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An online survey on Indian dental professionals for the treatment and management of dentine hypersensitivity: a questionnaire based cross-sectional study

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Abstract

Background: Dentine Hypersensitivity is a persistent and a troublesome clinical condition which at times is under diagnosed by dental professionals who may struggle to successfully resolve the problem to their patient's satisfaction. It has been a long-term significant challenge for practitioners due to the uncertainties around its diagnosis and treatment.

Aim & Objective: To assess the knowledge and understanding of dental professionals on the issues and challenges associated with the clinical diagnosis and management of dentine hypersensitivity and to provide simple strategy based on clinical features that may help dental professionals to successfully manage the condition in their day-to-day clinical practice.

Material & Methods: A cross-sectional online survey was conducted on 300 practicing Indian dental professionals for data collection. A self-administered questionnaire Performa consists of 20 questions related to the demographic characteristics of dentists. The second section investigated the knowledge about the description of pain in DH, triggering and predisposing factors, treatment strategies, preventive and treatment measures, remineralization products, etiological factors of dental wear, and main characteristics of DH. The questionnaire is framed based on the previously validated questionnaire of United Kingdom, Brazil and Kuwait. Data were analysed by using SPSS software 22.0 and presented in the form of frequency and distribution tables.

Results: Out of 300 sample size, 281 responded positively to this survey. Among which more than half of the dental professionals were females 172 (61.2%) and males were 109 (38.8%). Most dentists (74%) prescribe a strontium chloride as a desensitizing agent as first line treatment. 70.4% of dental professionals correctly respond to etiological and predisposing factors related to DH. The Most encountered problem was the subjective aspect of dentinal hypersensitivity

Conclusion: The results of this study suggest that in terms of knowledge and understanding of DH, there is still

confusion concerning some aspects of the diagnosis and management of the condition.

Keywords: Dentin Hypersensitivity, Cemental Hypersensitivity, Hydrodynamic Theory, Desensitising Toothpaste, Exposed Dentinal Tubules.

Introduction

Dentin Hypersensitivity can be defined as "Short acting, sharp pain that arises from exposed dentine due to various stimuli which is evaporative, thermal, osmotic, tactile and chemical and this pain cannot be attributed to any other form of dental defect, disease or pathology.[1,2] Many other terms have been used to diagnose this typical common condition such as Dentine Sensitivity, Root sensitivity, cervical dentine sensitivity, cemental hypersensitivity but Dentin Hypersensitivity is the most often used term across the literature.[3]

It has been reported that Dentin Hypersensitivity has multifactorial etiology and patients with periodontal and gingival disease usually encounter this painful condition.[4] Dentin Hypersensitivity is initiated by denudation of dentinal tubules and several possible common causative factors which include gingival recession, pockets formation, acute and chronic inflammatory periodontal diseases, trauma, traumatic occlusal forces, parafunctional habits, acidic dietary components, abrasion, erosion, attrition, abfraction, tooth flexure, faulty and overzealous tooth brushing and periodontal procedures (specially Scaling and Root planing) lead to dentine exposure.[5-7]

Dentin Hypersensitivity as reported by Canadian Advisory Board is Diagnosis of Exclusion.[2] It is diagnosed by means of self-report of sharp pain in vital tooth/ teeth by patients in response to external stimuli.[8] A number of theories have been put forward to describe the mechanism of Dentin Hypersensitivity[9] but Brannstorm's Hydrodynamic Theory is the most widely acceptable theory and according to this theory, various stimuli cause changes in fluid movements in dentinal tubules either outwards or inwards, resulting in activation of nociceptors in pulpo-dentinal border, which ultimately lead to the characteristic short, sharp pain of Dentin Hypersensitivity.[10,11] Females and adults (35-49 years) are more susceptible to DH than males and older individuals ≥ 60.[12] Most common teeth affected with DH include premolars and anterior teeth.[13]

