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Dentinska preosjetljivost prije parodontne terapije i nakon nje

Dentin Hypersensitivity Before and After Periodontal Treatment

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Svrha: Želio se procijeniti intenzitet dentinske preosjetljivosti prije postupaka supragingivne i subgingivne instrumentacije i nakon njih. **Materijal i metode:** Bio je odabran prikladan uzorak od 200 ispitanika obaju spolova u dobi od 18 do 71 godine, a dijagnosticiran im je bio marginalni gingivitis, gingivna recesija i umjeren i/ili izrazit kronični parodontitis. Preosjetljivost je ustanovljena kliničkim pregledom te izmjerena mehanički provlačenjem sonde preko izloženog dentina i toplinskim podražajima – mlazom zraka iz pustera na osjetljivim područjima. **Rezultati:** Otkriveno je nekoliko vrsta preosjetljivosti kod istog pojedinca, a najčešća je bila preosjetljivost dentina u području korijena zuba. Najviše ispitanika bolovalo je od kroničnog parodontitisa, najčešće su imali više od pet preosjetljivih zuba, a povećana preosjetljivost bila je zabilježena nakon supragingivne i subgingivne instrumentacije. Sekundarni čimbenici koji su pojačavali osjetljivost i sve varijable vezane uz preosjetljivost, statistički su značajni ($p<0,05$). **Zaključak:** Preosjetljivost je česta kod pacijenata s parodontnom bolešću, a izraženija je nakon inicijalne parodontne terapije te kada je udružena s ostalim lokalnim čimbenicima.

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Uvod

Dentinska preosjetljivost stanje je koje se često javlja na zubnom vratu ili korijenu ili na objema razinama, a uzrokuje ju izloženost dentina i cementa. U toj preosjetljivosti općenito sudjeluje više čimbenika. U opisivanju toga stanja koristimo se s različitim nazivima, a najčešći su: dentinska preosjetljivost, cervikalna preosjetljivost, dentinska hiperestezija i – u slučajevima parodontne etiologije te pojave – osjetljiv ili preosjetljiv korijen (1, 2).

Etiologija preosjetljivosti zuba i/ili zubnih korjenova vezana je za višestruke odrednice i predisponirajuće čimbenike. Češće se javlja kod zuba bez cervikalnih karijesnih lezija, onih s gubitkom dentina (erozija, abrazija, abfrakcija, atricija) i bez gubitka tvrdoga zubnog tkiva uzrokovanog izloženošću površine korijena. Ta izvrgnutost može potjecati iz vlastite etiologije (gingivne recesije) ili može nastati zbog razvoja parodontitisa, ali se također javlja nakon parodontne obrade – kirurške ili konvencionalne, što često potiče preosjetljivost na vratu ili korijenu zuba. Među ostalim razlozima nalaze se ingestije kisele hrane i napitaka, traumatske tehnike četkanja, malokluzija, parafunkcijske navike, neodgovarajuće stomatološke proteze i manjak zuba antagonista, odnosno protetičkoga rada koji bi ga nadomjestio. Pregledom literature, kako bi se odredila moguća etiologija, uočeno je koliko je važno uzeti preciznu anamnezu, nakon čega slijedi detaljan klinički pregled (3-12).

Introduction

Dentin hypersensitivity has been described as a common condition at the cervical or radicular level, or both, owing to exposure of the dentin and cementum, and is generally recognized to be of multifactorial etiology. Several terms are used to refer to the condition, the main ones being dentin hypersensitivity, cervical hypersensitivity, dentin hyperesthesia and, in cases of periodontal origin, sensitive or hypertensive root (1,2).

The etiology of hypersensitive teeth and/or roots is associated with multiple determinants and predisposing factors. It is usually present in teeth with noncarious cervical lesions, with loss of dentin (erosion, abrasion, abfraction, attrition), and with no loss of substance caused by exposure of the root. This exposure may have its own cause (gingival recession) or be due to the development of periodontitis, but it also occurs after periodontal treatment, whether surgical or nonsurgical, usually leading to sensitivity at the cervical or radicular level. Other major causes are the ingestion of acidic food and drinks, traumatic brushing, malocclusion, parafunctional habit, unsuitable dental prosthesis, and the tooth adjacent to edentulous area with or without prosthetic restoration. With regard to determination of the probable etiology, the literature consulted draws attention to the importance of a judicious anamnesis, followed by a thorough clinical examination (3-12).

