentin hypersensitivity (DH) among adults in Turkey. The objective of this study was to determine the prevalence and risk factors associated with DH among young adults in Turkey.

Materials and methods: This survey was conducted among adult patients referred to the Department of Restorative Dentistry in Necmettin Erbakan University. The study population consisted of 1250 adult subjects, 591 males and 659 females. The questionnaire elicited information on demography, systemic disease, using medicine, dental visit frequency, frequency of periodontal treatment, self-reported dentin hypersensitivity, frequency of tooth brushing, hardness of toothbrush, gingival bleeding during the brushing, brushing before bedtime, bruxism, smoking and xerostomia. Statistical analysis of data was made using the Chi-square test.

Results: The prevalence of self-reported DH was 51,6% among the individuals and it was significantly higher in females than males ($p < 0,05$). The greatest number of subjects with DH were within the 31-40 years age group ($p < 0,05$). Statistical analysis showed that bruxism and xerostomia had a significant association with DH. Other etiological and risk factors, such as frequency of tooth brushing, hardness of toothbrush, gingival bleeding during the brushing were found a significant association with DH too ($p < 0,05$). Lower posteriors were commonly involved (33,82%) and cold drinks (58,91%) are the main stimulating factor. 54,12% individuals were found to be complaining of DH more than 1 year.

Conclusions: There is high prevalence rate of DH and mainly among females. Bruxism can also lead to abfractions and dentinal hypersensitivity throughout the dentition due to the small cracks that form, as well as the loss of enamel-exposing dentin. DH was found to be common among hard toothbrush users. However, future studies are needed to provide more epidemiological data on dentine hypersensitivity and risk factors.

Keywords: Dentin hypersensitivity, prevalence, risk factors, bruxism.

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I. Introduction

Dentin hypersensitivity (DH) is a widespread clinical finding with a wide variation in prevalence, etiology, and risk factors. It is characterized by a sudden, sharp and short-term pain that the exposed dentin produces as a response to thermal, evaporation, tactile, electrical, osmotic or chemical stimuli. Traditionally, the term dentine hypersensitivity was used to describe this distinct clinical condition; however, several authors have also used the terms cervical dentine sensitivity (CDS), cervical dentine hypersensitivity (CDH), dentine sensitivity (DS) and root dentine sensitivity (RDS)/root dentine hypersensitivity[RDH]. DH is a relatively common dental clinical condition in permanent teeth caused by dentin exposure to the oral environment as a consequence of loss of enamel and/or cementum. While there has been a longstanding interest, dentine hypersensitivity (DH) has become a prominent issue among dental researchers in the last decade^{1,2}.

Several theories have been proposed to explain the mechanism of dentine hypersensitivity. Hydrodynamic theory, is the most widely accepted theory to explain the sensitivity of dentine.^{2,3} It postulates that most pain-evoking stimuli increase the outward flow of fluid in the tubules. Dentin tubules may become exposed as a result of enamel loss from attrition, abrasion, erosion (acid dissolution) or abfraction (cervical stress lesion), but dentin exposure often may be a result of gingival recession and cementum loss from root surfaces, most frequently in canines and premolars.⁵ It has been shown that the etiology of DH is multi-factorial, however interactions between several factors including stimuli as well as predisposing factors may play an important role in initiating this condition.⁶

With ageing people in populations worldwide keeping their teeth longer, there is an increased incidence of dentine hypersensitivity, gingival recession and periodontal disease. Dentine hypersensitivity negatively impacts on individual's quality of life as it limits dietary choices, impedes effective oral hygiene, and adversely affects verbal expression, enjoyment of food, and aesthetics, many afflicted individuals do not specifically seek.⁷ Clinical studies have shown that dentin hypersensitivity is a common condition in adult populations. The prevalence of dentinal hypersensitivity has been reported over the years in a variety of ways: as greater than 40 million people in the U.S. annually⁶, 14.3% of all dental patients, between 8% and 57% of adult dentate population, and up to 30% of adults at some time during their life time.⁸ The diversity of reports may be caused in part, by different methods used to diagnose the condition and it is generally considered that surveys which rely on patient questionnaires alone greatly exaggerate the prevalence figures and thereby yield misleading data (Table 1).