Variation in Prevalence of Dentin Hypersensitivity exists worldwide, ranging from 1.34% to 98%.[14-16] This presence of variation exists due to several reasons including different study designs, different selection criteria for each study sample, different diagnostic approaches and also type of setting where study was performed. In addition, some epidemiological studies involving large community samples identified 25.5%-34.5% of populations with clinically diagnosed DH.[12,13] Questionnaire studies analysing patients' complaint of DH report a prevalence of up to 57%[17] whereas questionnaire studies determining the Dental Professionals perspective recorded an occurrence of only 10% to 25%.[18] This illustrates a fundamental difference between the perception of DH from both the dentist and patient outlook which may have a potential impact on the Quality of life (QoL) of those who suffered from the problem.[19,20] Patients with sensitive teeth experience discomfort while eating, drinking, and brushing their teeth, all these activities may also consider that affect the quality of life (QoL).

Questionnaires are objective tools that researchers can use to collect information about people's knowledge, beliefs, attitudes, and behaviour. Cross-sectional studies can be based on questionnaires, providing descriptive data on the entire population being studied. In scientific literature, several self-reported questionnaire studies assess and attempted to survey dental students or dental professionals' knowledge about dentin hypersensitivity.

Gillam et al, announced after effects of a study on 181 UK dental specialists' impression of DH and information of its treatment. They achieved the conclusion that all around most dental practitioners seemed to comprehend the etiology of DH and gave rectify encourages to their patients.[20] Amarasena et al in their review including 284 Australian private dental specialists found that their impression of DH is by and large predictable with the current logical accord regarding this matter.[21] Then again, in an overview on 331 dental specialists and 211 hygienists, the Canadian Advisory Board on Dentin Hypersensitivity in 2003 distinguished 14 key learning holes identified with the causes, analysis and administration of DH.[2] According to this survey, approximately 50% of the respondents reported lack of confidence in managing patients' pain due to DH. The Canadian Advisory Board on Dentin Hypersensitivity suggested that providers initiate management of this condition by applying desensitizing treatment that is noninvasive; i.e., desensitizing toothpaste and/or topical agents. Some dental providers use a stepped approach to treatment with multiple visits; others apply and prescribe multiple treatments at one time. Invasive treatments of DH are also performed by placing a restoration on an otherwise healthy tooth.[2]

From these studies, there appears to be a lack of awareness among dental professionals of the importance of implementing prevention strategies to eliminate the etiological causes of DH. It is also important to note that the number of patients who perceive DH to cause serious pain may still present a significant clinical challenge for the dental practitioner. Hence the present study was based with an aim to assess and evaluate the knowledge of Indian dental professionals about dentin hypersensitivity regarding pain description, triggering factors, predisposing factors, diagnosis, preventive and treatment measures and to provide simple strategy based on clinical features that may help dental professionals to successfully manage the condition in their day-to-day clinical practice.

Materials and methods

The cross-sectional questionnaire-based study was conducted for three months from February 2021 to April 2021, to assess the knowledge of dentin hypersensitivity regarding its clinical presentation, its diagnosis and treatment measures among Indian dental professionals. Prior to start of study, all participants were informed about the purpose and the objective of this study. They were also provided information about their voluntary participation, right to refusal, and anonymity of responses. Those willing to participate in the study provided their consents. A total of 300 dental professionals were randomly selected and received the questionnaire online. No reminder was given to those participants who did not return the questionnaire.

Inclusion criteria

1. Those Participants who were willing to participate and filled the entire questionnaire
2. Both male and female dental professionals
3. General Dental Practitioner, Specialized Dentists, Interns, Postgraduate Students.

Questionnaire Preparation and Survey Structured

A Google survey form was created of self-administered questions based on a previously validated questionnaire used in the United Kingdom, which incorporated queries on worldwide reports about DH including on its prevalence, the important predisposing factors, major triggers, mechanisms, differential diagnosis, patient management, dentist management and continuing education relating to DH.[18] This helped to maximize the response rate from dentists and enable ease of data handling and analysis. This has been recently updated and

used in several studies namely in Brazil, India and Kuwait.[22,23,24]

The questionnaire included total 20 Multiple choice questions on Dentin Hypersensitivity organized into two sections: The first section seeks the information of dentist based on sociodemographic analysis such as Age, Gender, Educational Qualification and Clinical or Teaching experience. The second section focused mainly on the dentists' perspective of their patients presenting with DH and its causes, triggers, and predisposing factors as well as diagnosis, treatment strategies, preventive measures, treatment measures, and remineralization products. Moreover, dental professionals also asked to give an example of desensitizing toothpastes to evaluate the knowledge of being efficient in DH treatment.

