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Moroccan dentist's perception and management of dentin hypersensitivity

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Abstract

Introduction: Dentinal sensitivity is a common problem in dental practice. This study aimed the assessment of dentists' perception of dentinal hypersensitivity (DH) distribution and its coalescence with factors such as sex, age, symptoms, and management strategies. **Materials and method:** A randomly selected sample of three hundred Moroccan private practice dentists (among 1339 dentists) took part in a questionnaire-based survey. This survey assesses dentin hypersensitivity according to dentists' perception, their level of knowledge, and their management strategy. **Results:** The perception of most of Casablanca`s private dentists on the prevalence, etiology and diagnosis of dentin hypersensitivity is mainly consistent with the existent scientific data. Most dentists (69.1%) prescribe a desensitizing gel and fluoride toothpaste as first line treatment.59% of practitioners used as a preventive attitude eliminating risk factors and predisposing factors. The Most encountered problem was the subjective aspect of dentinal hypersensitivity. **Conclusion:** The perception of Moroccan dentists of dentine hypersensitivity matches the current scientific consensus on the management of dentine hypersensitivity.

Keywords: management, dentine hypersensitivity, diagnosis, treatment.

INTRODUCTION

Dentin hyperestheasia (DH) is a frequent oral health problem that affects one or many teeth of a substantial number of individuals on a global basis [1]. This condition is generally observed during the realization of conservative care acts [2]. It is described as an exaggerated response of the exposed dentine to tactile, thermal, osmotic or chemical stimuli [3]. It is identified by a short sharp sensation, that can go from a simple discomfort to an extreme pain [4]. Its prevalence varies according to the population of the study and the methods of investigation [5]. Brânnstrom *et al*. [6] proposed the "hydrodynamic theory" as the mechanisme behind DH, however, its etiologies and diagnosis remain inconclusive [3, 7]. In fact; it has been reported that DH has multifactorial aetiology, and that the interaction between several factors including stimuli along with predisposing factors can possibly play a crucial role in generating dentine hypersensitivity. Usually, people with mild dentinal sensitivity tend to not necessarily look for professional advice or seek dental treatment as well [8, 9, 10, 11] but when they do, the difficulty at this point remains in the diversity of techniques and therapies that exist [3]. Several materials are used to reduce dentinal hyperesthesia: varnishes, restorative materials, dentin sealants [12] toothpastes and mouthwashes [13] but, despite this wide range of techniques and therapeutic alternatives, the professionals remain confused regarding the etiology and diagnosis [13, 14]. Moreover, most practitioners declare a certain lack of confidence when it comes to managing this condition efficiently [15]. Therefore, the need to explore dentine hypersensitivity's nature in selected samples of general practionners is real. This investigation would likely improve the comprehention of this problem amongst dental practitioners and as a consequence help patients improve their oral health [9]. Moreover, despite the wide research material on DH in the literature, randomized surveys on populations of dentists are scarce [16]. All these reasons have prompted us to conduct our study with the aim to assess the distribution of this condition and its correlation to sex, age, symptoms, predisposing factors, stimuli and management strategies in a population of private practice dentists in Casablanca, in order to help professionals with the management strategies of DH.

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MATERIALS AND METHOD

Our survey included the private practice dentists of Casablanca who practiced general and conservative dentistry. The National Council of Dentists (NCD) membership list was used to randomly select 300 among 1339 dental practionners who were requested to fill in an administered questionnaire. The size of the initial sample was 300 dentists, only 282 have completed the questionnaire. The other 12 questionnaires were incomplete and were consequently excluded from the study.

The questionnaire was designed in french by our team based on worldwide reports [17] regarding dentine hyperesthesia and its prevalence, predisposing factors, the main triggers, differential diagnosis, its mechanisme, patient management, dentist management strategies and dentists continuing education programs about DH.

Ethical approval was obtained from the commitee of thesis which stands for the ethical board in our institution. The authors declare that they have no conflict of interest.

The questionnaire included 30 questions divided into 6 sections: the identification of the dentist (age, sex, year of graduation, the origin of the diploma), Socio-economic characteristics of the patients in every practice, general information on DH according to dentists, the perception of dentists on the etiologies of DH, the methods of investigation and therapeutic management strategies of DH. (Annexe1)

A preliminary survey was conducted among twelve private practitioners to test the comprehension of the questionnaire and to calibrate the interviewers.