To accurately determine the prevalence of dentine hypersensitivity and identify influential factors for developing effective prevention strategies suited to specific areas, a scientific survey of unbiased participants should be carried out.^{9,10} Studies about possible prediction for DH are important and this might lead to the diagnosis of lesions in an early stage and to the identification of their possible causes, aiming to maintain the oral health of subjects. When we reviewed the literature using the PubMed Database (National Library of Medicine), most publications concerning dentine hypersensitivity were case reports, clinical trials and reviews. Because of the insufficient epidemiologic data, there is little information about the true prevalence of this problem.¹¹ More epidemiological studies are still necessary to evaluate the prevalence of DH and relation of different etiological factors in population. Therefore, the purpose of this study was to determine the prevalence of DH in the Turkish population and to investigate different etiological factors associated with this condition.

Table 1

Researchers	Country	Type of the Study	n	Prevalence (%)
Haneet and Vandana, 2016	India	Questionnaire-Clinical	404	20,6
Clement et al, 2015	Nigeria	Questionnaire	211	52,8
Naidu et al, 2014	India	Questionnaire-Clinical	212	32
Zakereyya and Aljamal, 2014	Iranian	Questionnaire-Clinical	1478	28,7
Çolak et al, 2014	Turkey	Questionnaire	1463	8,4
Braimoh and Ilochonwu, 2014	Nigeria	Questionnaire	360	63,3
Rane et al, 2013	India	Questionnaire-Clinical	960	42,5
Vijaya et al, 2013	India	Questionnaire-Clinical	655	55
Khafaji, 2013	Arabia	Questionnaire-Clinical	204	27
Cunha-Cruz et al, 2013	USA	Questionnaire-Clinical	787	12,3
Wang et al, 2012	China	Questionnaire-Clinical	6843	34,5
Çolak et al, 2012	Turkey	Questionnaire-Clinical	1169	7,6
Ye et al, 2012	China	Questionnaire-Clinical	2120	34,1
Bahşi et al, 2012	Turkey	Questionnaire-Clinical	1368	5,3
Amarasena et al, 2011	Australia	Questionnaire-Clinical	1149	9,1
Bamise et al, 2009	Nigeria	Questionnaire	1019	68,4
Kehua et al, 2009	China	Questionnaire-Clinical	1320	25,5
Rees et al, 2003	Hong Kong	Questionnaire-Clinical	226	67,7

: Some Studies on the Prevalence of Dentin Hypersensitivity.

II. Materials And Methods

This cross-sectional epidemiological study was conducted among 1250 (591 male, 659 female) individuals coming to Department of Restorative Dentistry during a time period of 2015 to 2016 in Konya city of Turkey. The study was confirmed by the ethical committee of the Faculty of Dentistry, Necmettin Erbakan University. The purposes of this survey and all the procedures were explained to each individual who had to sign a written consent form before participation. A detailed 'Questionnaire Form' was applied on a voluntary basis to all participants. Individuals who responded reluctantly and believed that they did not give reliable answers were not included in the study.

The questionnaire elicited information on demography (age, gender and living place), systemic disease, using medicine, frequency of dental visit, frequency of periodontal treatment, the presence of DH, bruxism, smoking, xerostomia, gingival bleeding during the brushing and tooth brushing habits. History of tooth brushing habits of DH such as frequency of tooth brushing, brushing before bedtime, hardness of toothbrush and type of tooth brushing were taken. Initiating stimulus, duration of discomfort, the teeth that started brushing and the teeth where sensitivity were also assessed. Statistical analysis was performed using SPSS version 21 (IBM, SPSS, Chicago, IL, USA). The obtained data was calculated as percentages. Associations between parameters were tested by Chi square. $p < 0,05$ was considered to be significant.

III. Results

A total of 1250 individuals were evaluated in the study. Prevalence of DH among these individuals is found to be 51,6%. The age distribution within subjects is shown in Table 1 and Figure 1. The age groups with the highest prevalence of DH were, respectively, 31-40 (59,38%) and 21-30 (56,25%). And these values were statistically significant among the age groups ($p < 0,05$). The prevalence of DH was 54,59% for females and 48,94% for males and there was a significant difference between the genders ($p < 0,05$). The prevalence of DH in the individuals with reflux was 63,15%, which was statistically significant ($p < 0,05$). DH was found predominantly in hard toothbrush users (58,63%) and individuals who brushing the teeth rarely (63,30%) ($p < 0,05$).