The final questionnaire was sent electronically using the Google Forms tool for conducting the online survey. The dentists were requested to click on the link to gain access to the survey. Along with the link directing to the Google survey site, the purpose of the study was clearly stated. The dental professionals were given full freedom whether to participate or leave the survey link provided. The dentists received no training to complete the questionnaire, with an estimated response time of 10 minutes. Data were collected electronically over a period of three months from February 2021 to April 2021 and analysed by using SPSS software 22.0 and presented in the form of frequency and distribution tables.

Results

The size of the initial sample was 300 dental professionals among which 281 dental professionals responded positively by participating in this study. They completed and submit the questionnaire Performa in google forum by participating in the study with a response rate of 93.6%. Some dental professionals refused to fill the questionnaire and some dental professionals didn't complete the questionnaire. Hence the incomplete data were excluded from the study.

Socio-demographic characteristics of participating dental professionals

The Socio-demographic characteristics of the study participants are presented in Table 1, among which more than half of the dental professionals were females 172 (61.2%) and males were 109 (38.8%) and practicing in different sectors or areas. The results showed that 50.8% of the dentists of our sample were in the age between 36-45 years. 46.2% were aged between 25 and 35 years, and 2.8% were aged above 45 years. Majority of dental professionals 166 (59.0%) had <5 years teaching and clinical experience. Post graduate professionals were 157 (55.8%) and Graduate professionals were 124 (44.1%) and both were engaged in academics and private practice.

Table 1: Socio-demographic characteristics of participating dental professionals (n=300)

Socio-demographic factors		Dentists (n)	n (%)
Age	25-35 yrs.	130	46.2%
	36-45 yrs.	143	50.8%
	> 45 yrs.	8	2.8%
Gender	Male	109	38.8%
	Female	172	61.2%
Qualification	Graduate (BDS)	124	44.1%
	Postgraduates (MDS)	157	55.8%

Clinical/Teaching Experience	< 5 yrs.	166	59.0%
	5-10 yrs.	84	29.8%
	10-15 yrs.	30	10.6%
	> 15 yrs.	1	0.003%

Perception of Dental Professionals regarding the characteristics of Dentin Hypersensitivity

In our study we assessed the different diagnosis that a most dentists consider when a patient complains of tooth sensitivity as well as dentists' perceptions when screening for dentine hypersensitivity's symptoms. In fact, 22.0% of dentists reported that patients experience pain arising from exposed dentin, whereas 2.1% describe dentin hypersensitivity as a short, sharp or transient pain and 9.9% described it as pain occurs in chronic condition with acute episodes and 2.8% describe pain in dentin hypersensitivity due to non-noxious stimulus. Majority of dental professionals 177 (63%) considered that patient reported and experience all types of pain that occur in dentin hypersensitivity. Among the affected teeth with dentin hypersensitivity, canine and incisors showed the biggest percentage with 67.6% and 22.4% respectively, followed by molars (5.3%) and premolars (3.9%).

Among the possible triggers of DH, thermal stimuli were cited frequently (10.6%) as a trigger of dentine hypersensitivity followed by Evaporative (4.2%), tactile (1.7%), and osmotic (1.4%), however 81.8% of the dentists considered that dentine hypersensitivity can be triggered by all the stimuli above. (Table 2)

Table 2: Perception of Dental Professionals regarding the characteristics of Dentin Hypersensitivity (N=300)