The questionnaires were collected by two investigators over a period of 3 months from January 2015 to May 2015. The collection of the questionnaires required between 20min in case of an immediate response to 1 month in case of a delayed response. The most encountered problems at this stage have been:

- The difficulty in developing a questionnaire that could identify this topic of management of dentin hyperesthesia;
- The difficulty in locating dental offices from the addresses in the NCD lists;
- Some of the dentists refused to answer the questionnaire, in this case we replaced them with the one that precedes or follows them in the list provided by NCD;

In order to analyze all the parameters of our survey, we have undertaken a procedure with a descriptive aspect by studying the distribution in numbers and rates of each variable, and in case of quantitative variable, we present the interval of variation, the mean and the standard deviation. Four types of parameters were used in this survey: variables related to the identification of the study population, variables related to socio-economic level of the patients, variables related to the evaluation of the perception of dentists' on DH and variables related to dentists' management attitude towards DH. Data were analyzed by Epi info 6 Software for Windows.

RESULTS

The size of the initial sample was 300 dentists representing 22.40% of the total number of dentists in Casablanca for the year 2015. Out of three hundred dentists 282 completed and returned the questionnaire. Participant's attitudes were diverse: some of them asked us to leave the questionnaire and come back afterwards to collect it.

Others preferred to fill it instantly, and then there are those who refused to fill it.

Identification of the population of the study

The results showed that 61.7% of the dentists of our sample are aged between 30 and 40 years.20% were aged between 40 and 50 years, and 16,7 % were aged under 30 years. Up to 57.1% were males and 42.9% were females.

Respondents were divided by the origine of the diploma. There were 89 % of the respondents who graduated from Moroccan universities while 11% graduated overseas.

Nearly 37.6% of the dentists practice in Casablanca between six and ten years

As a part of the evaluation of the study population we felt necessary to quantify the number of dentists subscribed to a scientific journal such as Doctinews or Medical Esperance the results showed that 86% of the dentists are not subscribed to any scientific revue (Table 1).

Table 1: The identification of the population of the study

	Respondents (n=282)	
	n	**%**
Age		
≤ 30	47	16,7
] 30,40]	174	61,7
] 40,50]	58	20,5
>50	3	1,1
Gender		
Female	121	42,9
Male	161	57,1
Years of practice		
[1,5]	68	24,2
] 5,10]	107	37,6
] 10,15]	65	23
] 15,20]	23	8,1
] 20,25]	16	5,5
≥30	3	1,2
Graduation country		
Morocco	251	89
Overseas	31	11
Subscribed dentists		
Yes	39	13,8
No	243	86,2

Dentists perception according to socio- demographic characterisctics of the patients

Table 2 describes the socio-demographic characteristics of patients with DH as perceived by dental practionners.

The mean age of patients consulting in dental practices is 35,24 (sd ±9,934).

As for the level of education of patients, most dentists (76,6%) perceived that the patients consulting in their private practice have a secondary level of education, while the majority (94%)of our dentists' considered that their patients have an average socio-economic level.

Table 2: Dentists' perception of the socio-demographic characteristics of the patients

Age range of patients	***Mean***	***sd***	***Variance***
≤20	18,23	±7,655	58,593
] 20,40]	35,24	±9,934	98,680
] 40,60]	30,25	±7,759	60,196
>60	16,14	±7,492	56,132
Level of education of patients	***n***	***%***	
Primary	4	1,4	
Secondary	216	76,6	
Superior	55	19,5	
Other	4	1,4	
Total	282	100	
Socio-economic level of patients			
low	5	1,8	
Average	265	94	
High	12	4,3	
Total	282	100	

The aspects of DH as perceived by dentists

Table 3 depicts the aspects of DH according to the perception of dentists from their everyday practice. In terms of prevalence 43.6% of dentists consider that DH occurs from 20 to 39% in their diagnosis, and 32.6% reported that DH occurs between 40% and 60% in their diagnosis.

In terms of frequency 41.5% of the dentists stated that the frequency of DH is constant (over the last ten years) and perceived as increasing for 39.4%of them.

Concerning predisposing factors, 87,6% of dentists didn't link DH to an acidic diet as a predisposing factor, 78,8% approved gingival recession, 88,3% denied the relation between DH and dental caries and likewise 94% of them stated that the use of non-Fluor toothpaste is not a predisposing factor for DH.

Among the possible triggers of DH, thermal stimuli were cited frequently (28,84%) as a trigger of dentine hypersensitivity followed by air (28,02%), touch (4,12%), and acid (3.02%), however 35,98% of the dentists considered that dentine hypersensitivity can be triggered by all the stimuli above.