Kod primjene poticaja (taktilnih, osmotskih i termičkih) uobičajena je bol na zahvaćenim zubima koja se subjektivno manifestira u pacijentovim pritužbama već tijekom pregleda ili kada stomatolog primjenjuje te poticaje. U vezi s tim fenomenom u literaturi se navodi nekoliko teorija o tumačenju mehanizama djelovanja iz kojih proizlazi intenzivna bol, a najčešće je u nerazmjeru s primljenim podražajima. Uglavnom je prihvaćena Brannströnova hidrodinamička teorija (13) koja ističe kretanje intratubularne tekućine prema pulpi ili u suprotnom smjeru – ovisno o prirodi podražaja, pa nastaju distorzije u mehanoreceptorima, što stimulira senzoričke živce u subodontoblastnom spletu (14, 15). Termički i mehanički podražaji, dakle mlaz zraka i povlačenje sonde po izloženom dentinu, smatraju se učinkovitima u mjerenju intenziteta preosjetljivosti (12, 16, 17).

Čini se da se preosjetljivost kod parodontne bolesti, ali i ona nakon supragingivne i subgingivne instrumentacije, pojačava nakon liječenja, a javlja se čak i tada kada je na početku nije bilo zbog uklanjanja dentina i zubnog cementa zajedno s kamencem. Preosjetljivost može s vremenom prestati ili trajati, pojačati se ili odmah nastupiti punim intenzitetom, u trajanju od pet do 60 dana nakon liječenja (1, 18-27).

Svrha je ovog rada identificirati preosjetljive zube i/ili korijene na razini zubnog vrata ili korijena, ili oboje kod pacijenata s parodontnom bolešću i to prije osnovnih terapija supragingivnom i subgingivnom instrumentacijom te nakon njih, a izdvojiti ostale čimbenike preosjetljivosti.

Materijal i metode

Početni se uzorak sastojao od 350 odraslih osoba obaju spolova, upisanih godine 2008. u program liječenja u Klinici za parodontologiju Stomatološkog fakulteta u gradu Pernambucu u Brazilu. Kako bi im se postavila dijagnoza i odredila terapija, svi su bili podvrgnuti parodontnom pregledu koji su obavili studenti pod izravnim nadzorom nastavnog osoblja. Nakon toga svima su postavljene dijagnoze te su poslani ispitivačima koji su im objasnili svrhu istraživanja i njezinu važnost u kontekstu liječenja. Nakon što su potvrdili kako shvaćaju svrhu ispitivanja te pristali sudjelovati, potpisali su obrazac o slobodnom i obaviještenom pristanku u skladu s odlukom 196/96. brazilskoga Ministarstva zdravstva. Istraživački je rad odobrilo Povjerenstvo za etiku Sveučilišta u Pernambucu prema protokolu 143/06. Ispitivači su sudionike pitali jesu li imali jedan ili više preosjetljivih zuba, imaju li gubitak zuba, je li im postavljen kakav protetički rad te o oralno-higijenskim i prehrambenim navikama. Oni koji su potvrdno odgovorili odabrani su za oralni pregled radi identifikacije i bilježenja vrste i broja preosjetljivih zuba te sekundarnih čimbenika uključenih u obrazac preosjetljivosti. Isključeni su svi oni bez tvrdoga zubnog tkiva izgubljenog zbog erozije, abrazije te atricije i abrakcije, oni sa zubima prekrivenima kamencem, s ispunima i/ili krunicama s vidljivim pukotinama, lezijama s pulpnim uključenjem, svim umnjacima

Normally, the affected teeth present pain to the stimuli (tactile, osmotic and thermal), subjectively manifested through the patients' complaints or during the examination by the professional using these stimuli. In the literature dealing with this phenomenon, there are several theories to explain its mechanism of action, which produces intense pain, for the most part disproportionate to the stimulus received. The most widely accepted theory is that of Brannström (13), known as the "Theory of Hydrodynamics", represented by the movement of intratubular fluid towards the pulp or in the opposite direction, depending on the nature of the stimulus, causing distortions in the mechanoreceptors, which leads to stimulation of the sensory nerve in the subodontoblastic plexus (14,15). The thermal (air jet) and mechanical (dragging the probe over the exposed dentin) stimuli are considered effective in measuring the intensity of the hypersensitivity (12,16,17).