Questionnaire		Dentists	n %
1. Which is the most common tooth affected by Dentin Hypersensitivity?	First Premolar	2	0.7%
	Second Premolar	11	3.9%
	Canine	190	67.6%
	First Molar	15	5.3%
	Mandibular Incisors	63	22.4%.
2. What are the eliciting stimulus for Dentin Hypersensitivity?	Tactile	5	1.7%
	Thermal	30	10.6%
	Osmotic	4	1.4%
	Evaporative	12	4.2%
	All the above	230	81.8%
3. Do you know any theory explaining the perception of pain across the dentin?	Yes	229	81.4%
	No	25	8.8%
	Don't Know	27	9.6%
4. The pain description of Dentin Hypersensitivity is:	Short, sharp or transient pain of rapid onset	6	2.1%
	The pain arising from exposed dentin typically in response to chemical,	62	22.0%

	thermal, tactile and osmotic stimuli		
	Pain occurs in chronic condition with acute episodes	28	9.9%
	Pain in response to non-noxious stimulus	8	2.8%
	All the above	177	63%

Most frequent etiological and pre-disposing factors of Dentin Hypersensitivity that affect the quality of life (QoL) of patients as indicated by the dental professionals

Majority of dental professional's considered that dentin hypersensitivity had negative impact on the quality of life of patients was reported by 76.2% of the respondents and 177(62.9%) of them believed that impact was severe.

As summarized in Table 3, concerning the pre-disposing factors, 49 (17.4%) dental professionals indicated their first choice as exposed dentinal tubules as a potential pre-disposing factor, followed by tooth brushing habits (5%), and abrasion, erosion, abfraction and/or attrition lesions i.e., wasting disease (3.9%) respectively, as a predisposing factors of dentin hypersensitivity. Majority of dental professionals 198 (70.4%) considered that all the above pre-disposing factors involved in the causation of dentin hypersensitivity. According to our respondents, the possible triggers faced by the patients during dentin hypersensitivity, hot and cold food cited most frequently (22.3%) as a trigger of dentin hypersensitivity followed by breath cold air (3.2%), tooth brushing (2.8%) and Periodontal conditions and Scaling procedures 1.4% and 1.1% respectively. In sum of total percentage of the entire trigger factors 194 (69%) dental professional agreed that all the above factors may contribute in causing the difficulties faced by the patients. Considering the systemic factors as pre-disposing factors, 201 (71.5%) dental professionals responded that chronic acid regurgitation, pregnancy and long-term use of anti-inflammatory analgesics and psychotropic drugs all may contribute in developing the dentin hypersensitivity condition. Chronic acid regurgitation was the first choice (15.3%) among dental professionals (Table 3).

Table 3: Most frequent etiological and pre-disposing factors of Dentin Hypersensitivity that affect the quality of life (QoL) of patients as indicated by the dental professionals

Questionnaire		Dentists	n %
1. Is Dentin Hypersensitivity a serious problem for patients?	Yes	241	85.8%
	No	40	14.2%
2. Is there any impact of Dentin Hypersensitivity on quality of life?	Yes	214	76.2%
	No	67	23.8%
3. What is the severity of impact of Dentin Hypersensitivity on quality of life?	Mild	25	8.8%
	Moderate	65	23.1%
	Severe	177	62.9%
	Extremely Severe	14	4.9%

4. What are the difficulties faced by the patients during Dentin Hypersensitivity?	Hot and cold food	63	22.3%
	Tooth brushing	8	2.8%
	Breathe cold air	9	3.2%
	Periodontal conditions	4	1.4%
	Scaling Procedures	3	1.1%
	All the above	194	69%
5. Predisposing Factors involved in the causation of Dentin Hypersensitivity?	Tooth brushing habits	14	5%
	Gingival Recession	9	3.2%
	Exposed dentinal tubules	49	17.4%
	Wasting diseases	11	3.9%
	All the above	198	70.4%
6. What systemic conditions according to you can predispose patients to develop Dentin Hypersensitivity?	Chronic acid regurgitation	43	15.3%
	Pregnancy	9	3.2%
	Long term use of anti-inflammatory, analgesics and psychotropic drugs	28	9.9%
	All the above	201	71.5%

Frequency and %age among dental professionals responding to the given diagnostic questions of the questionnaire

Table 4 summarizes the most frequent diagnostic methods used by dental professionals while diagnosing dentin hypersensitivity. Cold water jet, was chosen most frequently by dental professionals as the first choice (75.4%). This was followed by thermal test (14.5%), scratching dentin with a dental explorer (8.1%), using other methods, most likely verbal rating scale (1.7%). Regarding the therapeutic strategy used in dentin hypersensitivity, 215 (76.5%) dental professionals agreed that decreasing the nerve excitability and only 15 (5.3%) dental professionals positively respond to occlusion of dentinal tubules as mode of action of treatment modality.

