

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Prevalence Of Dentinal Hypersensitivity In South Coastal Population, India.

Urvashi Sodvadia*, Gowrish S Bhat, Mithra Nidarsh Hegde, and Nireeksha Shetty.

Department of Conservative Dentistry and Endodontics, A B Shetty Memorial Institute of Dental Science, Nitte University, Mangalore, Karnataka, India.

ABSTRACT

The aim of the study was to determine the prevalence of dentinal hypersensitivity, gender and age co-relation, aggravating factors and awareness of the patients based on action taken by them to relieve the pain of dentinal hypersensitivity in south coastal population in India. The study was conducted on a total population of 2000 patients over a period of three months from May 2018-July 2018 were examined from an Out-patient section of Department of Conservative Dentistry and Endodontics, Nitte University and from rural and satellite centers of Nitte University. Diagnosis of dentinal hypersensitivity was made by a questionnaire, oral and clinical examination. Schiff's cold air score scale was used to determine the severity of pain. On the analysis of data, it was found that the prevalence of dentinal hypersensitivity was 23.7%. Males (60.97%) were more affected and age group of 15-30 years (43.03%) showed the highest prevalence rate. Cold (75.1%) was the most common aggravating factor and gingival recession (66.24%) was the most common cause for dentinal hypersensitivity. Maxillary premolars showed the highest prevalence rate. Maximum number (72.99%) of patients were falling in the group who had done nothing to relieve the pain of dentinal hypersensitivity showing the less awareness about the same.

Keywords: Dentinal hypersensitivity, hypersensitivity, prevalence, trigger factors, Schiff's score

**Corresponding author*

INTRODUCTION

Dental hypersensitivity being most common & multifactorial finding occurs due to exposed dentin in coronal part and radicular part as well [1,2]. Dental hypersensitivity having different prevalence rate ranging between 4-74% [3]. Women have slightly higher prevalence than men and 30-40 years of age is at peak level [1].

Dental hypersensitivity is short, sharp pain arising from exposed dentine response to stimuli, typically thermal, tactile, evaporative, osmotic or chemical which cannot be described to any other form of the dental disease [4]. The severity of hypersensitivity varies, it may relate to a number of exposed dentinal tubules and diameter of the same [5]. However, it is stated that many individuals have exposed dentin but all are not sensitive to stimuli [6]. This might be due to occlusion of exposed dentinal tubules by the formation of sclerosed dentin or irregularly laid down secondary dentin [7]. Hence, logically it is more experienced by younger individuals [2].

The patient might get disturbed even during normal day-to-day activities like eating, drinking, brushing and breathing [8]. It is also noted that due to excessive Dental Hypersensitivity behavioral and emotional changes are also found in patients [9]. True dental hypersensitivity can come out as a consequence of pulpal inflammation which can indicate clinical presentation of irreversible pulpitis i.e. severe persistent pain, as compared to the short sharp pain of dental hypersensitivity [6]. According to the majority of the literature review; sharp pain is actually normal pulpal response to exposed dentine and is termed as dental sensitivity [10].

Lesion localization and lesion initiation are the two phases of dental hypersensitivity [6]. Loss of enamel or cementum over the dentin occurs results in exposure of dentin to the external environment. Attrition, abrasion, erosion or abfraction could be the reason for the same. Lesion localization is mainly caused by the gingival recession which in turn is due to tooth abrasion (because of faulty toothbrushing technique), vigorous flossing, as a consequence of periodontal treatment [11]. Dentin must be exposed to initiate dental hypersensitivity. However, all exposed dentin may not get stimulated. This is due to the presence of covering of smear layer which ultimately blocks the exposed dentinal tubules. Hence, lesion localization has to be started for the occurrence of dental hypersensitivity[6].

Numerous theories have been proposed to explain the mechanism of dental hypersensitivity. But 'hydrodynamic theory' is currently the most widely accepted theory to explain dental hypersensitivity. According to this theory, that movement of fluid within dentinal tubules of exposed dentin results in pain due to activation of pulp [12,6].