Hypersensitivity related to periodontal disease and after treatment, in particular supragingival and subgingival instrumentation, tends to an increase in intensity after treatment, and even when initially absent, arises due to the removal of dentin and cementum with the calculus. The hypersensitivity may gradually subside or persist, even becoming more intense, and may be immediate, lasting from 5 to 60 days after the treatment procedures (1,18-27).

This study set out to identify the presence of hypersensitive teeth and/or roots at the cervical and radicular levels, or both, in patients with periodontal disease before and after basic treatment with supragingival and subgingival instrumentation, and also to identify other factors associated with hypersensitivity.

Materials and Methods

The initial sample consisted of 350 adult patients of both genders, enrolled for treatment in the Periodontics Clinic, Faculty of Dentistry of Pernambuco - FOP / UPE, in 2008. To determine the diagnosis and treatment needs, all patients underwent a periodontal examination conducted by students under the guidance and direct supervision of the teaching staff. When the diagnoses were completed, the patients were referred to the researchers, who explained to them the purpose of the study and its importance in the context of treatment. After confirming their understanding and agreement to participate, the patients signed the Free Informed Consent document, in accordance with resolution 196/96 of the Brazilian Ministry of Health. The research study was approved by the Ethics in Research Committee of the University of Pernambuco - UPE, protocol 143/06. The subjects were then asked by the duly calibrated researchers whether they had one or more teeth with hypersensitivity, any lost teeth or prosthetic restoration, and also about their oral and eating habits. Patients who responded affirmatively were selected for the oral examination in order to identify and record the types and number of sensitive teeth, as well as the types of secondary factors involved in the pattern of hypersensitivity. Patients who had teeth with dentin structure removed by erosion, abrasion, attrition and abfraction, teeth completely

te oni koji su bili podvrgnuti bilo kakvoj parodontnoj obradi, pušači i bivši pušači, kronični bolesnici i pacijenti na sustavnim lijekovima. Na kraju je dobiven uzorak od 200 sudionika obaju spolova u dobi od 18 do 71 godine.

Osmislili smo i dnevnik za praćenje intenziteta inicijalne preosjetljivosti prema danu i vremenu parodontne terapije koju je na dan primalo po deset pacijenata. Na početku je bio primijenjen i mehanički podražaj pomoću sonde na mjestima preosjetljivosti, a zatim je slijedilo dvominutno termičko podraživanje mlazom zraka iz pustera te bilježenje pojave jednog ili dvaju podražaja (28) (Tablica 1.). Jedan je ispitivač obavljao testove, a pomoćnik je zapisivao rezultate. Treba istaknuti da je radno područje bilo osušeno i zaštićeno staničevinom prije početka testiranja. S obzirom na vrstu preosjetljivosti u ispitnoj populaciji, podijelili smo je na cervikalnu, ako nije bilo izloženosti cementno-caklinskog spojišta te korijensku kod izloženosti CCS-a s ogoljelom površinom korijena.

covered with dental calculus, teeth with restorations and/or prosthetic crowns with a major visible gap, teeth with pulpal involvement, all third molars, patients who had undergone some type of periodontal treatment, smokers and former smokers, those with systemic disease and those who were on any systemic medication were excluded from the study. At the end of this process we obtained a convenience sample of 200 patients of both sexes aged 18-71 years.

A timeline was devised to measure the intensity of initial hypersensitivity according to the day and time of periodontal attendance, ten patients being examined per day. First, the mechanical stimulus was applied with a probe at the sites of hypersensitivity, followed two minutes later by the thermal stimulus using the air jet of the triple syringe, recording the presence of one or both stimuli (28) (Table 1). The tests were applied by a single researcher, assisted by a recorder, both overseen by the research coordinator. It should be emphasized that, prior to the application of the stimuli, the

Tablica 1. Procjena dentinske preosjetljivosti prema Uchidi i sur.[28]
Table 1 Evaluation of dentin hypersensitivity according to Uchida et al.[28].