Table 3: The aspects of DH as perceived by dentists

	n	***%***
Proportion of DH in patients		
≤20%	47	16,7
] 20,40]	123	43,6
] 40,60]	92	32,6
] 60,80]	19	6,7
>80	1	0,4
Total	282	100
Frequency of DH		
Increasing	111	39,4
Descreasing	53	18,8
Constant	117	41,5
Other	1	0,4
Total	282	100
Predisposing factors		
Acidic diet	n	%
Yes	35	12,4
No	247	87,6
Total	282	100
Gingival recession		
Yes	222	78, 8
No	60	21,3
Total	282	100
Dental caries		
Yes	33	11,7
No	249	88,3
Total	282	100
Use of non Fluor toothpaste		
Yes	17	6
No	265	94
Total	282	100

Triggers	N (YES)	%
Thermal (cold /hot)	105	28,84
Air	102	28,02
Acid	11	3,02
Touch	15	4,12
All above	131	35,98
Total	364	100

Characteristics of DH

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, 45.5% of dentists reported that patients experience pulsatile pain, whereas 25.47% describe DH as a weak and transitory sensation, and 24,21% described it as an intermittent pain (Figure1).

The perception of dentists on the distribution of DH is illustrated in figure 2. In sum, among the affected teeth with DH, premolars and incisors showed the biggest percentage with 30.84%and 30,32% respectively, followed by molars (23,39%) and canines (15,42%).

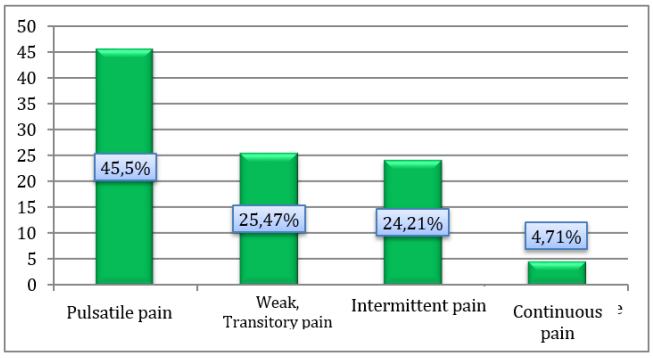

Figure 1: Characteristics of DH as perceived by dentists

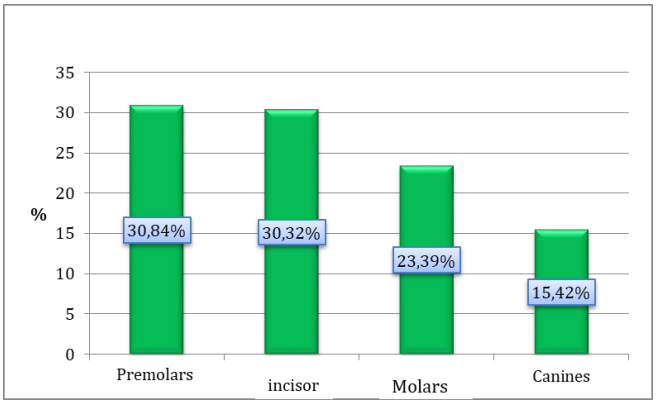

Figure 2: Dentist's perception on DH distribution

Dentists perception of the conditions of occurrence

According to our respondents, DH occurs most in patients with periodontal disease according to 26,36% of dentists and in patients with horizontal brushing technique according to 33,59% of dentists. Likewise, 51,32% of the dentists confirmed that DH is more common in patients with bad habits such as smoking and drinking, whereas 43,35% of the practitioners perceived it to be common in patients suffering from stress and anxiety. (Table4)

Table 4: Dentists 'perception of the conditions of occurrence of DH

Conditions of occurrence 1	n	%
Patients with periodontal disease	135	26,36
After a periodontal treatment	78	15,23
Patients with bruxism	127	24,80
Tooth brushing technique	172	33,59
Total	512	100
Conditions of occurrence 2		
Race	2	0,53
Patients with gastric disease	18	4,78
Stress	163	43,35
Bad habits: smoking /alcohol	193	51,32
Total	376	100

Differential diagnosis

For our respondents, differential diagnosis of DH was considered in case of noncarious cervical lesions for 39,76% of the dentists, and in case of cracked tooth syndrome for 25,59% of the dentists, for 19,88% of the respondents, post-operative sensitivity is considered a differential diagnosis of DH. (Table 5)

