

Clinical evaluation of cervical dentin sensitivity (CDS) in patients attending general dental clinics (GDC) and periodontal specialty clinics (PSC)

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Abstract

Aim: The objective of this study was to compare the prevalence, severity and distribution of CDS in patients attending general dental clinics (GDC) and periodontal specialty clinics (PSC) and to correlate them to possible causal factors.

Material and Methods: 2 groups of patients aged 20–60 years recruited from GDC (144) and PSC (151) were evaluated for CDS by means of a questionnaire and intraoral clinical examinations. Furthermore, gingival recession and plaque scores were recorded at the same visit.

Results: The results showed that patients referred to PSC had a significantly higher prevalence of CDS (60.3%) than those examined at GDC (42.4%) ($p < 0.001$). Also, mean plaque scores of PSC patients (1.87 ± 0.88) was found to be significantly higher than that of GDC (1.44 ± 0.7) ($p < 0.01$). The occurrence and extent of gingival recession associated with hypersensitive teeth was significantly higher in PSC than GDC patients ($p < 0.01$), with a 5% incidence of severe recession (≥ 5 mm) in PSC only. The association of periodontal disease and periodontal treatment to the high prevalence of CDS and gingival recession in PSC patients would suggest their role in predisposition to hypersensitivity. The distribution of CDS in tooth types revealed that upper molars and lower anteriors of PSC patients were mainly affected, and followed by, to a lesser extent, lower right canine and right first molars of GDC patients.

Conclusion: The prevalence of CDS among our periodontal patients appears somewhat lower than that reported in periodontal specialty clinics of earlier studies but still higher than those reported in other dental populations. This indicates that periodontal disease and its treatments may increase the occurrence of hypersensitivity.

Key words: CDS; general dental clinics; periodontal specialty clinics; prevalence; etiology

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Dentin hypersensitivity or cervical dentin sensitivity (CDS) is often used to describe a painful condition in which exposed dentin is unduly sensitive to intraoral stimuli which might be thermal, evaporative, tactile, osmotic or chemical and cannot be explained by any other

dental defect or pathology (Holland et al. 1997). This condition is considered to be partly due to the presence of widely open dentinal tubules at the exposed dentin surface (Brannström 1986), with a multifactorial etiology, since dentin exposure can occur due to trauma, root

surface abrasion, gingival recession or various dental treatments (Dababneh et al. 1999).

Recent studies have examined the prevalence of CDS in patients attending dental hospitals (Flynn et al. 1985, Orchardson & Collins 1987, Chabanski et

al. 1996, Liu et al. 1998), general dental clinics (Gillam et al. 1996, Rees 2000) and periodontal specialty clinics (Gillam et al. 1995, Chabanski et al. 1997). Interestingly, the prevalence of CDS was found to be much higher in periodontal patients (72–98%) than other populations (3.8–57%) (Chabanski et al. 1997). The variation in the prevalence of CDS may be related to the population studied and methodology used.

In general, epidemiological studies on CDS are still scarce and only few studies have been reported on periodontal patients (Gillam et al. 1995, Chabanski et al. 1997). None of these studies tried to compare CDS in different patients. Therefore, the aims of this study were to establish the prevalence, distribution and severity of CDS in patients attending general dental clinics and periodontal specialty clinics and correlate them to possible causal factors such as tooth wear and gingival recession.

Material and Methods

The patients interviewed and examined in this study were from the "General Dental Clinics" used by the intern dentists and "Periodontal Specialty Clinics" of King Saud University, Dental College.

During the 6 months period of the study, patient inclusion criteria included:

1. verbal consent to participate in the study
2. age between 20–65 years
3. good general health.

The following formed exclusion criteria:

1. patients with orthodontic appliances
2. a history of any disease requiring drugs such as analgesics, tranquilizers or mood altering medications
3. teeth with crowns, enamel cracks, caries, restorations or needing root filling
4. abutment teeth for bridge or denture.

Patients from both general dental clinics (GDC) and periodontal specialty clinics (PSC) were informed about CDS, before being interviewed by the authors. Personal data (name, age, sex), oral hygiene habits and answers related to CDS including frequency, location, severity, avoidance of sensitive areas and treatment were recorded. The CDS was recorded present only when re-

ported by the patient and confirmed by positive response to air blast test within three seconds from the air syringe of the dental unit.