There was a statistically significant association between gingival bleeding during the brushing and DH ($p < 0,05$). It was reported that DH was in 67% of the individuals who had bleeding during brushing (Table 2). Statistical results showed that bruxism and xerostomia had a significant association with DH ($p < 0,05$). A 63,31% of individuals with bruxism and 68,05% of individuals with xerostomia were reported to have DH (Table 2). The stimulating factors for DH were mostly cold (58,91%) and brushing (12,55%). The proportions of the other factors are also shown in Figure 2. It was reported that DH is in 54,12% of individuals over 1 year (Figure 3).

It was reported that 64,41% of the individuals with DH started brushing their teeth from the upper anterior teeth, 15,65% from the lower posterior teeth, 12,09% from the upper posterior teeth and 7,85% from the lower anterior teeth (Figure 4). Similar to this order, 33,82% of the individuals with DH felt the sensitivity in the upper anterior teeth, 30,96% felt in the lower posterior teeth, 23,48% felt in the upper posterior teeth and 11,74% felt in the lower anterior teeth (Figure 5). The association of DH with other etiologic factors that not giving statistically significant results are also shown in Table 3.

IV. Discussion

There is some evidence that the presence of dentine hypersensitivity is growing steadily. It is difficult to compare the results of epidemiological studies because of different examination standards used (calibration of examiner(s), scoring system, number and site of teeth) and different nonhomogeneous groups examined (age, gender, number of examined individuals, geographical location). There is a great need for well-defined and generally accepted criteria for evaluation of dentine hypersensitivity for use in research and in diagnosing this problem at patients.¹² The results of our study showed that 51.6% of patients claimed DH. Discomfort from dentine hypersensitivity is a common finding in adult populations, with the available prevalence data ranging from 5-68%. The overall prevalence figure for dentine hypersensitivity reported in this study, higher than many of the prevalence figures reported previously (Table 1). In our study, we found that DH was commonest in 31-40-age groups. This finding is in agreement with previous reports published by others.^{2,13,14} However Orchardson and Collins¹⁵ showed peak prevalence between 20 and 25 years, Graf and Galasse¹⁶ between 25 and 29 years and Addy et al¹⁷ between 20 and 40 years. The different age distribution of dentine hypersensitivity prevalence for different studies could arise from the age compositions of the study populations. Therefore, the results of this study seemed to be reasonable because the cervical dentine exposure increases over time. The probable reason for the decline in DH symptoms after age sixty might be ascribed to dentinal sclerosis and the laying down of secondary or tertiary dentine.¹⁸

In the current study, DH affected females more than males; a result that is consistent with previous reports. This is similar to the findings of Tan et al.¹⁹ in a study among young people in the Chengdu city, China and Ye et al.² among adults in Shanghai municipality. Specialist restorative dental-clinic based study also reported a higher incidence of dentinal sensitivity in women than in men.²⁰ Fischer et al.¹⁴ reported non-statistically significant higher prevalence of dentinal sensitivity among female dental patients than males in Rio de Janeiro, Brazil. So many studies found that females were having more prevalence of DH.^{13,20} The explanation is that dentinal sensitivity is more common in individuals who are meticulous and have good oral hygiene, and women of any age, generally speaking, are more attentive to basic hygiene than an age-matched group of males reflecting their overall healthcare and better oral hygiene awareness.¹⁴ However DH was more among male population as compared to female and comparable results were seen in study done by Bamise et al in 2007.¹¹ The reasons for this difference are not yet clear.