Table 5: Dentists' perception of differential diagnosis of DH

Differential diagnosis	n	%
Dental caries	75	14,76
Cracked tooth	130	25,59
Non carious lesions	202	39,76
Postoperative sensitivity	101	19,88
Total	508	100

Dentists' perception of the management strategies and preventive attitudes towards DH

The results showed that 64,78% of the dentists prescribe desensitizing toothpaste as a first intention to treat DH, followed by the application of Fluor varnishes (28,9%) and only 1(0,33%) practitioner uses laser as a first line treatment for DH. (Figure 3)

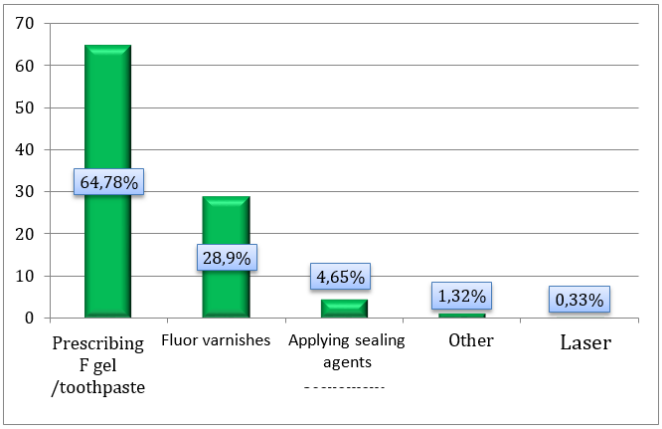

Figure 3: First line treatment according to dentists

In our sample, prevention management of dentine hypersensitivity includes an education of the patients to improve their tooth brushing skills for 34,26% of the practitioners, while 27.37% preconize minimizing the risk of dentine exposure either as a result of the removal of enamel, or the removal of cementum by educating them on oral hygiene.19,83% chose to apply Fluor varnishes and 18,52% preconized a diet education. (Table 6)

Table 6: Preventive strategies towards DH according to dentists

Preventive strategy	***N (yes)***	***%***
Patient education on oral hygiene	119	27,37
Advice on diet	113	18,52
Education of toothbrushing technique	209	34,26
Applying fluor varnishes	121	19,83
Total	610	100

Encountered problems in treating DH

The most encountered problem in DH management was according to the practitioners the subjective aspect of physiological response in patients with DH (31,44%). For 27,29 % the absence of a desensitizing toothpaste that could eliminate DH was one the problems in treating DH. However, for 21,44% of the practitioners the lack of a standardized approach in the management of DH was the most encountered problem. (Table 7)

T**able 7:** The most encountered problems in treating DH

Most encountered problems	***N(Yes)***	***%***
Absence of a standardized approach in treating DH	110	21,44
Subjective aspect of patients 'response	160	31,18
The variety of treatments	103	20,07
The absence of a desensitizing agent that could eliminate DH	140	27,29
Total	513	100

DISCUSSION

Before discussing the findings in detail, it is necessary to light up two essential points which can be used to correctly asses the quality of the results obtained in our study:

- The quantitative representativeness of the population.
- The reliability of the collected information.

In terms of representativeness, an exhaustive study would have been better. However, a rate of 22.40% of the total number of dentists, is considered sufficient from a statistical point of view to be able to extend the results to the entire target population. For the qualitative representativeness, according to the socio-demographic parameters, the sex, the age of the practitioner, and the origin of the diploma were adequately represented. The reliability of the information collected in our investigation depends on several factors such as the dentist's sincerity when responding to the questionnaire and the reliability of synthetic scales.

Dentin hypersensitivity has been defined as "brief, vivid pain that is experienced in exposed dentin, usually in response to thermal, tactile, osmotic or chemical stimuli or in the presence of air, and cannot be attributed to any other form of abnormality or dental disease" [13]. According to various studies [18, 19], the prevalence of DH varies from 8% to 57% in the general population, and treatment strategies are incredibly diverse.

The scientific evidence supporting these various treatments is also varied, so it may be difficult for the practitioner to choose the appropriate treatment [17].

Dental hyperesthesia should be seen as a set of symptoms more than a real lesion.

Dentin hyperesthesia is a painful syndrome that can lead the patient to neglect his oral hygiene, brushing can be a difficult mechanical stimulus to bear.

Consequently, the continuous presence of bacterial plaque aggravates the superficial demineralization of the dentin and the gingival recession that will uncover the cervical dentine and maintains this painful syndrome [20].