The teeth of all patients who had CDS were examined using a graded William's periodontal probe, dental mirror and explorer. Oral hygiene was measured by the plaque index of Silness & Løe (1964) and the presence of tooth wear was recorded (Everrett 1964). Also, the presence and extent of gingival recession was measured for sensitive teeth, at mid-buccal and mid-lingual sites using a William's periodontal probe, from cemento-enamel junction to the gingival margin. One average score per patient was calculated. The periodontal status of patients in terms of periodontal problem was not classified or recorded.

Statistical analysis

Descriptive statistics including means and standard deviations and frequency distribution were constructed using SPSS program. Differences between the mean plaque scores in both groups were analyzed using *t*-tests. Also χ^2 test was used to test the difference in CDS prevalence in both groups.

Results

A total of 295 patients ($M=80$, $F=215$) with an age range between 20–65 years were included in this study. They were 144 ($M=28$, $F=116$) subjects recruited from the general dental clinic (GDC) and 151 ($M=52$, $F=99$) subjects from periodontal specialty clinic (PSC) with mean ages of 33.3 ± 10.0 years and 37.36 ± 10.45 years respectively (Tables 1, 2).

The number and percentages of patients with CDS are shown in Table 1. Patients referred to PSC had a significantly higher CDS prevalence (60.3%) than those examined at GDC (42.4%) ($p < 0.001$).

The means and standard deviations of plaque scores in patients with CDS

in both GDC and PSC are presented in Table 2. Mean plaque scores of PSC patients were significantly higher than that of GDC ($p < 0.01$).

Clinical examination of patients in regard to etiology of CDS demonstrated that a non-significant higher proportion of patients had "tooth wear" in the GDC (23.4%) than those in PSC (14%).

The occurrence and extent of gingival recession associated with CDS in PSC patients was significantly higher than in GDC patients ($p < 0.01$) (Table 3). Only patients in PSC had gingival recession ≥ 5 mm which was about 5%.

In relation to severity of CDS, 33% of GDC patients claimed to have "no concern" with CDS compared to 23% of those in PSC patients. Higher proportion of GDC and PSC patients (61%) had "slight to moderate" concern whilst "severe concern" was less frequent (5.7% and 15.9%, respectively). Therefore only 11% to 12% of these patients avoided the area "most of the time" (Table 4).

Duration of CDS lasting for days accounted for about 24% in GDC and 28% in PSC patients. Approximately similar proportions of these patients claimed that CDS lasted 1–4 weeks or a year. About 25% of GDC patients versus 20% of those in PSC stated that this had lasted over a year (Table 4).

Approximately 39% of GDC patients and 32.2% of PSC patients stated that they had not received any treatment for the discomfort caused by CDS. Of those who received treatment, 22% in GDC and 23% in PSC claimed that they used fluoride-containing mouthwashes while 20% versus 28% of them used desensitizing toothpastes, mainly Sensodyne. A smaller proportion of patients in GDC (19%) and in PSC (17%) had received professional treatment for their CDS (Table 4).

The number of teeth with CDS per patient ranged from 1 to 10 for GDC and 1 to 17 for PSC. The mean number of hypersensitive teeth per patient in GDC (3.05 ± 2.23) was fewer than in

Table 1. Numbers (*n*) and % of patients with or without CDS in general dental (GDC) and periodontal specialty clinics (SPC)

Clinic	CDS present <i>n</i> (%)	CDS absent <i>n</i> (%)	Total <i>n</i> (%)
GDC	61 (42.4)	83 (57.6)	144 (100)
PSC	91 (60.3)*	60 (39.7)	151 (100)

* χ^2 - test ($p < 0.001$).

Table 2. The means (\bar{x}) and standard deviations (SD) of the age, number of sensitive teeth (n) and plaque scores (PII) of patients in general (GDC) and periodontal specialty clinics (PSC)

Patient with CDS	GDC $\bar{x} \pm SD$	PSC $\bar{x} \pm SD$
age (years)	33.32 \pm 10.03	37.36 \pm 10.45
no. teeth involved	3.05 \pm 2.23	4.05 \pm 3.05
plaque scores (PII)	1.44 \pm 0.70	1.87 \pm 0.88*

* *t*-test ($p < 0.01$).

