

Original ARTICLE

A survey on Dentin hypersensitivity after vital tooth preparation for fixed partial denture

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ABSTRACT

Background: Dentine hypersensitivity is characterized by short, sharp pain arising from exposed dentine in response to stimuli typically thermal, evaporative, tactile, osmotic or chemical and which cannot be ascribed to any other form of dental defect or pathology. The aim of this survey is to gender differences in the incidence of dentin hypersensitivity. **Materials & Methods:** Subjects: Study population consisted of 30 subjects, 15 men and 15 women, who visited the department of prosthodontics HP Govt Dental College shimla, OPD for replacement of missing tooth/teeth with a fixed partial prosthesis (FPD). All participants were examined to ensure good oral health except for the symptoms of dentin hypersensitivity. Then clinical and radiographic investigations were performed on all subjects to exclude conditions of teeth, which might have caused pain similar to dentin hypersensitivity. There was at least one vital abutment tooth in each FPD. If an FPD had two vital abutments, only one was chosen, randomly. Each abutment tooth received two stimuli: tactile stimulus and thermal stimulus (water jet at room temperature, 15°C and 45°C). Sensitive teeth were identified with an explorer passed cervically over the abutment tooth. Ten minutes following tactile stimulation, dentin hypersensitivity was elicited using a jet of water to approximately the same anatomical feature of the tooth as had received the tactile stimulus. **Assessment of Sensitivity:** Immediately following stimulation, the subjects were asked to grade their overall sensitivity using a 10 cm Visual Analogue Scale (VAS) labelled at the extremes with "no pain," at the zero cm end of the scale, and "severe pain," at the 10 cm end of the scale. Measurements from the scale were made in millimetres giving a scoring range of 0 to 10. **Results:** Statistically significant results were obtained before ($p=0.770$) and after tooth preparation ($p=0.6420$) in both the men and women (Table 2). Comparisons between men and women before and after tooth preparation showed statistically highly significant differences ($p=0.001$) indicating that women were more sensitive than men bon tactile and thermal stimulation and after tooth. **Conclusion:** It was observed that women reported more dentin hypersensitivity than men before and after tooth preparation.

Key words: Dentin, Hypersensitivity, Survey

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INTRODUCTION

Dentine hypersensitivity is characterized by short, sharp pain arising from exposed dentine in response to stimuli typically thermal, evaporative, tactile, osmotic or chemical and which cannot be ascribed to any other form of dental defect or pathology (Orehardson & Collins 1987a, Addy 1992).¹ The dentin contains 2 million/cm² of dentinal tubules. When a tooth is prepared for a restoration, the dentin thickness decreases in the area of the preparation resulting in an increase in the permeability of the dentin layer and the potential for pulpal pathology.² DH is a painful clinical condition with an incidence ranging from 4 to 74%. The variations in the reports may be because of difference in populations and different methods of investigations. The methods employed are usually patient questionnaires or clinical examinations. Interestingly, the incidence of DH is much higher

in patient questionnaires studies than in clinical studies which quote an incidence of mere 15%.³

A slightly higher incidence of DH is reported in females than in males. While DH can affect the patient of any age, most affected patients are in the age group of 20-50 years, with a peak between 30 and 40 years of age. Regarding the type of teeth involved, canines and premolars of both the arches are the most affected teeth. Buccal aspect of cervical area is the commonly affected site.⁴

There are several theories for dentinal hypersensitivity, such as odontoblastic transduction theory, neural theory and hydrodynamic theory. Most accepted Brannstrom's hydrodynamic theory (Trowbridge, 1986), mentioned that there is a displacement of the contents of the dentinal tubules when an stimulus is applied to the external dentin surface, this result in a mechanical

stimulation of the neurons at the pulpodentinal border. The variations of temperature, humidity, osmotic and air pressure, or forces acting on the external surface of tooth lead to elevate hydrodynamic flow. Cold or hot foods, drinks and physical pressure commonly provoke people with dentin hypersensitivity.⁵ When a vital tooth is prepared for fixed restoration it leads to dentin hypersensitivity which is very common and least documented. The incidence of dentin hypersensitivity varies from individual, tooth being involved and with gender also. The aim of this survey is to gender differences in the incidence of dentin hypersensitivity.

MATERIALS AND METHOD

Subjects: Study population consisted of 30 subjects, 15 men and 15 women, who visited the department of prosthodontics HP Govt Dental College shimla, OPD for replacement of missing tooth/teeth with a fixed partial prosthesis (FPD). The informed consent of all the subjects who participated in this clinical investigation was obtained.

Clinical Assessments: All participants were examined to ensure good oral health except for the symptoms of dentin hypersensitivity. Then clinical and radiographic investigations were performed on all subjects to exclude conditions of teeth, which might have caused pain similar to dentin hypersensitivity. There was at least one vital abutment tooth in each FPD. If an FPD had two vital abutments, only one was chosen, randomly. Each abutment tooth received two stimuli: tactile stimulus and thermal stimulus (water jet at room temperature, 15°C and 45°C). Sensitive teeth were identified with an explorer passed cervically over the abutment tooth. Ten minutes following tactile stimulation, dentin hypersensitivity was elicited using a jet of water to approximately the same anatomical feature of the tooth as had received the tactile stimulus.