Razina • Level	Vrsta Preosjetljivosti • Type of sensitivity
0	Bez značajne neudobnosti (bez boli nakon podražaja) • Without significant discomfort (no pain after the stimulus)
1	Umjerena neudobnost (umjerena bol nakon podražaja) • Mild discomfort (mild pain after stimulation)
2	Izrazita neudobnost (oštra bol tijekom primjene podražaja) • Severe discomfort (sharp pain during application of stimulus)
3	Izrazita neudobnost (akutna bol tijekom primjene podražaja i nakon nje u trajanju duljem od 10 sekundi) • Severe discomfort (acute pain during and after application of the stimulus for more than 10 seconds)

Primjena termičkih i mehaničkih podražaja ponavljala se 30 dana nakon osnovnog liječenja (supragingivna i subgingivna instrumentacija), kako bi se odredila konačna ocjena preosjetljivosti. Bila je obavljena prema istom metodološkom redoslijedu kao i kod početnih mjerenja.

Analiza je obavljena pomoću postotka i statističkih mjerenja (aritmetička sredina, medijan, standardna devijacija, koeficijent varijacije te minimalna i maksimalna vrijednost) zatim hi-kvadrat testa, ili Fisherova testa ako uvjeti nisu dopuštali primjenu hi-kvadrata. Služili smo se i izračunom stope vjerojatnosti ako nije bilo moguće primijeniti Fisherov test. Koristili smo se i parnim testom t-student i F-om (ANOVA) s parnim usporedbama prema Tukeyu. Razina značajnosti u provedbi statističkih testova iznosila je pet posto.

work areas were dried with gases and protected with cotton. Regarding the type of hypersensitivity in the sample, it was considered to be cervical when there was no exposure of the cementoenamel junction and radicular when there was exposure of the cementoenamel junction with a denuded root surface.

The reapplication of the thermal and mechanical stimuli was conducted 30 days after the basic treatment (supragingival and subgingival instrumentation), in order to obtain the final grade of hypersensitivity. This reapplication followed the same methodological sequence as the initial measurement.

The analysis was performed using percentage and statistical measurements (mean, median, standard deviation, coefficient of variation, minimum and maximum value) and the chi-square test or Fisher's Exact test, when the conditions for using the chi-square did not apply, or the Likelihood Ratio when it was not possible to use the Fisher Exact test, as well as the paired t-Student and F (ANOVA) with Tukey's paired comparisons. The level of significance used for the statistical tests was 5.0%.

Rezultati

Ispitanici su bili u dobi od 18 do 71 godine, s aritmetičkom sredinom od 43,28, medijanom od 44 godine, SD-om 13,16 i koeficijentom varijacije od 30,41 posto. Više od 50 posto bile su žene (58,5%) i od toga broja njih 60 posto imalo je preosjetljivost korijenskog tipa, a u 89,5 posto slučajeva

Results

The patients' ages ranged from 18 to 71 years, with a mean of 43.28 years, median 44.00 years, SD 13.16 and a coefficient of variation of 30.41%. More than half the patients (58.5%) were female, 60.0% had hypersensitivity of the radicular type, and in 89.5% secondary factors were

Tablica 2. Procjena intenziteta boli kod početne i konačne mehaničke stimulacije
Table 2 Assessment of the intensity of initial and final mechanical stimulation

Ocjena prije struganja • Grade before scaling	Intenzitet poslije struganja • Intensity after scaling								Ukupno • Total		Vrijednost p • Value of p
	0		1		2		3				
	N	%	n	%	n	%	N	%	n	%	
0	9	4.5	26	13.0	3	1.5	-	-	38	19.0	**
1	-	-	73	36.5	47	23.5	3	1.5	123	61.5	
2	-	-	1	0.5	18	9.0	20	10.0	39	19.5	
Ukupno • Total	9	4.5	100	50.0	68	34.0	23	11.5	200	100.0	

(**): Nije određena zbog razlike u broju kategorija • Not determined due to the difference in the number of categories

Tablica 3. Procjena intenziteta početne i konačne termičke stimulacije
Table 3 Assessment of the intensity of initial and final thermal stimulation

Ocjena prije struganja • Grade before scaling							Ukupno • Total		Vrijednost p • Value of p
	1		2		3				
	N	%	n	%	N	%	n	%	
0	2	1.0	64	32.0	30	15.0	96	48.0	p (1) < 0.001*
1	-	-	20	10.0	60	30.0	80	40.0	
2	-	-	-	-	24	12.0	24	12.0	
Ukupno • Total	2	1.0	84	42.0	114	57.0	200	100.0	

(*): Značajna razlika kod 0,05 • Significant difference at 0.05
(1): Primjena McNemarova testa • Using the McNemar test

identificirani su bili sekundarni čimbenici poput traumatske tehnike četkanja, retencijske kvačice parcijalnoga mobilnog protetičkog rada, zubi-nosači kojima je na suprotnoj strani bio bezubi greben, unos kisele i korozivne hrane i napitaka te recentno postavljene stomatološke restoracije.

