

Prevalence and Impact of Dentine Hypersensitivity among Undergraduates in a University Campus of Central India

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Abstract

Background: Dentine hypersensitivity (DHS) is a common clinical problem exhibiting a varied prevalence values. There is limited documentation on the prevalence of DHS outside the hospital setting and impact of DHS among young adults in India. **Aim:** The aim of this study was to determine the prevalence and trigger factors associated with DHS among young adults in a university community in Central India. It also aimed to determine the functional and psychological impacts of DHS among them. **Materials and Methods:** A cross-sectional survey was carried among undergraduates of Rani Durgawati University of Jabalpur in January, 2015. The surveyed population consisted of 570 young adults, 242 males and 328 females, aged 17 to 26 years. All participants answered questions regarding demography, self-reported DHS, the trigger factors, action taken, and functional and psychological impact of DHS on quality of life. Statistical analysis used descriptive statistics and the Chi-square test. $P < 0.05$ was considered as significant. **Results:** The prevalence of DHS was 57.9% (330/570) among the surveyed population and was significantly higher in females as compared to males ($P = 0.03$). Majority of the participants 95.7% (316/330) who reported DHS were right-handed. About, 53.9% (178/330) participants experienced DHS on the left side of the mouth. Upper posteriors accounted for 38.8% of DHS followed by lower anterior for 31.8%. Among the participants with DHS, majority 211 (63.9%) have not sought any action and only 28 (8.5%) have consulted the dentist for shocking sensation. The major precipitant for the DHS was a cold drink 26.3% (87/330). About 20.6% (68/330) and 15.2% (50/330) of participants with DHS ingest sour-taste fruit and non-sour taste fruit regularly. Majority of participants, i.e. 49.1% (162/330) with DHS experienced more discomfort while eating hard food. Approximately, 33.9% (112/330) participants expressed unhappiness due to tooth sensitivity. Eating, talking and brushing were disturbed, respectively, in 30.9% (102/330), 8.5% (28/330), and 29.4% (97/330) of the participants. Individuals with functional and psychological disturbance were significantly more likely to visit a dentist. **Conclusion:** The prevalence of DHS found in this study was high which was significantly higher in females than males. All the participants were right-handed and left side of the mouth was the most commonly affected. Cold drink was the major precipitant for DHS. Hard food and sour-taste fruit consumption was significantly associated with DHS. Majority of the participants have not sought any action against shocking sensation. DHS disturbed the functional and psychological patterns of the affected participants. Determining the prevalence and impact of DHS in community-based population is required to treat such patients at the earliest.

Keywords: Dentine sensitivity, Prevalence, Young adults, Quality of life, Trigger factor

Introduction

Dentine hypersensitivity (DHS), or cervical dentinal sensitivity, is a relatively significant clinical problem, which is defined as pain arising from exposed dentin typically in response to thermal, chemical, tactile or osmotic stimuli.^[1] DHS is generally characterized by short, sharp pain arising from exposed dentin, which cannot be ascribed to any other form of dental defect or disease.^[2-4] Several authors^[5,6] have reported the impact of this shocking sensation on the quality of life of an affected individual during eating, drinking, brushing and breathing. DHS may limit the dietary choices among affected individuals, which

may further influence their effective oral hygiene and esthetics. Gillam *et al.*^[7] discussed the perceptions of DHS in a general practice population and observed that most of the individuals affected with DHS do not specifically seek treatment for this

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How to Cite this Article: Deogade SC, Suresan V, Rathod JR, Naitam D. Prevalence and Impact of Dentine Hypersensitivity among Undergraduates in a University Campus of Central India. Ann Med Health Sci Res. 2017; 7:137-143.

clinical problem, but may only mention it at a routine dental visit. Authors considered this attitude of individuals towards DHS as they do not view it as a significant dental health problem. Rees^[4] investigated the prevalence of DHS in general dental practice in the UK and found that the prevalence of DHS is variable depending on the methods used to diagnose the condition. The author mentioned the variable factors or parameters influencing the prevalence of DHS such as whether DHS is self-reported or confirmed with the specific oral test. Also, the factors like variation in the consumption of erosive drinks, or variation in the type of sample population and the type of setting where the investigation is carried out might influence the prevalence of DHS.^[4]