Dental Hypersensitivity is multifactorial but commonest etiology is root recession [9]. Other factors associated with Dental hypersensitivity are cervical lesion due to vigorous tooth rushing, attrition, abrasion, erosion, bruxism, malocclusion etc.

There are more cases of patients experiencing sharp pain after stimuli because patients usually do not report this painful condition when it is in the mild form [13].

It is reported that Dental Hypersensitivity is common in the adult population; while some studies showed it increases in advancing age. Same way some study shows premolars are mainly affected while some shows lower incisors are more commonly affected. Thus, heterogeneity is found in a study of Dental Hypersensitivity [9]. This diversion is found due to the difference in the selection of each study sample and in diagnostic approaches, local oral practices perform by patients[14].

Hence, the aim of the presentation was to determine the prevalence of dental hypersensitivity in the year of 2018-19 and to examine associated predisposing factors and initiating factors among the south coastal population of India.

MATERIALS AND METHODS

This study was conducted on a total population of 2000 patients over a period of three months from May 2018-July 2018, out of which 1122 were examined from an Out-patient section of the Department of Conservative Dentistry and Endodontics. Among which 430 belong to Urban strata and 692 belong to Peri-urban strata, and 878 were examined in Rural Health Centres of A.B. Shetty Memorial Institute of Dental Sciences, Nitte University, Derlakatte, Mangalore. Permission to conduct the study was sought from the relevant authorities. Informed verbal consents were obtained. Failure to consent did not affect patient's treatment and confidentiality of the information given was assured. Patients were examined for dentinal hypersensitivity after the tooth has been isolated and a questionnaire was prepared to ask the patient history related to dentinal hypersensitivity. The direct assessment consisted of visual examination with a standard mouth mirror, a sharp-ended explorer, and supplementary lighting from a dental operatory lamp. Patients were recorded under different age groups, sex, existing parafunctional habit, oral hygiene habits, teeth involved, possible causative factors. Few inclusion and exclusion criteria have been considered for the selection of the patients. Data were recorded on prepared survey form based on the WHO Oral Health Assessment Form 2013 [Annexure 1] All patients were examined for hypersensitivity irrespective of their response to the questionnaire.

The diagnosis of hypersensitivity was confirmed by using a 3-way syringe to administer a blast of air for 5 seconds at a distance of 1 cm from the tooth surface and reaction was recorded based on 'Schiff et al. 1998; Schiff's cold air score scale' [16].

Few inclusion and exclusion criteria have been considered for the selection of the patients:

- INCLUSION CRITERIA:
 - patients fall in the already mentioned age group
 - history of dentinal hypersensitivity
- EXCLUSION CRITERIA:
 - the patient is on desensitizing therapy
 - chronic use of anti-inflammatory drugs, analgesic etc
 - patients of orthodontics
 - extensively restored tooth

RESULTS

The total population of 2000 had been examined consist of 1104 (55.2%) males and 896 (44.8%) females. Among them, 430 subjects were belonging to an urban area, 692 subjects were belonging to the periurban area while 878 subjects were belonging to a rural area (Table 1). They were distributed further into four categories of different age groups like 15-30 years, 30-45 years, 45-60 years and above 60 years of age.

Table 1: Total population categorized into three groups based on location

Total population	Urban	Periurban	Rural
2000	430	692	872

The prevalence of dentinal hypersensitivity of this study was 23.7% as out of 2000 subjects, 474 subjects showed a positive response to dentinal hypersensitivity (Table 2). Total 60.97% were males while 39.02% were females, hence males have a higher prevalence than females (Table 3). Age group of 15-30 years (43.03%) showed the highest prevalence rate among all age groups while age group of more than 60 years (8.86%) showed the least prevalence (Table 4).