Assessment of Sensitivity: Immediately following stimulation, the subjects were asked to grade their overall sensitivity using a 10 cm Visual Analogue Scale (VAS)^{4,5} labelled at the extremes with "no pain," at the zero cm end of the scale, and "severe pain," at the 10 cm end of the scale. Measurements from the scale were made in millimetres giving a scoring range of 0 to 10. After the VAS was recorded before tooth preparation, the subjects underwent tooth preparation of the abutment teeth for the fixed partial denture. The VAS was recorded immediately after tooth preparation. The data was compiled and subjected to statistical analysis.

STATISTICAL ANALYSIS AND RESULTS

Data was analysed on an intention-to-treat basis with the subject and teeth as the unit of statistical analysis. In our study, we expressed the descriptive statistics as mean ±standard deviation (SD), based on the 10- cm VAS. We used the Mann-Whitney U test to conduct pairwise comparisons. In addition, we used the Wilcoxon signed rank test to determine the differences between participants 'responses to before and after tooth preparation in response to tactile and thermal stimuli. Comparison between men and women showed that women reported more dentin hypersensitivity than men, although results were statistically non-significant (Table 1). Statistically significant results were obtained before (p=0.770) and after tooth preparation (p=0.6420) in both the men and women (Table 2). Comparisons between men and women before and after tooth preparation showed statistically highly significant differences (p=0.001) indicating that women

were more sensitive than men bon tactile and thermal stimulation and after tooth preparation (Table 3).

Table 1: Descriptive Statistics of comparison of dentin hypersensitivity between men and women before and after tooth preparation, based on the VAS scale

Gender		Before tooth preparation	After tooth preparation
Female	Mean	0.54	4.75
	N	15	15
	SD	1.535	1.546
Male	Mean	0.38	4.45
	N	15	15
	SD	0.635	1.325

N= Number of Study Patients SD= Standard Deviation

Table 2: Mann-Whitney Test- To pairwise compare differences in dentin hypersensitivity between men and women before and after tooth preparation, based on the VAS scale

Parameter	Before tooth preparation	After tooth preparation
Mann-Whitney U	95	85.5
Wilcoxon W	200	190.50
Z	-0.140	-0.542
Significance (2-tailed)	0.870	0.540

Z= Difference between the values in each group of before and after tooth preparation

Table 3: Wilcoxon Signed Ranks Test – determination of participants 'responses to before and after tooth preparation in response to tactile and thermal stimuli

Gender		After Tooth Preparation – Before Tooth Preparation
Female	Z	-4.458
	Significance	0.001
Male	Z	-4.438
	Significance	0.001

Z= Difference between the values in each group of before and after tooth preparation

DISCUSSION

Even after many reviews on dentin hypersensitivity, it would seem justifiable to agree that the condition is “an enigma being frequently encountered but poorly understood.” Number of reviews are available for diagnosis, treatment and preventive measures in relation to dentin hypersensitivity. But very few litreature evaluated the incidence of dentin hypersensitivity following tooth preparation. The present study evaluated the hypersensitivity among men and women following tooth preparation. Epidemiological studies and pain and sensitivity research have shown that women and men experience and cope with pain and sensitivity differently.⁵ The search for a mechanistic understanding of observed sex and gender differences in sensitivity is still in its infancy. There are clear indications that multiple factors individually and collectively play a role, yet our recognition and understanding of the individual factors and their complex interaction is minimal at present. These factors include,

but are not limited to, genetic, hormonal, social roles, exercise, and information processing in the brain.

Women may experience and report pain differently than men.⁶ Although with any medical condition more women tend to present more than men. Hormonal variation, puberty and reproductive status, and menstrual cycle have all been shown to affect pain threshold and perception. In general, women have lower pain thresholds and less tolerance to noxious stimuli.⁶ Sex-related differences in blood pressure are emerging as one potential biological explanation of sex-related differences in pain. Many studies report a continuous, inverse relationship between resting blood pressure and pain sensitivity,^{7, 8} and women generally have lower resting blood pressure than men.

Stereotypical gender roles and expectations affect pain perception. Men report less pain and have higher thresholds in the presence of a female examiner, an effect that is increased in the presence of an attractive female.⁹ The exact opposite was present in women who reported more pain and had lower thresholds with attractive male examiners.¹⁰

Thus, the individual performing the test may produce dramatically different test results without any overt attempt to introduce bias. Differences between men and women have also been attributed to maladaptive coping strategies, such as catastrophizing. In human studies, there is an enhanced ability to gain a direct verbal report of sensitivity as well as assess other components such as suffering, memory, expectation, and fear. The stimuli used to evaluate sensitivity were tactile evaluation (where an explorer is passed over the sensitive lesion), and thermal evaluation i.e. response to water at room temperature and 15°C and 45°C, as thermal tests and cold test in particular have a good correlation to the hypersensitivity symptoms encountered in daily life. The temperatures of 45°C and 15°C had been selected as these were the temperatures at which food and beverages were likely to be frequently consumed.

CONCLUSION

It was observed that women reported more dentin hypersensitivity than men before and after tooth preparation. Still the multifaceted nature needs to be explored.

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