Thus, dentin hyperesthesia can be defined as "an acute pain of the exposed dentin responding to a stimulus and cannot be attributed to any other form of dental pathology" [3].

The aim of this study was to assess dentists' perception on the distribution of dentine hypersensitivity, its symptoms and management strategies. The findings showed that among the 282 dentists of our sample, 43.6% estimate that the proportion of cases with dentinal hyperesthesia in their diagnosis is between 20 and 40%, while 32.6% estimate it between 40% and 59%.

Knowing that the majority (89%) of these dentists have studied in Morocco, therefore we can assume that they had the exact same clinical and theoretical training, although only 13,8% of them are subscribed to a scientific review.

41, 5% of our respondents stated that the frequency of DH is constant, similar studies from 1964 to 2003 have shown that the prevalence of dentin hyperesthesia varies from 10% to 30% [21], similarly dentists were asked in a survey in the united kingdom (UK), about dentine hypersensitivity. They stated that nearly 25% of their patients had DH [22]. However; a study by Amarasena and al. showed lower prevalence rates [9]. In Greece, the prevalence is 18.2% according to a study conducted by Chrysanthakopoulos [21, 42], a study by Bahşi and al. showed a prevalence of 5.3% [10].

This wide disparity in prevalence rates can be due to several factors including the methodology used in screening for DH (clinical examination, questionnaire, etc.), variations in diets, the population sample, in general practice populations studies showed a rather lower prevalence rates [8, 23, 18] compared with the ones focused on specialized and hospital clinics, likewise investigations concerning patients' perception of DH instead of dentists' perception reported higher prevelance rates [9].

In our sample, dentists perception of DH increasing at 20–40 years and decreasing in elderly people is very much alike the findings of many other studies.This, decrease of DH in elderly can be explained by a weakening in neural sensations and the dentinal permeability related to dentine sclerosis and the obstruction of dentinal tubules due to natural aging process [16, 10].

Our dentist's perception of predisposing factors was in agreement with other dentist's perception worldwide, the majority (78,8 %)of dentists in our sample reported the exposure of the cervical area as a predisposing factor due to erosion, attrition, or recession.

In fact, two main processes intervene in the developpement of DH: dentin needs to become exposed ((esion localization), through either gingival rcession or the loss of enamel, and the permeability of dental tubules should be on both the oral cavity and the pulp (lesion initiation) [17]**.**

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 [24].

Dental erosion is described as a loss of tooth substance by exogenous or endogenous acids without bacterial involvement [27]. The main sources are dietary acids in food and beverages like colas [25, 26]. In this sense, it is observed that there is a high consumption of potentially erosive beverages such as soft drinks and yogurts, fruit juices plas soy, and mainly more processed products like traditional fruit juices and sports and energy beverages or low suger acidic drinks [28] among young people attributed to changes in eating habits, with increased intake of processed products however; in our study 12,4 % of the respondent said yes to acidic diet as a predisposing factor leading to DH, however, a study conducted in Brazil showed no association between dietary habits and occurrence of dental erosion, and consequently DH [29]**,** furthermore, another study in brazil showed that dentine hypersensitivity among children is usually associated with factors linked to erosion [31]. Dental erosion can be defined as a multifactorial condition that is affected by chemical, biological and behavioral factors. Progressive erosive loss may have esthetic and functional consequences, as well as hypersensitivity, therefore a restorative treatment often becomes necessary [25].

Dental hyperesthesia is triggered by a thermal stimulus for 28,84% of practitioners, while 28,02% think it is triggered by a jet of air, accordingly 35,98% of practitioners have testified that all previous stimuli may trigger dentin hyperesthesia.

A study conducted by Amarasena and al. showed that dentin hyperesthesia is triggered by cold, according to 80.1% of the practitioners [16].

The majority of practitioners participating in our survey described dentin hyperesthesia as a pulsatile pain, and 25,47% confirmed it its transitory character in agreement with many other studies [16, 43, 44].

Our study showed that the premolars 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, 43, 44].

According to our dentists' perception, DH occurs most in patients with the horizontal tooth brushing techniques and patients with bad habits such as smoking and drinking. however, a study carried out in australia among wine tasters showed no signs of DH [30]. Weareas only 4,78%of our dentists linked DH to patients with gastric disease which is one of the most important sources of dental erosion [46, 32].

The most considered differential diagnosis of DH according to our respondents was with noncarious cervical lesions (NCCLs). Generally, when these non-carious lesions are painless and does not affect esthetics, the patient does not complain. However, the location of the lesion becomes much easier to detect, when the pain is present. Whereas in DH no lesion is detected [45].