Table 4: Frequency and %age among dental professionals responding to the given diagnostic questions of the questionnaire

Questionnaire		Dentists	n %
1. What are the potentially used diagnostic aids in Dentin Hypersensitivity?	Cold water jet	212	75.4%
	Thermal test	41	14.5%
	Use of explorer	23	48.1%
	Verbal rating scale	5	1.7%
2. The therapeutic strategy that has been used in Dentin Hypersensitivity are:	Occlusion of dentinal tubules	15	5.3%
	Increase of flow of dentinal fluid into canaliculi	6	2.1%
	Activation of intradermal nerve endings type A-δ	9	3.2%
	Induction of intertubular dentin deposition	12	4.3%
	Decrease the nerve excitability	215	76.5%
	Stimulation of tertiary dentin formation	24	8.5%

Frequency and %age among dental professionals responding to differential diagnosis questionnaire of DH

The perception of dental professionals regarding the differential diagnosis of dentin hypersensitivity, majority of dental professionals 201 (71.5%) agreed that cracked tooth syndrome, irreversible pulpitis, Periodontal disease or fractured restoration may be considered as a differential diagnosis of dentin hypersensitivity. (Table 5)

Table 5: Frequency and %age among dental professionals responding to differential diagnosis questionnaire of DH

	Differential Diagnosis	Dentists	n %
1.	Cracked tooth syndrome	9	3.2%
2.	Irreversible pulpitis	41	14.5%
3.	Periodontal disease	22	7.8%
4.	Fractured restoration	8	2.8%
5.	All the above	201	71.5%

Treatment modalities routinely used when treating dentin hypersensitivity

As shown in Table 6, dental professionals reported using multiple products when managing dentin hypersensitivity. Almost half of dental professionals 209 (74.3%) uses desensitizing toothpaste followed by correction of tooth brushing technique (15.3%) and subgingival scaling (3.9%). Interestingly, restorative treatment of carious lesion, pulpectomy and teeth whitening were also reported to be used by the dental professionals when treating dentin hypersensitivity cases. Moreover, almost all dental professionals 255 (90.7%) do not prefer to prescribe corticosteroids in the treatment of dentin hypersensitivity. Dentin hypersensitivity is not causing any life-threatening

condition so dental professionals (82.9%) do not get any emergency call for the same.

Table 6: Treatment modalities routinely used when treating dentin hypersensitivity

Questionnaire		Dentists	n %
1. The treatment of dentin hypersensitivity comprises:	Subgingival Scaling	11	3.9%
	Correction of the toothbrushing technique	43	15.3%
	Recommendation of desensitizing toothpastes	209	74.3%
	Treatment of carious lesions	9	3.2%
	Teeth whitening	2	0.7%
	Pulpectomy	7	2.5%
2. Do you prefer corticosteroids in the treatment of Dentin Hypersensitivity?	Yes	26	9.2%
	No	255	90.7%
3. Do you get any emergency calls regarding Dentin Hypersensitivity?	Yes	48	17.0%
	No	233	82.9%

Most frequent products used when managing dentin hypersensitivity

As shown in Table 7, dental professionals reported that the most frequent, first choice of products prescribing when managing dentin hypersensitivity was: Strontium chloride (74%), followed by potassium nitrate toothpaste (17%), formaldehyde dentifrices (4.9%) and ammonium hexafluoro silicate (3.9%). When asked about best prescribing desensitizing agent approximately half of the dental professionals 196 (69.7%) responded positively by prescribing a desensitizing agent that contains 5% concentrated bioactive glass toothpaste (calcium sodium phosphosilicate).