Table 2: prevalence of dentinal hypersensitivity in a southcoastal population of India (p=0.003)

Prevalence of dentinal hypersensitivity	474 (23.7%)
---	-------------

Table 3: Prevalence of dentinal hypersensitivity in relation to gender (p = <0.0001)

Gender	Total number of subjects	Prevalence of dentinal hypersensitivity
Male	1104 (55.2%)	289 (60.97%)
Female	896 (44.8%)	185 (39.02%)

Table 4: Prevalence of dentinal hypersensitivity in relation to different age groups (p = <0.0001)

Age group	Prevalence of dentinal hypersensitivity
15-30 years	204 (43.03%)
30-45 years	156 (32.91%)
45-60 years	72 (15.19%)
>60 years	42 (8.86%)

In the present study, most common aggravating factor for dentinal hypersensitivity was cold (75.1%), followed by sweet (19.83%) and hot 5.06% (Table 5). Prevalence of hypersensitivity was associated with a maximum with the gingival recession that is 66.24%, caries (15.61%) and tooth abrasion (8.01%). 48 patients (10.12%) out of 2000 had undergone surgical treatment (Table 6). In the present study higher incidence of dentinal hypersensitivity was found among the smokers (25.31%). Maxillary teeth (66.67%) showed a higher prevalence than mandibular teeth (33.37%). Among the most common prevalent teeth were maxillary premolars (39.66%) followed by mandibular premolars (17.72%). Whereas the least prevalence has been found in molars (Table 7). A maximum number of subjects (47.46%) were defined by Schiff sensitivity score of 1 (Table 8).

Table 5: Prevalence of dentinal hypersensitivity in relation to aggravating factors (p = <0.0001)

Aggravating factors	Prevalence of dentinal hypersensitivity
Cold	356 (75.10%)
Sweet	94 (19.83%)
Hot	24 (5.06%)

Table 6: Prevalence of dentinal hypersensitivity in relation to causative factors (p = <0.0001)

Causative factors	Positive response
Gingival recession	314 (66.24%)
Dental caries	74 (15.61%)
Non-carious lesions	38 (8.01%)
Surgically treated teeth	48 (10.12%)

Table 7: Prevalence of dentinal hypersensitivity in different teeth (p = <0.0001)

Jaw involved	Teeth involved	Prevalence of dentinal hypersensitivity
Maxilla	Incisors	57 (12.02%)
	Canine	66 (13.92%)
	Premolars	188 (39.66%)
	Molars	5 (1.05%)
Mandible	Incisors	35 (7.38%)
	Canine	28 (5.9%)
	Premolars	84 (17.72%)
	Molars	9 (1.9%)

Table 8: Co-relation of number of subjects & their representation of Schiff's cold air score scale (p = <0.0001)

Score (Schiff's cold air score scale)	Number of subjects
0 (Tooth or subject does not respond to air stimulus)	157 (33.12%)
1 (Tooth or subject responds to stimulus but does not request discontinuation of stimulus)	225 (47.46%)
2 (Tooth or subject responds to air stimulus and requests discontinuation of stimulus)	71 (14.97%)
3 (Tooth or subject responds to air stimulus and considers stimulus to be painful and requests discontinuation of stimulus)	21 (4.43%)

At the end when they were asked about any treatment underwent or actions taken by them, only 8.86% visited the dentist, 18.14% used desensitizing toothpaste and 72.99% did not do anything about it (Table 9).

Table 9: Co-relation of number of subjects with actions taken by them to reduce the pain of dentinal hypersensitivity (p = <0.0001)

Actions were taken by the patient	Number of subjects
Not done	346 (72.99%)
Desensitizing toothpaste	42 (8.86%)
Visit a dentist	86 (18.14%)

DISCUSSION

A chronic disease with different prevalent rate, dentinal hypersensitivity has been studied to determine causative factors, aggravating factors, diagnosis and treatment options [14]. Mainly it results from loss of outer covering of tooth (that is enamel or cementum) leading to exposure of dentinal tubules [11]. The degree of sensitivity depends on the involved population, age group and different factors [2,7]. There are so many treatment options which are being used to reduce dentinal hypersensitivity like toothpaste containing potassium salts, resins, lasers, different fluorides (Sodium fluoride, Stannous fluoride) etc [5].