This study showed a significant association of DH with patients reporting reflux. This association is consistent with what might be expected due to the very erosive nature of gastric fluids,⁶³ which not only increase erosive tooth wear, but also are likely to impact the DH response by removing the dentine smear layer and opening tubules.⁶⁴ Gastric acid regurgitation associated with medical conditions such as acid reflux disease and disorders such as bulimia results in intrinsic erosion. By far the most common causes of extrinsic erosion are dietary factors that contribute to a more acidic oral environment.^{21,22}

In this study, DH was found predominantly in hard toothbrush users and individuals who brushing the teeth rarely. Because incorrect tooth brushing appears to be an etiological factor in dentine hypersensitivity,

instruction in proper brushing technique can prevent further loss of dentine and the resulting hypersensitivity. Excessive force, hard toothbrushes, highly abrasive toothpastes should be avoided. Although there is a need for more direct clinical and scientific evidence for these associations, it is recommended that they be taken into consideration when planning management strategies for the dentine hypersensitivity sufferer.²³

It was reported that DH was in 67% of the individuals who had bleeding during brushing. Latest findings suggest that dietary acid was the only trigger whereas gingival bleeding, recession and erosion were the predisposing factors that were significantly associated with greater dentine hypersensitivity levels in a private practice patient population in Turkey. The intraoral distribution of hypersensitive teeth in general dental clinics patients was lower than that of periodontal speciality clinics patients. These findings are consistent with other findings. Studies in patients attending a specialist periodontology clinic indicated that CDS prevalence was higher than that reported in the general dental population. This indicates etiology that periodontal disease and its treatments may increase the occurrence of hypersensitivity.²⁴

Bruxism was also strongly associated with DH. Bruxism can also lead to abfractions and dentinal hypersensitivity throughout the dentition due to the small cracks that form, as well as the loss of enamel-exposing dentin. Ommerborn et al.²⁵ found a higher prevalence of non-cariou cervical lesions in subjects with bruxism. Since non-cariou cervical lesions are also frequently associated with DH, this could explain the greater risk for DH found in this study for subjects with bruxism. Nevertheless, it must be taken in account that erosion has a complex multifactorial etiology, therefore, other biological and behavioral parameters can play a role modifying the effect of acidic agents on the tooth, and this was not assessed in the present investigation.²⁶

The etiology of dentin hypersensitivity is a multi-factorial interaction of erosion, abrasion, saliva, and biofilm/pellicle/plaque, all influencing whether demineralization occurs, exposing the dentin tubule. There was found association with DH and xerostomia in this study. It is well-accepted that saliva has multiple functions in preventing demineralization and even promoting remineralization. These functions include the buffering of acids utilizing bicarbonate, salivary proteins, and calcium phosphate (Kleinberg, 1970), and the dilution and clearance of erosive agents. The protein-rich biofilm layer, or salivary pellicle, is 20-500 nm thick (depending on location) within the first two hours of exposure to saliva, depending on location, and is resistant to removal by a toothbrush (without toothpaste) and masticatory forces.²⁷

V. Conclusion

As dentine sensitivity or hypersensitivity may result from dental treatments, every patient must be informed of the potential treatment risks. Informing the patient in advance regarding the possibility of potentially painful events following periodontal therapy and recently placed restorations can greatly strengthen the dentist-patient relationship and reduce pain and anxiety. In addition, explaining to the patient the possible causes of dentine hypersensitivity may help to modify or control these causative factors which in turn may improve the outcome of treatment. Since the results concerning the prevalence and risk factors of DH in the literature are conflicting, further epidemiological investigations in this field are still need in order to identify with accuracy the risk factors and implement the most suitable preventive measures.

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Table 2. Common etiologic factors associated with dentin hypersensitivity

Parametres	Category	DH (%)	No DH (%)	p-value
Age	12-20	38,05	61,95	0,000*
	21-30	56,25	43,75	
	31-40	59,38	40,62	
	41-50	28,44	71,56	
	51-60	19,14	80,86	
Gender	Female	54,59	45,41	0,047*
	Male	48,94	51,06	
Type of Systemic Disease	Diabetes	43,75	56,25	0,034*
	Asthma	40	60	
	Hypertension	70	30	
	Migraine	58,69	41,31	
	Reflux	63,15	36,85	
Frequency of Tooth Brushing	Rarely	63,30	36,70	0,001*
	Twice a week	59,03	40,97	
	Once a day	50,87	49,13	
	Twice a day or more	47,59	52,41	
Hardness of Toothbrush	Hard	58,63	41,37	0,039*
	Medium	50,16	49,84	
	Soft	32,28	67,72	
Gingival Bleeding During the Brushing	Yes	67	33	0,000*
	No	44,50	55,50	
Bruxism	Yes	63,31	36,69	0,000*
	No	44,37	55,63	
Xerostomia	Yes	68,05	31,95	0,000*
	No	41,49	58,51	