Table 7: Most frequent products used when managing dentin hypersensitivity

Questionnaire		Dentists	n %
1. Which is the most commonly prescribed desensitizing agent in the clinics?	Ammonium hexafluoro silicate	11	3.9%
	Strontium chloride	208	74.0%
	Potassium nitrate dentifrices	48	17.0%
	Formaldehyde dentifrices	14	4.9%
2. In your opinion which is better?	A toothpaste containing 5% concentrated bioactive glass toothpaste (calcium sodium phosphosilicate)	196	69.7%
	A toothpaste containing 5% potassium nitrate	58	20.6%
	A toothpaste containing strontium salt	27	9.6%

Preventive strategy towards dentin hypersensitivity among dental professionals

The results of our study showed that in terms of prevention management of dentine hypersensitivity includes use of mouthguards and desensitizing agents before, during or after bleaching techniques for 34.1% for the dental professionals while 90 (32%) dental professionals agreed to avoid eating neutral food at the end of meal may reduce the occurrence of dentin hypersensitivity and 66 (23.4%) responded positively to decrease the consumption of acidic food beverages can prevent the occurrence of dentin hypersensitivity. Majority of dental professionals 205 (72.9%) responded positively and correctly that during the prevention of dentin hypersensitivity, dental professionals should maintain the biologic width, avoid placing subgingival restoration and also during the periodontal therapy care should be taken to minimize removal of cementum may help in reducing the occurrence of dentin hypersensitivity.

Table 8: Preventive strategy towards dentin hypersensitivity among dental professionals

Questionnaire		Dentists	n %
1. The preventive measures for the occurrence of Dentin Hypersensitivity are:	To avoid using interdental toothbrushes	10	3.5%
	To decrease the frequency and consumption of acidic food beverages	66	23.4%
	To avoid very hard and very soft (old) brushes with rounded ends	14	4.9%
	To avoid eating neutral foods at the end of meals	90	32%
	To use mouthguards and desensitizing agents before, during or after bleaching techniques	96	34.1%
	To avoid using toothpicks on the gum's abrasive toothpastes	5	1.8%
2. What preventive measures a dental professional should take while performing any dental procedure to prevent Dentin Hypersensitivity?	Maintaining the biologic width	24	8.5%
	Avoid placing subgingival restorations	11	3.9%
	During periodontal therapy care should be taken to minimize removal of cementum	41	14.5%
	All the above	205	72.9%

Discussion

Previous studies or reviews have indicated that Dentists may be uncertain about the aetiology, diagnosis and effective management of Dentine Sensitivity/Dentine Hypersensitivity (DH).[2,25] According to the 2003 Consensus Document on DH[2] there are several concerns relating to the effective diagnosis and management of the condition which may have an impact on the treatment of dentin hypersensitivity. The questionnaire used in the present study was based on a previously validated

questionnaire used in the United Kingdom relating to the understanding of DH[18,26] which been recently updated and used in several studies namely in Brazil, Kuwait and India.[22,27] The response rate from the study was 93.6% which in comparison to previous questionnaire of this nature was quite satisfactory. The responses from the various questions in the present study appear to be consistent with the results of studies in other countries, although there are some differences with other published studies when dental professionals were asked about the etiological factors associated with DH.[21] The authors also recognized that the questionnaire may be improved with a more prescriptive list of available products as used in other studies[21] rather than the use of open-ended questions to identify the products used or recommended by the dentist.

The advantage of using a self-administered questionnaire in studies of this nature was that they are relatively easy to utilize and inexpensive to produce. The questionnaire survey was targeted at dentists and designed to capture personalized attitudes and opinions concerning the identification and the management of DH. There were no major problems with the responses from the dental professionals and it was decided however that the questionnaires should be distributed by e-mail/webmail rather than through distribution by hand (hard copy). It was anticipated that the number of participants (dentists) in the study would improve using this method of distribution.