According to this study, prevalence of dentinal hypersensitivity was 23.7% which is almost similar to study which is conducted by CH Chu, KK Pang and EC Lo (2010) among Chinese adult 25.5%[17] and Hegde MN and Bhalla N (2009) 22.5% [18] while higher result like 67.7% was found in another study which is conducted among Hong Kong clinic population by JS Rees, LJ Jin, I Kudanowska and R Vowles (2003) [19]. Reasons behind differences between these prevalence rates may have attributed to the type of population studied, different diagnostic methods such as the use of a questionnaire, scoring criteria of Schiff sensitivity scale. Variations in geographical locations with different dietary and oral hygiene habits could also be the reason for the disparity in the results.

Males are more prevalent than females according to this study which has similar result found in a study conducted by Chabanski M B, Gilliam DG, Bulman JS and Newman HN(1996) [20]. While the study conducted by Rees JS and Addy M (2003) [21] showed female to be highly prevalent as compared to males, this might be because of their awareness of oral hygiene and overall healthcare.

In present study prevalence of dentinal hypersensitivity was higher in the age group of 15-30 years. The higher prevalence among this particular age group might be because of more aggressive oral hygiene practices. While the least prevalent age group is above 60 years is because of the formation of secondary or reparative dentine. The similar results were found in studies conducted by Fischer C, Fischer Rg and Wennberg A (1992) and Flynn J, Galloway R and Orchardson R (1985) [22,23] while the study conducted by Lui Hc, Lan WH and Hsieh CC (1998) reported age group of 50-59 being more prevalent [24].

In the present study, diagnosis of dentinal hypersensitivity was made on the basis of a questionnaire followed by a clinical examination in which probing and air blasting from dental three-way air syringe was used as a stimulus. According to the findings, cold drink/food or cold air was the most common aggravating factor

followed by sweet (second most commonly involved factor) and hot food or beverages, this study had similar findings with Dhaliwal J and Palwankar P (2013) [13] and Gilliam DG, Seo HS, Bulman JS and Newman HN (1999) [25]. But studies done by Rees JS and Addy M (2002) [21] and Flynn J, Galloway R and Orchardson R (1985) [23] considered heat as a second most common aggravating because heat is responsible for inward movement of fluid within tubules whereas cold produces rapid outward movement of fluid so heat takes longer time to produce pain as compared to cold.

Maxillary teeth were more affected than mandibular teeth which have a similar finding of a study done by Addy M and Pearce N (1994) [26]. While Teeth predilection order was from premolars being most frequently affected followed by incisors and molars. Similar findings are found in studies done by Rees JS and Addy M (2002) [21] and Rees JS (2000) [27]. Some studies have different results which are done by Taani DQ and Awartani F (2001) [28] and Udoe CI (2006) [29], where canines were more commonly involved.

Some predisposing factors are associated with dentinal hypersensitivity. According to the present study, gingival recession (66.24%) found to be the most commonly associated factor. Loss of Enamel causes exposure of dentinal tubules to the external environment. This enamel loss can be seen in a form of attrition, abrasion, erosion or abfraction resulting from vigorous or frequent tooth brushing, but a gingival recession can also be responsible for dentine exposure which is most frequently seen in premolars and canine. Apart from these, surgical treatment like periodontal therapy can also predispose to Dentinal hypersensitivity. Smoking (25.31%) is also found to be associated with dentinal hypersensitivity as it is more prone to gingival recession, similar result found in a study conducted by Vijaya V, Sanjay V, Varghese RK, Ravuri R and Agarwal A (2013) [30] and Rees JS and Addy M (2002) [21] but study done by Al-Khafaji H (2013) [31] showed co-relation between smokers and dentinal hypersensitivity was not much significant.