Fischer *et al.*^[8] investigated the prevalence and distribution of cervical DHS in a population of Brazil and observed that the large discrepancy in the prevalence of DHS is related to the variations in the methods of data collection. They also, indicated that even though high percentages of a population may report to have sensitive teeth, a much smaller proportion are actually diagnosed as having cervical DHS on the basis of defined clinical diagnostic criteria.^[8] Rees and Addy^[9] carried a cross-sectional study and noted that the incidence of DHS in most populations ranges between 10% to 30% of the general population. The incidence can vary considerably depending on the cohort being studied with periodontal patients, patients with gingival recession and smokers with periodontitis showing the highest incidence of diagnosed DHS.^[9] Several studies^[8-14] have reported that the teeth most commonly affected by DHS are the upper premolars followed by the upper first molars with the incisors being the least sensitive teeth. Some workers^[8,10-12] reported a slightly higher incidence of DHS in females compared to males. However, Flynn *et al.*^[10] reported that this gender-based difference in the incidence of DHS was not statistically significant in the general population of Scotland. Other investigations^[15-19] documented the prevalence of DHS in Nigeria ranging from 1.34% to 68%. Bamise *et al.*^[18] reported a higher prevalence of DHS among right-handed individuals than the left-handed ones. Some authors^[8,15,20,21] correlated the cold drink as the main triggering factor for DHS.

Available data on the prevalence of DHS, showed that previous investigations were carried out in hospital settings or general dental practices.^[4,9,15,16,21-23] These investigated dental populations could experience more dental or periodontal diseases than compared to the general population. It is evident that many people affected with DHS do not necessarily seek professional advice or dental treatment, which makes it more difficult to obtain an accurate prevalence of DHS for the general population than for those seen in hospitals or clinics. Irwin and McCusker^[24] reported an increase in the incidence and prevalence of DHS among young adults due to aggressive

brushing. In addition, there is limited data on DHS among undergraduates of university community of Central India. The aim of the study was to determine the prevalence and trigger factors associated with DHS among the young undergraduates in a university community of Jabalpur, Madhya Pradesh, India. It also aimed to determine the impact of DHS among them.

Materials and Methods

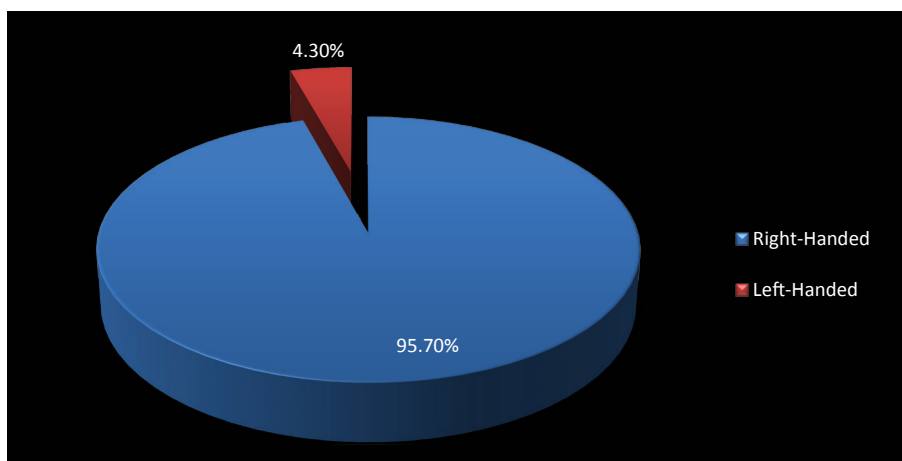
This cross-sectional survey was conducted among undergraduates of Rani Durgawati University (RDU), Jabalpur, Madhya Pradesh, India, during 16th to 22nd February 2015. Before commencement of the survey, ethical clearance was obtained from the Ethical Committee of the RDU, and official permission was received. The students were recruited at the ceremonial occasion of Rajshekhar Samaroh at the campus of the University of Jabalpur. Students from various departments of the university often congregate at the pavilion to attend the programs. Those who had dental caries, fractured teeth, fractured restorations and gingival inflammation were excluded from the survey. The objective of this study was explained to the participants, and informed consent was obtained before the interview. The method of data collection was interviewer administered questionnaire that elicited information on demography, self-reported dentine sensitivity, the trigger factors, action taken and impact of DHS on quality of life. The questions asked were based on the questionnaire used by Flynn *et al.*^[10] (with small modifications) to determine the prevalence of “hypersensitive” teeth in Central India. A census sampling method was applied in which the data is gathered on every member of the population. Data were entered into the Statistical Package of Social Sciences (SPSS, Inc., Chicago, USA) version 20.0 for analysis and entered data were subjected to descriptive statistics in the form of frequency, percentages, cross tabulation. Test of significance was done with Chi-square statistics. $P < 0.05$ was considered to be significant.