The patients with DH have been shown to indicate significant negative impact on oral health related quality of life (OHRQoL).[28,29] This corroborates with the results of our study where 76.2% of respondents said that DH impacted quality of life of patients, and 62.9% regarded the impact as severe. Our study showed that the canine were the most frequently affected teeth, followed by incisors and molars which is in agreement with many studies that showed the same results and it has been suggested that this distribution pattern of DH may be related to toothbrushing habits, while premolars and buccal surfaces are likely to receive more attention during brushing.[16,18,21]

It is difficult to clinically measure the pain of DH; therefore, dental practitioners frequently obtain patients' history about the condition to reach to proper diagnosis, although this may not give objective assessment of the pain. In order to overcome this deficiency, thermal stimulation and air blast testing are commonly used to evaluate DH in clinical trials.[2] Dental hypersensitivity is triggered by a thermal stimulus for 10.6% of dental professionals, while 1.4% and 4.2% think it is triggered by osmotic and evaporative stimulus respectively, accordingly 81.8% of dental professionals have testified that all previous stimuli may trigger dentin hypersensitivity. A study conducted by Amarasena et al. showed that dentin hyperesthesia is triggered by cold, according to 80.1% of the practitioners.[21]

The result of present study regarding the perception of etiological and predisposing factors of dentin hypersensitivity was in agreement with other dentists' perception worldwide, the majority (70.4%) of dental professionals in our survey reported tooth brushing habits, exposed dentinal tubules and exposure of cervical area as a predisposing factor due to wasting disease (attrition and erosion) or gingival recession. This finding is supported by the most accepted theory related to DH, the hydrodynamic theory, which proposes that stimuli (thermal, physical or osmotic changes) cause displacement of the fluid that exists within the dentinal tubules and this mechanical disturbance activates the nerve endings in the pulp.[10] This requires that the dentin must be exposed to the oral cavity. Erosion, attrition, abrasion and possibly

abfraction induce tubule exposure. Both laboratory and clinical evidence shows that the buccal cervical enamel is lost by a combination of abrasion and erosion.[30] Dental erosion is described as a loss of tooth substance by exogenous or endogenous acids without bacterial involvement.[31] The main sources are dietary acids in food and beverages like colas. However, it is observed that there is a high consumption of potentially erosive beverages such as soft drinks and yogurts, fruit juices, and mainly more processed products like traditional fruit juices and sports and energy beverages or low sugar acidic drinks among young people attributed to changes in eating habits, with increased intake of processed products. Some systemic conditions such as reflux or chronic acid regurgitation associated with gastrointestinal problems, long term use of anti-inflammatory analgesics and antipsychotic drugs is also an important source of dental erosion. Majority of dental professionals (71.5%) were positively responded to these causes as a collaborative factor for the systemic cause of dental erosion.

In addition to this, our survey also considered the possible triggers faced by the patients during dentin hypersensitivity. The response by the dental professionals indicated that dentin sensitivity may occur when patient consumes hot and cold food and during toothbrushing. It may also consider the fact that periodontal disease, gingival recession and scaling and root planing (phase 1 therapy) procedure act as an additive factor for the patients who may experience post-operative sensitivity from dental procedures.

The most common diagnostic tests were in keeping with previous studies namely a clinical examination, dental history and clinical sensitivity to cold water jet (air blast) used by dental professionals. There can be a variation on the main diagnostic tests used to assess dentin hypersensitivity. In this study, almost 75.4% of the dental professionals cited cold water jet when diagnosing dentin hypersensitivity. A recent review showed that clinicians generally depend on self-reporting of patients about DH complaint and they do not routinely perform differential diagnosis.[25] According to Canadian Advisory Board on Dentin Hypersensitivity, fractured restoration, marginal leakage, pulpitis, dental caries, periodontal disease, chipped teeth, bleaching sensitivity and cracked tooth syndrome should be ruled out when diagnosing dentin sensitivity.[2] The present study reported irreversible pulpitis and periodontal disease as the commonest conditions in differential diagnosis of DH.