According to this performed study, when they were asked about actions taken by themselves in order to reduce the pain, most of them (72.99%) have done nothing. This suggests the less awareness in the people regarding dentinal hypersensitivity and its treatment aspect. While some have visited the dentist (18.14%) and some have used desensitizing toothpaste (8.86%).

CONCLUSION

Dentinal Hypersensitivity has been observed commonly by dental practitioners. Exposure of dentin due to loss of enamel or cementum is responsible for its occurrence. A most common causative factor was a gingival recession and the aggravating factor was the consumption of cold fluids or beverages. Prevalence of dentinal hypersensitivity was highest in premolar teeth. Almost half of the subjects had been represented with score 1 (Schiff's cold air score scale). Because of low awareness of the treatment strategies, only a few subjects had been gone through the treatment for dentinal hypersensitivity.

REFERENCES

- [1] Splieth CH. Epidemiology of dentin hypersensitivity. *Clinical oral investigations*. 2013 Mar 1;17(1):3-8.
- [2] Dowell P, Addy M. Dentinal Hypersensitivity – A Review Aetiology, symptoms and theories of pain production. *Journal of clinical periodontology*. 1983 Aug;10(4):341-50.
- [3] Rees JS, Jin LJ, Lam S, Kundanowska I, Vowles R. The prevalence of dentinal hypersensitivity in a hospital clinic population in Hong Kong. *Journal of Dentistry*. 2003 Sep 1;31(7):453-61.
- [4] Addy M, Urquhart E. Dentinal Hypersensitivity: its prevalence, etiology and clinical management. *Dent Update*. 1992 Dec;19(10):407-8.
- [5] won Kim J, Park JC. Dentin Hypersensitivity and emerging concepts for treatments. *Journal of Oral Biosciences*. 2017 Sep 8.
- [6] Miglani S, Aggarwal V, Ahuja B. Dentin Hypersensitivity: Recent trends in management. *Journal of conservative dentistry: JCD*. 2010 Oct;13(4):218.
- [7] Hiatt WH, Johansen E. Root Preparation I. Obturation of dentinal tubules in the treatment of root hypersensitivity. *Journal of Periodontology*. 1972 Jun;43(6):373-80.
- [8] Naidu GM, Chaitanya Ram K, Sirisha NR, Sandhya Sree Y, Kopuri RK, Satti NR, Thatimatla C. Prevalence of dentin hypersensitivity and related factors among adult patients visiting a dental School in Andhra Pradesh, southern India. *Journal of clinical and diagnostic research: JCDR*. 2014 Sep;8(9):ZC48.