Results

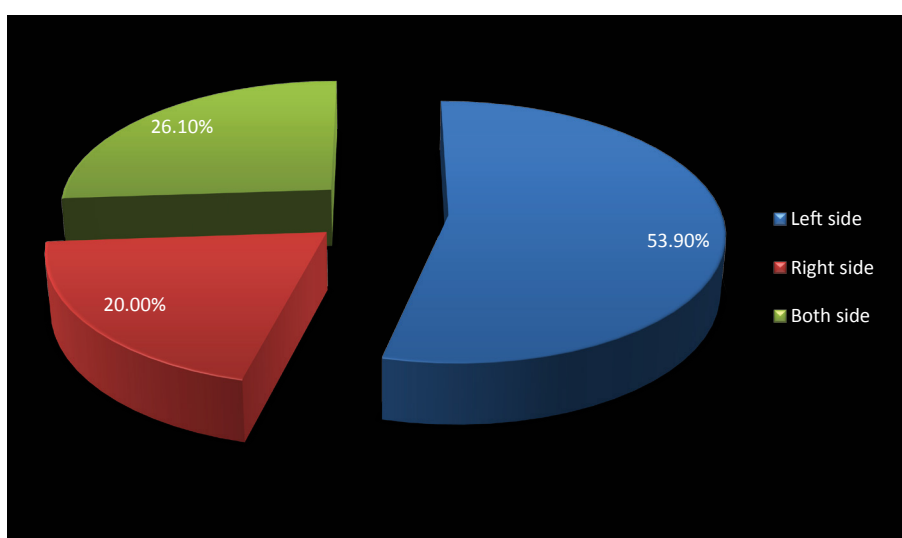
A total of 570 participants comprised of 42.4% (242/570) males and 57.6% (328/570) females participated in the study. The prevalence of DHS was 57.9% (330/570) among the surveyed population and was significantly higher in females than males ($P < 0.03$) [Table 1]. Out of 330 respondents who reported DHS, 95.7% (316/330) were right handed and 4.3% (14/330) were left handed [Graph 1]. The sensitivity was significantly more experienced by the participant on the left side 53.9% (178/330), than the right side 20.0% (66/330) and both sides 26.1% (86/330) [Graph 2]. Overall, posterior accounted for 52.4% (173/330) of DHS, where upper posterior teeth accounted for 38.8% (128/330) and lower posterior teeth accounted for 13.6% (45/330). All total anterior accounted for 47.6% (157/330) of

Table 1: Prevalence of dentine hypersensitivity among the participants

Dentinal hypersensitivity	Gender		Total n (%)
	Male n (%)	Female n (%)	
Present	112 (46.3)	218 (66.4)	330 (57.9)
Absent	130 (53.7)	110 (33.6)	240 (42.1)
Total	242 (42.4)	328 (57.6)	570 (100.0)



Graph 1: Distribution of right- and left-handed participants experiencing dentine hypersensitivity.