Regarding the management, 76.5% of dental professionals in favor of nerve depolarization as the mode of action of treatment modality followed by tubule occlusion (5.3%%). This is in accordance with Ling et al who have mentioned the above two modalities for DH treatment, although tubule occlusive therapies have been frequently proposed because it is believed that sealing the dentinal surface diminishes the movement of fluids inside the tubule and hence is capable of reducing DH.[32] It appears also from the questionnaire that the majority of dentists favor a treatment modality with desensitizing agents (74.3%). These outcomes are reliable with those revealed by Schuurset al[33] who found in their study of 400 Dutch dental specialists, that 77% instructed the utilization of home-care methods like therapeutic toothpastes. Gillam et al[12] additionally revealed utilization of tooth paste as a prevalent decision by UK dental practitioners. Orchardson et al[14] and Jackson et al have supported the utilization of desensitizing dentifrice with strontium chloride and potassium nitrate for summed up affectability. However, in a systematic review by Karim and Gillam suggested that there is a lack of evidence stating categorically about the effectiveness of strontium or potassium salts in reducing DH.[34]

In addition to this, Resin composites and glass ionomer cements, as well as varnishes and dentinal adhesives work as fillings, sealing the entrances of the open dentinal tubules and blocking sensitivity by the formation of a sealing covering. In our study during the survey, 196 (69.7%) dental professionals recommend that toothpaste containing 5% concentrated glass toothpaste (calcium sodium phosphosilicate) as a best desensitizing agent while 20.6% dental professionals recommend 5% potassium nitrate toothpaste as a best desensitizing agent.

As for prevention strategies the results of the literature show that many dental professionals do not take into account the preventive aspects of DH, a study conducted by Ciaramicoli and al. showed the value of prevention because the efficacy of laser desensitization increased when etiological factors were removed.[35] Therefore, a treatment plan should take into account the etiological factors and include an identification and an elimination of predisposing etiological factors such as endogenous or exogenous acids and traumatic brushing. Indeed, nearly 72.9% of dental professionals in our survey opt for teaching the patient the correct brushing method, avoid use of toothpicks, decrease the consumption of acidic beverages and use of mouthguards and desensitizing agents before, during and after bleaching techniques as a preventive approach. Also, majority of dental professionals (72.9%) indicated that prevention of DH by maintaining the biologic width and minimal removal of cementum during periodontal therapy should be taken into account as a preventive measure.

Dentine hypersensitivity is regarded as an enigma because it commonly occurs yet is inadequately understood ant it is a significant and prevalent issue facing dental practitioners. Many aspects of dentine hypersensitivity are poorly understood by dental professionals and in particular the aetiology, diagnosis and management of the condition. Two conditions – gingival recession and erosive tooth wear – most commonly predispose a patient to suffer the symptoms of dentin hypersensitivity. Differential diagnosis is critically important, followed by a clinically appropriate management plan that also addresses any predisposing conditions. This study does have some limitations; and interpretation of its conclusions should take these into account. This study relied on questionnaire data rather than direct observation of clinical procedures.

The present study highlighted several differences from previous studies and it was apparent there is a need for additional education strategies to be practiced in everyday dental practice in particular a greater focus on the importance of the prevention in the management of DH as well as in the diagnosis and management of the condition. Furthermore, the dentist should recognize that there are other forms of chronic pain when considering a differential diagnosis as well as the need to have a monitoring strategy when managing DH.[2,20] In relation to initiating a management strategy, it is worth considering implementing a training program to enable dentists to provide a standardized reporting as used in the USA PEARL and National Practice Based-Research Network (PBRN) programs.[1,22,25]

Conclusion

The results of the present study would appear to suggest that in terms of knowledge and understanding of DH, there is still confusion concerning some aspects of the diagnosis and management of the condition. There is clearly a need for additional education strategies to be practiced in everyday dental practice, in particular a greater focus on the importance of prevention in the management of DH as well as in the diagnosis and management of the condition. Further, it is recommended that the professionals regularly proceed to continuous training in order to update their knowledge with new

scientific data on this subject. The investigations involving larger sample sizes should be conducted to support these findings, and to broaden our knowledge on this aspect.

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