*Significant, $p < 0,05$

Table 3. Common etiologic factors associated with dentin hypersensitivity

Parametres	Category	DH (%)	No DH (%)	p-value
Living Place	Urban	50,60	49,40	0,087**
	District	57,71	42,29	
Systemic Disease	Yes	57,14	42,86	0,114**
	No	50,61	49,39	
Using Medicine	Yes	52,13	47,87	0,923**

	No	51,54	48,46	
Frequency of Dental Visit	Regularly once a year	48,40	51,60	0,157**
	12-24 months	46,95	53,05	
	In case of complaint	52,94	47,06	
Brushing Before Bedtime	Yes	49,70	50,30	0,062**
	No	55,47	44,53	
Teeth that Started Brushing	Upper Anterior Teeth	47,63	52,37	0,281**
	Upper Posterior Teeth	44,73	55,27	
	Lower Anterior Teeth	40	60	
	Lower Posterior Teeth	59,45	40,55	
Type of Tooth Brushing	Horizontal	52,98	47,02	0,615**
	Rolling	51,46	48,54	
	From Gum to Teeth	50,99	49,01	
Frequency of Periodontal Treatment	Last 6-12 Months	52,13	47,87	0,166**
	Last 6 Months	53,46	46,54	
	Before Last 12 Months	54,03	45,97	
	Never	45,09	54,91	
Smoking	Yes	55,76	44,24	0,143**
	No	50,50	49,50	