Ispitanici su uglavnom imali preosjetljive donje zube (29,5%), većina je patila od kroničnog parodontitisa (55,5%), a najčešći sekundarni čimbenik bila je retencijska kvačica mobilnoga protetičkog rada (23,5%). Više od pet zuba s dentinskom preosjetljivošću zabilježeno je kod 52 posto pregledanih.

S obzirom na mehaničku stimulaciju, većina sudionika s preosjetljivim zubima (61,5%) imala je ocjenu jedan prije struganja i samo je polovica klasificirana nakon toga postupka (Tablica 2.). Kod termičke stimulacije nitko nije osjetio bol (ocjena 0) prije supragingivne i subgingivne instrumentacije, a najviše (48%) ih je imalo ocjenu jedan (Tablica 3.). Više od 50 posto ispitanika (57%) dobilo je ocjenu tri nakon supragingivne i subgingivne instrumentacije.

U Tablici 4. predstavljena je distribucija vrsta preosjetljivosti prema spolu, te se može zaključiti da je najviše ispitanika sa cervikalnom preosjetljivošću (65,9%) bilo u dobi od 18 do 29 godina; od prve do treće dobne skupine korijenska se vrsta preosjetljivosti povećavala od 34,1 posto do 70 posto; u dvije najstarije dobne skupine iznosila je od 67,4 posto do 75 posto, a kod sudionika s objema vrstama preosjetljivosti u dobnoj skupini od 50 do 59 godina bila je 32,6 posto. Kod svih tih razlika stopa značajne povezanosti je niska (p<0,05). Postotak ispitanika s preosjetljivošću vrata zuba bio je veći kod pacijentica nego kod pacijenata (31,6 prema 8,4 posto), a obrnuto je zabilježeno kod ispitanika s objema vrstama preosjetljivosti koje su se češće pojavljivale kod muškaraca negoli kod žena (27,7 prema 11,1 posto za cervikalni

identified, such as traumatic brushing, removable partial denture (RPD) clasps, abutment teeth with edentulous ridges, intake of acidic and corrosive food and drinks, and recent dental restorations.

The highest percentage of patients had sensitive lower teeth (29.5%); the majority (55.5%) had chronic periodontitis; the secondary factor with the highest percentage (23.5%) was teeth with RPD clasps; and 52.0% of those examined had more than five teeth with dentin hypersensitivity.

With regard to mechanical stimulation, the majority of patients with hypersensitive teeth (61.5%) had grade 1 prior to scraping and only half were thus classified following this procedure (Table 2). In the thermal stimulation, no patients had pain (grade 0) prior to supragingival and subgingival instrumentation, the highest percentage (48%) being grade 1 (Table 3). After supragingival and subgingival instrumentation more than half (57.0%) were grade 3.

The type of hypersensitivity according to age and gender is shown in Table 4, revealing the following findings: the percentage of patients with cervical hypersensitivity was very high (65.9%) in patients aged 18-29 years; the percentage of those with radicular hypersensitivity increased from 34.1% to 70.0% from the first age group to the third, and ranged from 67.4% to 75.0% in the two oldest age groups; the percentage of patients with both types of hypersensitivity was 32.6% among the 50 to 59-year-olds. All these differences show a significant association (p <0.05). The percentage of patients with cervical hypersensitivity was higher among females than males (31.6% vs. 8.4%), while the reverse was true for those with both types of hypersensitivity, which was higher among male patients (27.7% vs. 11.1% and 63.9% vs. 57.3%, respectively, for the cervical and radicular types), and the association was significant (p <0.05).