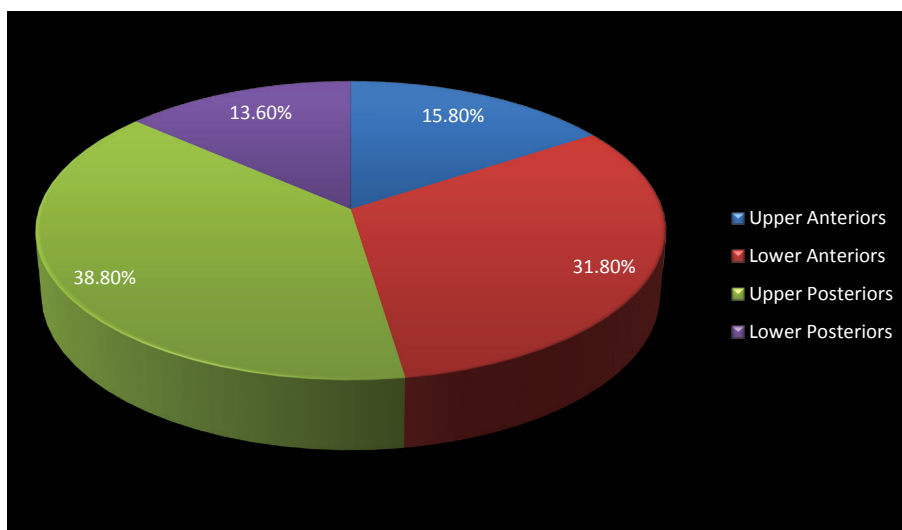


Graph 2: Distribution of different sites of dentine hypersensitivity among participants.

DHS, where upper anterior teeth accounted for 15.8% (52/330) and lower anterior teeth accounted for 31.8% (105/330) (Graph 3). Among 330 participants with DHS, majority 63.9% (211/330) has not sought treatment and few 36.1% (119/330) have tried warm water and salt or visited the dentist or used various forms of herbal/desensitizing toothpastes to treat the sensitivity [Table 2]. The major precipitant for the DHS was a cold drink (26.3%). Others were tooth brushing (21.8%), sweet food (14.8%), cold food (10.3%), hot food (6.4%), fruit juices (8.8%), chewing (4.3%) and air entering the mouth (7.3%) [Graph 4]. Approximately, 20.6% (68/330) and 15.2% (50/330) of participants with DHS ingest sour-taste and non-sour taste fruit regularly [Table 3]. Majority of participants that reported DHS, i.e. 49.1% (162/330) experienced more discomfort with hard food [Graph 5]. DHS showed psychological impact among the participants. About 33.9% (112/330) participants reported unhappiness due to the shocking sensation. In 30.9% (102/330), 8.5% (28/330) and 29.4% (97/330) of the participants, eating, talking and brushing were disturbed, respectively [Table 4]. Participants who expressed unhappiness and disturbance of eating, talking and brushing were significantly more likely to take action than those who experienced DHS without any of these reported situations.