**Nonsignificant, $p > 0,05$

Figure 1. Association between DH and age

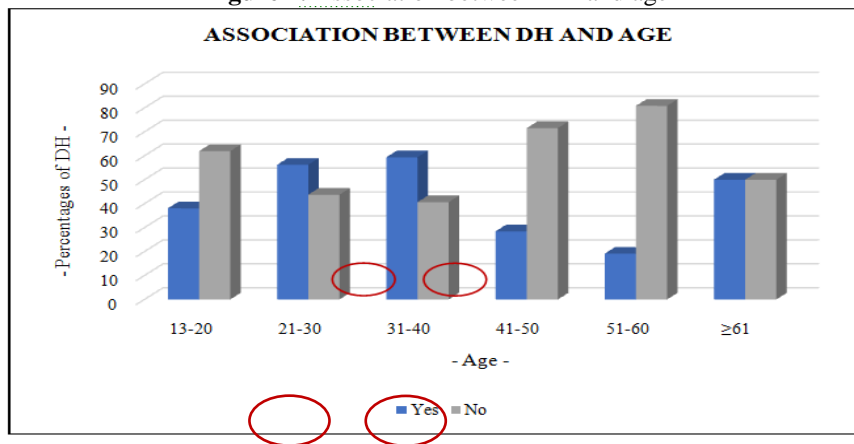


Figure 2. Type of the stimulants

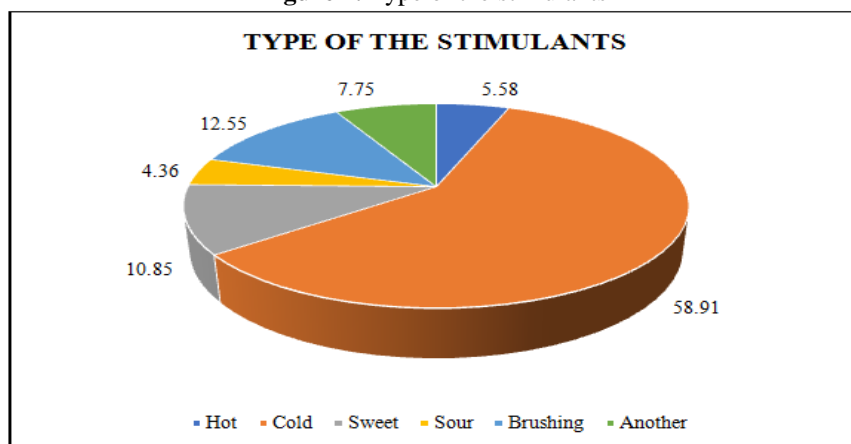


Figure 3. Duration of DH

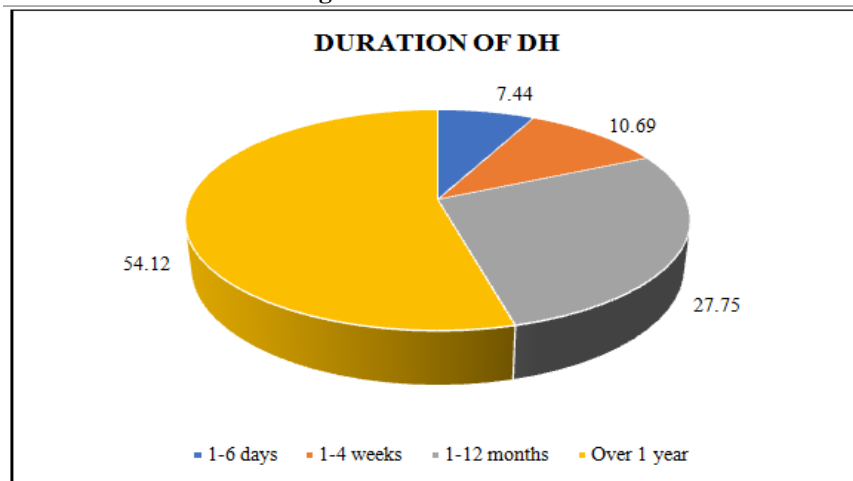


Figure 4. The teeth that started brushing

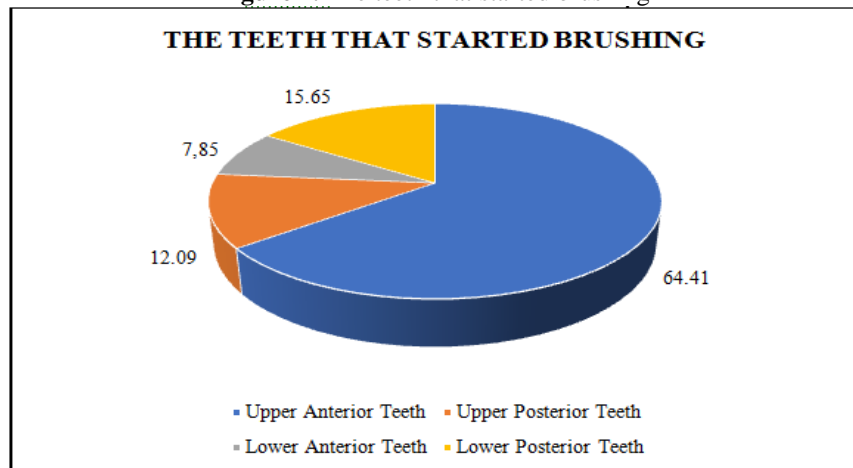
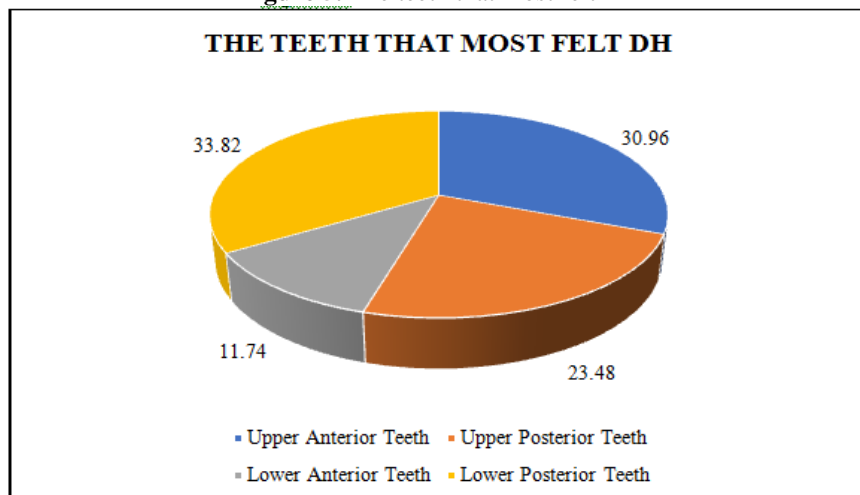


Figure 5. The teeth that most felt DH



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