Table 3. %s of patients with CDS and associated with tooth wear and various amount of gingival recession in general dental (GDC) and periodontal specialty clinic (PSC)

Clinic	Tooth wear* (%)	Gingival recession**		
		1-2 mm (%)	3-4 mm (%)	≥ 5 mm (%)
GDC	23.4	23.4	6.3	0.0
PSC	14.0	38.5	27.1	5.2

χ^2 -test (* $p > 0.05$, ** $p < 0.01$).

PSC (4.05 \pm 3.05). CDS was identified in all types of teeth except third molars as they were difficult to examine because of inaccessibility (Figs. 1, 2). There was no definite pattern of CDS in upper jaw teeth in GDC patients while there was a symmetrical pattern in the lower jaw, with higher frequency in the canines (Fig. 1). On the other hand, the relative frequency was higher in upper molars and lower anterior teeth of PSC patients (Fig. 2). However, smaller peaks were noted in the upper 1st molars and lower canines and left 1st molars of GDC patients.

Discussion

A review of the existing literature of international surveys would indicate large variations in the prevalence of CDS depending on the population studied and the methodology used (Dababneh et al. 1999). Studies in patients attending a specialist periodontology clinic indicated that CDS prevalence was higher than that reported in the general dental population (Chabanski et al. 1996, 1997). The results of these studies demonstrated a prevalence of CDS ranging between 72.5% and 98% of patients. The

Table 4. Responses to the questionnaire and intraoral examinations by general dental (GDC) and periodontal specialty clinics (PSC) patients

Responses	GDC (%)	PSC (%)
Severity of CDS:		
no concern	32.9	22.7
slight-moderate concern	61.4	61.4
severe concern	5.7	15.9
Avoidness of CDS:		
never	52.3	36.2
sometime	36.9	51.8
most of the time	10.8	12.0
Duration of CDS:		
1-6 days	23.7	28.4
1-4 weeks	27.1	21.6
1-12 months	23.7	29.7
> 1 year	25.4	20.3
Treatment of CDS:		
none	38.9	32.2
mouth washes	22.0	23.0
desensitizing toothpaste	20.3	28.1
professional	18.8	16.7

χ^2 -test ($p > 0.05$).

present study confirms those findings as the prevalence of CDS in the periodontal specialty population (60.3%) was significantly higher than that reported in general clinic population (42.4%). This latter finding from the general clinic is almost similar to those of (Gillam et al. 1996, 1999) and disagree with other re-

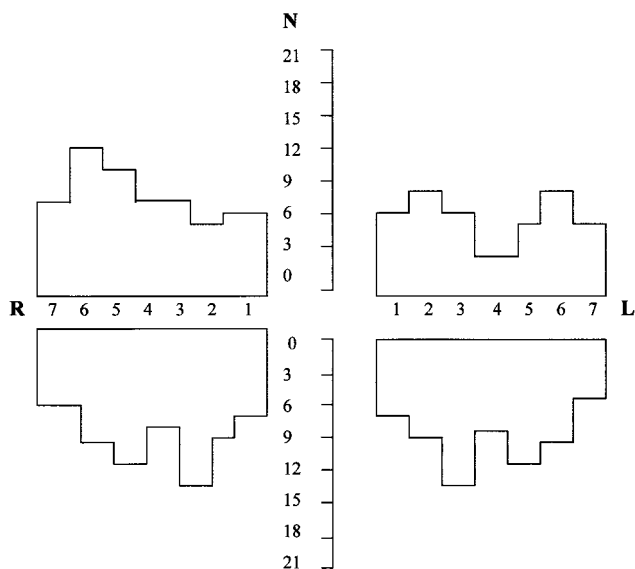


Fig. 1. The occurrence of CDS in individual tooth type for all patients of general dental clinic (GDC).