Discussion

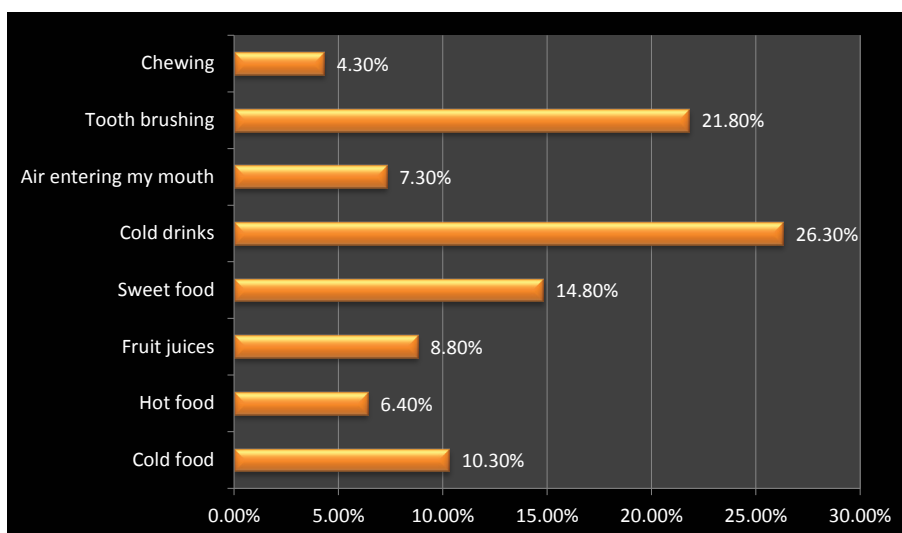
Dental hypersensitivity is the most challenging clinical condition for patients to explain and for dental clinicians to precisely diagnose and it may disturb an individual during his/her routine workouts like eating, drinking, brushing and even during breathing. Sometimes, this shocking sensation may be so severe that the affected person may develop nutritional deficiency due to restricted diet.^[5] In this study; the prevalence of DH was 57.9% among the 570 surveyed participants. This was comparable to 57.2%^[24] dentinal sensitivity reported in general dental practice population, but lower than previously reported studies.^[17,21,25-27] However; it was higher than other reported studies.^[7,8,15,19,28-31] The varying results of prevalence could be attributed to that of different diagnostic criteria or methodology used in different studies. Also, within the same study, there was an obvious difference in the prevalence that used tactile or thermal tests for confirming DH.^[32] Other factors contributing to variation in prevalence values could be attributed to clinical tests, self-reporting by patients, or the dentists' assessment, cultural and ethnic influence on lifestyle, and disease perception.^[4,9,33,34] In this survey, the prevalence of DH was significantly higher in females than males ($P < 0.01$). This finding is in agreement with the studies reported by



Graph 3: Distribution of different sites of dentine hypersensitivity among participants.

Table 2: Actions taken by the participants experiencing dentine hypersensitivity

Action taken	Frequency (n)	Percentage (%)
I have not done anything	211	63.9
I used warm water and salt	19	5.8
I visited the dentist	28	8.5
I used the herbal toothpaste	17	5.2
I used the desensitizing toothpaste	15	4.5
I used snuff on my teeth	16	4.9
I changed to using only chewing sticks	13	3.9
Other	11	3.3
Total	330	100



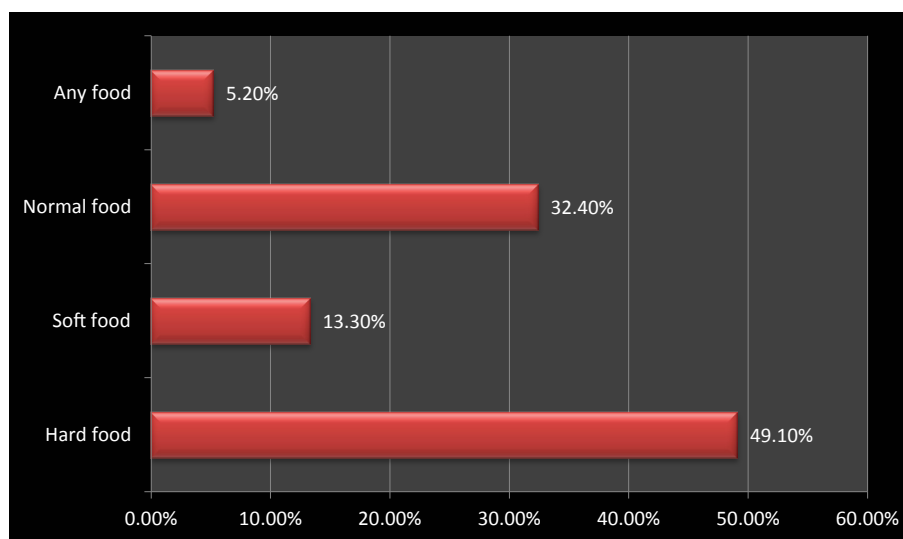
Graph 4: Different stimuli causing dentine hypersensitivity among the participants.