The results of our survey showed that most dentists prescribe fluoride gel and toothpaste as a first-line treatment. This proportion is lower than the one found in the study carried out in Australia by Amarasena *et al*. [16] where the most adopted strategy (90% of practitioners) was the elimination of risk factors and the prescription of desensitizing toothpastes.

On the other hand, a study conducted in Canada showed that only 50% of practitioners had attempted such a strategy [9].

In fact, the treatment of DH is either a hydrodynamic one focusing on desensitizing agents and dentifrices mainly containing fluorides that have the ability to seal or occlude the dental tubules through calcium fluoride crystal precipitation. Or it can be neural, by decreasing the activity of the dentinal sensory nerve [33]. DH traditionnal treatments include local application of desensitizing agents, either at home or by a professional [34]**.** Generally speaking an in-office application of the product might be limited to patients with severe dentinal hypersensitivity, while the prescription of an over the counter product such as toothpasts or mouthwashes might be more suitable for patients with mild to moderate DH [35].

Tubule sealants, tubule-occluding agents and protein precipitants can be classified as the most commonly used agents. Sodium fluoride gel (NaF), which belongs to the tubule-occluding agents family, is the most frequently used agent [34]**.** However E. Talioti and al. Showed in their systematic review that clinical data are limited to support the efficacity of OTC (over-the counter) desensitizing agents [40]. Likewise, another 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 [35].

28,9% of our respondents apply Fluor varnishes as a treatment for DH. Topically applied fluoride buffers the pH of the saliva and remineralises tooth structure. Like desensitizing agents, fluorides acts by blocking the dentinal tubules and preventing fluid movement backward and forward within the dentinal tubules in response to stimuli of pain. A study in irradiated head and neck cancer patients showed that a three-month fluoride varnish therapy is effective in decreasing radiation caries and sensitivity [37]. The application of fluoride varnishes has positive effects on preventing enamel erosion which reduces dentinal sencitivity [38]**.**

In our survey, only one practionner used laser therapy to reduce DH. In general, high output power laser systems such as neodymium: yttrium-aluminum garnet (Nd:YAG), erbium: yttrium-aluminum- garnet (Er:YAG), and carbon dioxide (CO_2) [33] can reduce or even eliminate dentinal pain due to their ability to occlude dentinal tubules [39].

GaAlAs laser showed a very high efficacity in improving immediately DH related pain, both alone and even better in combination with NaF gel [34].

As for prevention strategies the results of the literature show that many dental professionals do not take into account the preventive aspects of DH [40, 41], a study conducted by Ciaramicoli and al. showed the value of prevention because the efficacy of laser desensitization increased when etiological factors were removed [23].

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 34,26% of practitioners in our survey opt for teaching the patient the correct brushing method as a preventive approach. However, and 27,37% of the practitioners in our sample provide an oral hygiene education for their patients.

The commonest problems faced by dentists in our study in the management of dentinal hyperesthesia were: the subjective aspect of patient responses, more than 27,29% consider the absence of an agent capable of eliminating DH as the most common constraint, nearly an equal percentage is looking for a more standardized approach. Indeed, studies have shown that most dentists are uncertain of an appropriate management strategy for dentin hypersensitivity, these uncertainties were observed in a Canadian survey [18] where half of the practitioners considered a differential diagnosis, although dentin hypersensitivity is, by definition, a diagnosis of exclusion.

Half of the respondents indicated that they lack confidence in managing the pain caused by DH.

In addition, only half of the practionners indicated that they would seek to modify the patient's predisposition factors in order to control DH pain.

In sum the results of this study revealed that the perception of the majority of private practitioners in Casablanca on the etiology, prevalence, diagnosis and management strategies of DH, is in general congruent with the ongoing scientific guidelines in managing DH.

Most dental practionners appear to possess an adequately high knowledge about most issues involving dentin hypersensitivity,

When it comes to the management strategies of dentin hyperesthesia, many treatment methods have been proposed and the choice varies according to the clinical case. When a patient comes with symptoms that can be related to dentin hypersensitivity, performing a clinical examination is mandatory in order to rule out other probable causes, establish a diagnosis and start the treatment.

Depending on the cause identified, a combination of customized oral hygiene instructions, use of desensitizing agents and specialized treatment may be required to manage the condition.

Nevertheless, it is recommended that the professionals regularly proceed to continuous training in order to update their knowledge with new scientific data on this subject.

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