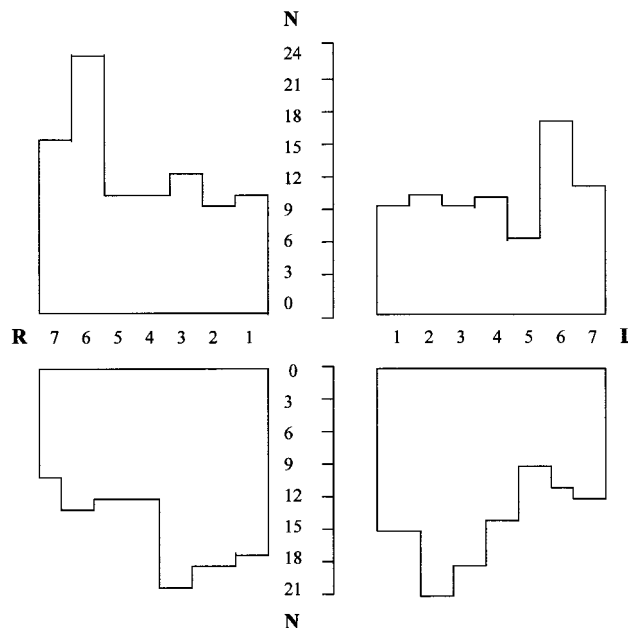


Fig. 2. The occurrence of CDS in individual tooth type for patients of periodontal specialty clinic (PSC).

sults (Flynn et al. 1985, Fischer et al. 1992, Irwin & Mc Cusker 1997).

The variations found in the results of these studies are generally due to procedural differences. For example, studies used subjective response of patients which is not reliable index because they tended to consider other forms of dental pain as CDS, or used air and probe stimuli which are not exact reproductions of daily life stimuli. Therefore, only patients who reported to have sensitive teeth and responded positively to air blast test were considered to have CDS in this study. It would seem prudent to complement any study using questionnaires with a thorough clinical examination in order to determine the true prevalence of this condition (Chabanski et al. 1997, Gillam et al. 1999).

The majority of patients in GDC and PSC perceived CDS as low grade pain with no or slight to moderate concern during drinking, eating or brushing and were able to complete most day-to-day activities without undue discomfort. Therefore, 3/4 of the patients in both clinics "never" or "sometimes" avoided the sensitive area. Only a small proportion of both GDC and PSC patients perceive CDS to be "a severe" problem with severe concern and avoided the area of hypersensitivity "most of the time". Regardless of percentages, those findings are generally consistent with overall pattern of severity and avoidance of CDS shown in other studies (Liu et al. 1998, Gillam et al. 1999).

About 1 in 4 patients claimed to use fluoride-containing mouthwashes or desensitizing toothpastes, a finding consistent with many other reports (Gillam et al. 1996, 1999), but higher than that reported by other authors (Liu et al. 1998). Approximately 17- 19% of the patients had sought professional help for their sensitivity, a finding lower than that of Fischer et al. (1992) and higher than what reported by Liu et al. (1998).

The prevalence and pattern of gingival recession in PSC patients was different from that in GDC patients. It has been reported that periodontal diseases, periodontal treatment, such as root planing or surgery, and over-vigorous toothbrushing can cause gingival recession (Watsan 1984, Chabanski et al. 1997). Many authors claimed that such recession may account for the high prevalence of CDS in periodontal patients (Fischer et al. 1992, Chabanski et al. 1997), as found in this study. Further-

more, it is not known if hypersensitivity in the periodontal patients is true CDS or due to some underlying pathological process such as bacterial penetration into the dentinal tubules during the disease process (Adriaens et al. 1988).

The intraoral distribution of hypersensitive teeth in GDC patients was lower than that of PSC patients. These findings are consistent with other findings (Orchardson & Collins 1987, Chabanski et al. 1997). The occurrence of CDS in individual teeth as related to their relative frequency in different tooth types was not definite. Smaller peaks were found at upper first molar and lower anterior teeth of PSC patients, which partially agree with the findings of other studies (Addy et al. 1987, Chabanski et al. 1997).

Zusammenfassung

Klinische Überprüfung der zervikalen Dentinsensitivität (CDS) bei Patienten in allgemein zahnärztlichen Kliniken (GDC) und parodontalen Spezialkliniken

Ziel: Das Ziel dieser Studie war der Vergleich der Prävalenz, der Schwere und der Verteilung von CDS bei Patienten, die allgemein zahnärztliche Kliniken (GDC) und parodontologische Spezialkliniken (PSC) besuchten sowie die Korrelation zu möglichen ursächlichen Faktoren.