Tablica 4. Procjena vrste preosjetljivosti prema dobu i spolu
Table 4 Assessment of type of hypersensitivity according to age and gender

varijabla • Variable	Vrste preosjetljivosti • Type of hypersensitivity						Ukupno skupina • Total Group		vrijednost p • Value of p
	cervikalna • Cervical		korijenska • Radicular		Obje • Both				
	N	%	N	%	n	%	n	%	
dobna skupina • Age group									
18-29	27	65.9	14	34.1	-	-	41	100.0	p(1) < 0.001*
30-39	14	35.9	22	56.4	3	7.7	39	100.0	
40-49	3	6.0	35	70.0	12	24.0	50	100.0	
50-59	-	-	31	67.4	15	32.6	46	100.0	
60 or more	-	-	18	75.0	6	25.0	24	100.0	
spol • Gender									
muškarci • Male	7	8.4	53	63.9	23	27.7	83	100.0	p(1) < 0.001*
žene • Female	37	31.6	67	57.3	13	11.1	117	100.0	
Ukupno • Total	44	22.0	120	60.0	36	18.0	200	100.0	

(*): značajna razlika kod 0,05 • Significant difference at 0.05
(1): primjena hi-kvadrat testa • Using the chi-square test

Tablica 5. Procjena intenziteta mehaničkog i termičkog podražaja kod početnih i konačnih procjena prema tipu preosjetljivosti
Table 5 Assessment of the intensity of mechanical and thermal stimuli at the initial and final assessments according to the type of hypersensitivity

varijabla • Variable	Vrste preosjetljivosti • Type of hypersensitivity						ukupno skupina • Total Group		vrijednost p • Value of p
	cervikalna • Cervical		korijenska • Radicular		obje • Both				
	N	%	N	%	n	%	N	%	
Intenzitet mehaničkog podražaja • Grade of initial mechanical stimulus									
0	22	50.0	15	12.5	1	2.8	38	19.0	p(1) < 0.001*
1	21	47.7	82	68.3	20	55.6	123	61.5	
2	1	2.3	23	19.2	15	41.7	39	19.5	
Intenzitet mehaničkog podražaja • Grade of final mechanical stimulus									
0	8	18.2	1	0.8	-	-	9	4.5	p(2) < 0.001*
1	30	68.2	57	47.5	13	36.1	100	50.0	
2	6	13.6	50	41.7	12	33.3	68	34.0	
3	-	-	12	10.0	11	30.6	23	11.5	
Intenzitet termičkog podražaja • Grade of initial thermal stimulus									
1	32	72.7	50	41.7	14	38.9	96	48.0	p(1) = 0.001*
2	11	25.0	56	46.7	13	36.1	80	40.0	
3	1	2.3	14	11.7	9	25.0	24	12.0	
Intenzitet termičkog podražaja • Grade of final thermal stimulus									
1	1	2.3	1	0.8	-	-	2	1.0	p(2) < 0.001*
2	35	79.5	40	33.3	9	25.0	84	42.0	
3	8	18.2	79	65.8	27	75.0	114	57.0	
Ukupno • Total	44	100.0	120	100.0	36	100.0	200	100.0	

(*): značajna razlika kod 0,05 • Significant difference at 0.05
(1): primjena hi-kvadrat testa • Using the chi-square test
(2): primjena Fisherova testa • Using the Fisher Exact test

tip i 63,9 prema 57,3% za radikularni oblik). Povezanost je bila značajna (p<0,05).

U Tablici 5. predstavljena je povezanost između vrsta preosjetljivosti te početnih i konačnih ocjena boli nakon primjene mehaničkih i termičkih podražaja. S obzirom na početnu ocjenu boli nakon mehaničke stimulacije kod ispitanika sa cervikalnim preosjetljivošću, dva su postotka odgovarala ocjenama nula i jedan, i to 50 posto i 47,7 posto, a kod korijenske preosjetljivosti najveći je postotak (68,3%) odgovarao ocjeni jedan. Kod sudionika s objema vrstama preosjetljivosti, dva

The association between the types of hypersensitivity and the initial and final grades following the mechanical and thermal stimuli is seen in Table 5. In relation to the initial grade of mechanical stimulation, among the patients with cervical hypersensitivity, the two highest percentages corresponded to grades 0 and 1 with 50.0% and 47.7%, respectively, while for the radicular type the highest percentage (68.3%) corresponded to grade 1; and for those with both types of hypersensitivity the two highest percentages corresponded to grade 1 (55.6%) and grade 2 (41.7%). Regarding the final