- [9] Rane P, Pujari S, Patel P, Gandhewar M, Maria K, Dhume S. Epidemiological study to evaluate the prevalence of dentine hypersensitivity among patients. *Journal of international oral health: JIOH*. 2013 Oct;5(5):15.
- [10] Gilliam DG, Orchardson R. Advances in the treatment of root dentin sensitivity: Mechanisms and treatment principles. *Endod Topics* 2001;13(1):13-33.
- [11] Dababneh RH, Khouri AT, Addy M. Dentine hypersensitivity: Dentine hypersensitivity—an enigma? a review of terminology, mechanisms, etiology and management. *British dental journal*. 1999 Dec 11;187(11):606.
- [12] Davari AR, Ataei E, Assarzadeh H. Dentin hypersensitivity: etiology, diagnosis, and treatment; a literature review. *Journal of Dentistry*. 2013 Sep;14(3):136.
- [13] Dhaliwal JS, Palwankar P, Khinda PK, Sodhi SK. Prevalence of dentine hypersensitivity: A cross-sectional study in rural Punjabi Indians. *Journal of Indian Society of Periodontology*. 2012 Jul;16(3):426.
- [14] Chabanski MB, Gillam DG. Etiology, prevalence and clinical features of cervical dentine sensitivity. *Journal of oral rehabilitation*. 1997 Jan;24(1):15-9.
- [15] World Health Organization. Oral Health Assessment Form for Adults, 2013, Annexure 1.
- [16] Schiff T, Dotson M, Cohen S, De WV, McCool J, Volpe A. Efficacy of a dentifrice containing potassium nitrate, soluble pyrophosphate, PVM/MA copolymer, and sodium fluoride on dentinal hypersensitivity: a twelve-week clinical study. *The Journal of clinical dentistry*. 1994;5:87-92.
- [17] Chu CH, Pang KK, Lo EC. Dietary behavior and knowledge of dental erosion among Chinese adults. *BMC oral health*. 2010 Dec;10(1):13.
- [18] Hegde MN, Bhalla N. The Prevalence of Dentine Hypersensitivity in Southern India. *Journal of the Indian Dental Association*. 2009 Jun;3(6):189-91.
- [19] Rees JS, Jin LJ, Lam S, Kudanowska I, Vowles R. The prevalence of dentine hypersensitivity in a hospital clinic population in Hong Kong. *Journal of Dentistry*. 2003 Sep 1;31(7):453-61.
- [20] Gillam DG, Aris A, Bulman JS, Newman HN, Ley F. Dentine hypersensitivity in subjects recruited for clinical trials: clinical evaluation, prevalence, and intra-oral distribution. *Journal of oral rehabilitation*. 2002 Mar;29(3):226-31.
- [21] Rees JS, Addy M. A cross-sectional study of dentine hypersensitivity. *Journal of clinical periodontology*. 2002 Nov;29(11):997-1003.
- [22] Fischer C, Fischer RG, Wennberg A. Prevalence and distribution of cervical dentine hypersensitivity in a population in Rio de Janeiro, Brazil. *Journal of Dentistry*. 1992 Oct 1;20(5):272-6.
- [23] Flynn J, Galloway R, Orchardson R. The incidence of 'hypersensitive' teeth in the West of Scotland. *Journal of Dentistry*. 1985 Sep 1;13(3):230-6.
- [24] Liu HC, Lan WH, Hsieh CC. Prevalence and distribution of cervical dentin hypersensitivity in a population in Taipei, Taiwan. *Journal of Endodontics*. 1998 Jan 1;24(1):45-7.
- [25] Gillam DG, Seo HS, Bulman JS, Newman HN. Perceptions of dentine hypersensitivity in a general practice population. *Journal of oral rehabilitation*. 1999 Sep;26(9):710-4.
- [26] Addy M, Pearce N. Aetiological, predisposing and environmental factors in dentine hypersensitivity. *Archives of Oral Biology*. 1994 Jan 1;39:S33-8.
- [27] Rees JS. The prevalence of dentine hypersensitivity in general dental practice in the UK. *Journal of clinical periodontology*. 2000 Nov;27(11):860-5.
- [28] Taani DQ, Awartani F. Prevalence and distribution of dentin hypersensitivity and plaque in a dental hospital population. *Quintessence International*. 2001 May 1;32(5).
- [29] Udoye CI. Pattern and distribution of cervical dentine hypersensitivity in a Nigerian tertiary hospital. *Odonto-stomatologie tropicale= Tropical dental journal*. 2006 Dec;29(116):19-22.
- [30] Vijaya V, Sanjay V, Varghese RK, Ravuri R, Agarwal A. Association of dentine hypersensitivity with different risk factors—A cross-sectional study. *Journal of international oral health: JIOH*. 2013 Dec;5(6):88.
- [31] Al-Khafaji H. Observations on dentine hypersensitivity in general dental practices in the United Arab Emirates. *European journal of dentistry*. 2013 Oct;7(4):389.