Material und Methoden: 2 Gruppen von Patienten im Alter von 20 bis 60 Jahren von GDC (144) und PCS (151) wurden gebildet und hinsichtlich CDS evaluiert unter Nutzung eines Fragebogens und einer intraoralen Befundung. Weiterhin wurden die gingivalen Rezessionen und die Plaquescores bei der gleichen Visite aufgezeichnet.

Ergebnisse: Die Ergebnisse zeigen, dass Patienten, die zu PSC überwiesen wurden, eine signifikant höhere Prävalenz von CDS (60.3%) hatten als solche, die in GDC überprüft wurden (42.4%) ($p < 0.001$). Weiterhin waren die mittleren Plaquescores bei PSC Patienten signifikant höher (1.87 ± 0.88) als bei den GDC Patienten (1.44 ± 0.7) ($p < 0.01$). Das Vorkommen und die Ausdehnung der gingivalen Rezession, die mit überempfindlichen Zähnen verbunden waren, was signifikant höher in PSC als bei GDC Patienten ($p < 0.01$), mit einer 5%igen Inzidenz der schweren Rezession (≥ 5 mm) bei PSC allen. Die Verbindung der parodontalen Erkrankung und der parodontalen Therapie zu der hohen Prävalenz von CDS und zu gingivalen Rezessionen bei PSC Patienten könnte ihre Rolle bei der Prädisposition für Überempfindlichkeiten vermuten lassen. Die Verteilung von CDS auf Zahntypen zeigte, dass obere Molaren und untere Schneidezähne von PSC Patienten mehr betroffen waren und dem folgenden zu einem geringeren Ausmaß die unteren Eckzähne und rechten ersten Molaren der GDC Patienten.

Schlussfolgerung: Die Prävalenz von CDS unter unseren parodontalen Patienten scheint etwas geringer zu sein als die berichteten von parodontalen Spezialkliniken von früheren Studien, aber noch höher als diejenigen von anderen zahnärztlichen Populationen. Dies zeigt, dass die parodontale Erkrankung und ihre Behandlungen möglicherweise das Vorkommen der Überempfindlichkeit vergrößern.

Résumé

Evaluation clinique de la sensibilité dentinaire au collet (CDS) chez des patients de cabinets de dentisterie générale (GDC) et de cabinets spécialisés en parodontie

But: Le but de cette étude était de comparer la prévalence, la sévérité et la distribution de patients souffrant de CDS et consultant en cabinets de dentisterie générale ou spécialisés en parodontie et de corréler cela avec de possibles facteurs étiologiques.

Matériaux et méthodes: On rechercha des CDS dans 2 groupes de patients, âgés de 20 à 60 ans recrutés dans des cabinets de dentisterie générale (144) ou spécialisé en parodontie (151), au moyen d'un questionnaire et d'un examen clinique. De plus, les récessions gingivales et les scores de plaque enregistrés lors de la même visite.

Résultats: Les résultats montraient que la prévalence de CDS était plus grande chez les patients recrutés dans les PSC (60.3%) par rapport aux patients recrutés dans les GDC (42.4%) ($p < 0.01$). De même les scores de plaque moyen des patients PSC (1.87 ± 0.88) étaient significativement plus importants que ceux des patients recrutés dans les GDC (1.44 ± 0.7) ($p < 0.01$). La présence et l'étendue des récessions gingivales associées avec une dent hypersensible étaient significativement plus importantes chez les patients recrutés dans les PSC que chez les patients recrutés dans les GDC ($p < 0.01$) avec une incidence de 5% des rdécessions sévères (> 5 mm) seulement chez les patients recrutés dans les PSC. L'association entre le maladie parodontale et le traitement parodontal avec la forte prévalence de CDS et de récessions gingivales chez les patients recrutés dans les PSC indiquerait un possible rôle dans la prédisposition à l'hypersensibilité. La distribution des CDS selon le type de dent montre que l'affection touche principalement les molaires supérieures et les dents antérieures mandibulaires des patients recrutés dans les PSC, suivi, mais dans une moindre mesure, par les canines inférieures droites et les premières molaires droites des patients recrutés dans les GDC.

Conclusions: La prévalence des CDS parmi nos patients atteints de parodontite apparaît quelque peu inférieure à celle rapportée dans les cabinets spécialisés en parodontie.

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