Tablica 6. Intenzitet mehaničkog i termičkog podražaja prema ocjenama
Table 6 Intensity of mechanical and thermal stimuli according to the assessments

podražaj • Stimulus	statistika • Statistics	Procjena • Evaluation		razlika • Diference	vrijednost p • Value of p
		početna • Initial	konačna • Final		
mehanički • Mechanical	aritmetička sredina • Mean	1.01	1.53	0.52	p (1) < 0.001*
	medijan • Median	1.00	1.00	0.00	
	SD	0.62	0.76	0.57	
	Minimum	0	0	-1	
	Maximum	2	3	2	
termički • Thermal	aritmetička sredina • Mean	1.64	2.56	0.92	p (1) < 0.001*
	medijan • Median	2.00	3.00	1.00	
	SD	0.69	0.52	0.61	
	Minimum	1	1	0	
	Maximum	3	3	2	

(*): značajna razlika kod 0,05 • Significant difference at 0.05
(1): primjena t-student testa • By paired t-Student test
SD: standardna devijacija • Standard deviation

Tablica 7. Intenzitet termičkih i mehaničkih podražaja u početnoj i konačnoj procjeni prema vrsti preosjetljivosti
Table 7 Intensity of thermal and mechanical stimuli in the initial and final evaluations by type of hypersensitivity

podražaj • Stimulus	statistika • Statistics	Vrste preosjetljivosti • Type of hypersensitivity			ukupno skupina • Total group	vrijednost p • Value of p
		cervikalna • Cervical	korijenska • Radicular	obje • Both		
		(n = 44)	(n = 120)	(n = 36)	(n = 200)	
mehanički/početni • Mechanical/initial	aritmetička sredina • Mean	0.52 (A)	1.07 (B)	1.39 (C)	1.01	p(1) < 0.001*
	medijan • Median	0.50	1.00	1.00	1.00	
	SD	0.55	0.56	0.55	0.62	
mehanički/konačani • Mechanical/final	aritmetička sredina • Mean	0.95 (A)	1.61 (B)	1.94 (C)	1.53	p(1) < 0.001*
	medijan • Median	1.00	2.00	2.00	1.00	
	SD	0.57	0.68	0,83	0.76	
termički/početni • Thermal/initial	aritmetička sredina • Mean	1.30 (A)	1.70 (B)	1.86 (B)	1.64	p(1) < 0.001*
	medijan • Median	1.00	2.00	2.00	2.00	
	SD	0.51	0.67	0.80	0.69	
termički/konačni • Thermal/final	aritmetička sredina • Mean	2.16 (A)	2.65 (B)	2.75 (B)	2.56	p(1) < 0.001*
	medijan • Median	2.00	3.00	3.00	3.00	
	SD	0.43	0.50	0.44	0.52	

(*): značajna razlika kod 0,05 • Significant difference at 0.05
(1): primjena F-testa (ANOVA) s Tukeyevim parnim usporedbama • Using the F test (ANOVA) with Tukey's paired comparisons
NB: ako su u zagradama različita slova, postoji znatna razlika između odgovarajućih tipova preosjetljivosti • Note: If all the letters in brackets are different, there is a significant difference between the corresponding types of hypersensitivity
SD: standardna devijacija • SD: Standard deviation

najveća postotka odgovarala su ocjeni jedan (55,6%) i ocjeni dva (41,7%). S obzirom na ocjenu reakcije na konačnu mehaničku stimulaciju, sudionici s najvećim postotkom cervikalne preosjetljivosti dobili su ocjenu jedan i nitko od njih nije dobio ocjenu tri. Ispitanici s najvećim postotkom korijenske preosjetljivosti dobili su ocjene boli jedan i dva, i to po 47,5 posto i 41,7 posto. Bol kod sudionika s objema vrstama dentinske preosjetljivosti ocijenjena je s tri u 30,6 posto slučajeva i ocjenom jedan u 36,1 posto. Povezanost između tih dviju varijabli pokazala se statistički značajnom na razini od 5,0.

Kod obje vrste stimulacije aritmetička je sredina bila veća kod konačne procjene negoli kod nulte točke. Kod svih procjena aritmetička je sredina bila veća kod termičke nego-

mechanical stimulation, those with the highest percentage (68.2%) of cervical hypersensitivity were grade 1 and none were grade 3; those with the highest percentages of radicular sensitivity were grades 1 and 2, with 47.5% and 41.7%; and for those with both types of hypersensitivity the percentages ranged from 30.6% (grade 3) to 36.1% (grade 1). The association between the two variables was shown to be significant at the 5.0 level.