Fischer *et al.*^[8], Udoye^[15], Azodo and Amayo^[19], Braimoh and Ilochonwu^[26], Albashaireh and Aljamal^[27], Ye *et al.*^[28], Tan *et al.*^[31], Tengrunsun *et al.*^[35], an Bahsi *et al.*^[36] The prevalence of DH in females could be because of their tendency to brush more intensively than men and also, to eat more healthy fruity food items which are erosive. This combination creates an etiological risk factor for DH.^[37-39] Also; females are more aware to oral hygiene and tend to visit the dental clinicians more frequently.^[40,41] However, some studies have reported a higher prevalence of DH in males than females.^[16,42]

The prevalence of DH was significantly higher in right-handed participants than the left-handed ones. This finding was comparable to the results of other reported studies,^[18,19] which witnessed the predominance of DH etiologies on left-side among right-handed participants. This could be due to the fact that the right-hand is the dominant hand in right-handed individuals which results into the application of greater force during brushing on the left-side developing DH. However, the result of this study was in contrast to the findings reported by Tan *et al.*^[31] who observed the right side as the most commonly affected with DH.

Table 3: Sour-taste fruit and non-sour-taste fruit consumption among the participants experiencing dentine hypersensitivity

Frequency	Sour-taste fruit	Non-sour-taste fruit
	<i>n</i> (%)	<i>n</i> (%)
Regularly	68 (20.6)	50 (15.2)
Often	66 (20.0)	65 (19.7)
Sometimes	108 (32.7)	105 (31.8)
Occasionally	76 (23.0)	82 (24.8)
Rarely	12 (3.7)	28 (8.5)
Total	330 (100.0)	330 (100.0)

**Graph 5: Type of food causing dentine hypersensitivity among the participants.****Table 4: Bivariate analysis of the functional and psychological impact of dentine hypersensitivity and action taken among the participants**

Questions on DHS impact	Yes <i>n</i> (%)	I have done something	
		Yes (%)	No (%)
Does the shocking sensation disturb your eating?	102 (30.9)	72.3	27.7*
Does the shocking sensation disturb you from talking?	28 (8.5)	69.5	30.5*
Does the shocking sensation disturb you from brushing?	97 (29.4)	67.6	32.4*

* $P < 0.05$. NB: For bivariate analysis, the total number of participants experiencing DHS ($n=330$) formed the denominator, DHS: Dentine hypersensitivity

In this study, the majority of participants reported the prevalence of DH in upper posteriors, followed by lower anteriors. This finding was in agreement with the study of Ye *et al.*^[43] who reported the prevalence of DH in upper posteriors followed by lower posteriors. However, it was not in agreement with the studies reported by Taani and Awartani,^[23] Rees *et al.*^[21] and Rane *et al.*^[42] where the investigators observed the prevalence of DH in lower anteriors followed by upper posteriors. The main initiating trigger factor for DH was cold drinks, followed by tooth brushing, sweet food, cold food, fruit juices, air entering the mouth, hot food and chewing. This finding is similar with the results obtained from the other studies.^[4,9,16,19,21,24,31] As proposed by Brannstrom,^[20] cold drink induced dentinal fluid movement results in a change in osmotic pressure, which is transmitted as a stimulus to the odontoblastic process. This hydrodynamic phenomenon generates action potential on the afferent nerve ending located at the pulp-dentine border, thus increasing the patency of the dentinal tubules which further exacerbates DH. Approximately, 68 (20.6%) and 50 (15.2%) of the participants that reported DHS ingest sour-taste fruit (such as citrus fruit) and non sour-taste fruit (such as soft carbonated drink) regularly. This is in agreement with Tengrungsun *et al.*^[35],

but in contrary to Azodo and Amayo^[19]. Consumption of highly acidic foods and drinks are associated with tooth erosions which may contribute to dentine exposure developing DHS.^[13] Acidic fruits may remove the dentinal smear layer resulting in open dentinal tubules.^[12] About 162 (49.1%) of the participants experiencing DHS agreed that the hard consistency food created more discomfort during eating. This was similar to the findings reported by Tengrungsun *et al.*^[35]. High fiber food is coarse, like tiny gravel, and causes attrition when chewing causing DHS.^[18] Patients reporting shocking sensation should be advised to reduce the intake of acidic fruit and hard food.

In this study, majority of participants i.e. 211 (63.9%) affected with DH have not taken any action, while only 119 (36.1%) of the participants, had taken action by visiting the dentist, using desensitizing/herbal pastes, gargling with warm water and salt or following other remedies. This is similar to the results obtained by Fischer *et al.*^[8], Braimoh and Ilochonwu,^[26] and Kehua *et al.*^[30]. The probable reason for not seeking professional dental care is due to the fact that DH is not spontaneous but rather provoked, leading affected patients to develop adaptive behavior of restricting self-from triggering factors and avoid

using affected side of the mouth.^[44] The dependence of affected individuals on self-care for oral and dental health problem and visiting dental care only when situations are unbearable may also be contributory.^[19]

Oral and dental conditions are known to impact adversely on various oral functions such as eating, swallowing, and talking. Such painful situations may affect the mental wellbeing of an affected individual. The affected individuals' exhibits impaired oral health related quality of life as compared to the unaffected ones.^[45] Patients with DH develop adaptive behavior of avoiding triggering factors such as certain foods and beverages that initiate painful or shocking sensation. This change in adaptation develops nutritional deficiencies due to restrictions in dietary choices. Among the participants with DH, 102 (30.9%), 28 (8.5%) and 97 (29.4%) indicated that eating, talking and brushing, respectively were disturbed. Also, 112 (33.9%) participants affected with DH asserted unhappiness due to the transient sharp sensation. The unpleasant nature of shocking sensation adjunct with the restricted dietary choices may be the probable factors causing unhappiness among the individuals affected with DH. This reveals the importance of seeking and receiving appropriate treatment from professional care workers in order to improve the quality of life among the affected population.

Study limitations

One of the major limitations was that this was a questionnaire-based study which completely rely on the patient's perception of the condition that further tend to overestimate the existing problem.^[33] This could be due to patient's difficulty in determining the type of dental pain they may be experiencing at the time. The measurement of the pain response is inherently difficult as it is highly subjective and its perception and subsequent pain may differ widely among individuals. Another weakness was that it was purely a questionnaire-based study without any clinical diagnosis of DHS such as a simple clinical method of diagnosing DHS includes a jet of air or using an exploratory probe on the exposed dentin, in a mesio-distal direction, examining all the teeth in the area in which the patient complains of pain. The severity or degree of pain could have been quantified either according to categorical scale (i.e. slight, moderate or severe pain) or using a visual analogue scale.

Future research implications

In order to assess the true prevalence of DHS, a study with a population-based representative sample is needed. As DHS per se is not considered a serious problem, this can be done most likely as an add-on in other health surveys-or as a questionnaire study.

Conclusion

The prevalence of DHS found in this study was higher than previously reported, suggesting an increase in the levels of sensitivity within the general population. DHS was significantly higher in females than males. All the participants were right-handed and left side of the mouth was the most commonly affected. Cold drink was the major precipitant for DHS. Majority of the participants accepted their disturbed functional

and psychological patterns and were more likely to visit a dentist. Investigation for DHS outside the hospital setting is the need of time to execute early treatment for shocking sensation diverting its psychological impact on the population.

Acknowledgement

The study was self-funded. We would like to thank Asso. Prof. Dr. Sudhanshu Saxena, Deptt., of Public Health Dentistry, Hitkarini Dental College and Hospital, Jabalpur (M.P.) for his statistical help. We would like to thank all the subjects for their kind participation in this study.

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