In both types of stimulation, the mean was higher at the final evaluation than at baseline; at all evaluations, the mean was higher for the thermal than for the mechanical stimuli, and the greatest difference in mean value between evaluations was recorded in the thermal stimulus (Table 6).

Tablica 8. Razlike između početne i konačne procjene intenziteta mehaničkih i termičkih podražaja prema vrsti preosjetljivosti
Table 8 Differences between the initial and final evaluations for the intensity of mechanical and thermal stimuli according to type of hypersensitivity

podražaj • Stimulus	statistika • Statistics	Vrste preosjetljivosti • Type of hypersensitivity			ukupno skupina • Total group	vrijednost p • Value of p
		cervikalna • Cervical	korijenska • Radicular	obje • Both		
mehanički • Mechanical	aritmetička sredina • Mean	0.43	0.54	0.55	0.52	p(1) = 0.503
	medijan • Median	0.00	1.00	1.00	0.00	
	SD	0.50	0.59	0.56	0.57	
termički • Thermal	aritmetička sredina • Mean	0.86	0.95	0.89	0.92	p(1) = 0.688
	medijan • Median	1.00	1.00	1.00	1.00	
	SD	0.46	0.62	0.75	0.61	

(*): značajna razlika kod 0,05 • Significant difference at 0.05
(1): primjena F-testa (ANOVA) • Using the F test (ANOVA)
SD: standardna devijacija • Standard deviation

Tablica 9. Procjena vrste preosjetljivosti prema svakoj od varijabli: skupina preosjetljivih zuba, parodontološka dijagnoza, sekundarni čimbenici
Table 9 Evaluation of type of hypersensitivity according to each of the variables: groups of sensitive teeth, periodontal diagnosis, secondary factors.

varijabla • Variable	Vrste preosjetljivosti • Type of hypersensitivity						ukupno skupina • Total group		vrijednost p • Value of p
	cervikalna • Cervical		korijenska • Radicular		Obje • Both				
	n	%	N	%	n	%	N	%	
Skupina preosjetljivih zuba • Group of sensitive teeth									
gornji prednji • Upper anterior	16	76.2	4	19.0	1	4.8	21	100.0	p(1) < 0.001*
donji prednji • Lower anterior	4	6.8	47	79.7	8	13.6	59	100.0	
gornji stražnji • Upper posterior	6	27.3	14	63.6	2	9.1	22	100.0	
donji stražnji • Lower posterior	1	11.1	6	66.7	2	22.2	9	100.0	
gornji prednji + donji prednji • Upper anterior + Lower anterior	1	7.7	10	76.9	2	15.4	13	100.0	
gornji prednji + gornji stražnji • Upper anterior + Upper posterior	-	-	7	100.0	-	-	7	100.0	
gornji prednji + donji stražnji • Upper anterior + Lower posterior	-	-	8	80.0	2	20	10	100.0	
donji prednji+ gornji stražnji • Lower anterior+ Upper posterior	1	7.7	7	53.8	5	38.5	13	100.0	
donji prednji+ donji stražnji • Lower anterior+ Lower posterior	-	-	5	100.0	-	-	5	100.0	
gornji stražnji + donji stražnji • Upper posterior + Lower posterior	2	11.8	9	52.9	6	35.3	17	100.0	
preosjetljivi zubi u svim skupinama • Hypersensitive teeth in all groups	13	54.2	3	12.5	8	33.3	24	100.0	
Parodontološka dijagnoza • Periodontal diagnosis									
marginalni kronični gingivitis • Marginal chronic gingivitis	35	87.5	5	12.5	-	-	40	100.0	p(2) < 0.001*
gingivna recesija • Gingival recession	7	14.3	37	75.5	5	10.2	49	100.0	
kronični parodontitis • Chronic periodontitis	2	1.8	78	70.3	31	27.9	111	100.0	
Sekundarni čimbenici • Secondary factors									
traumatsko četkanje • Traumatic brushing	5	12.5	32	80.0	3	7.5	40	100.0	p(1) < 0.001*
zub-nosač kod bezubih grebena • Abutment of edentulous ridges	-	-	26	60.5	17	39.5	43	100.0	
kvačice kod parcijalnih mobilnih • RPD clamps	-	-	36	76.6	11	23.4	47	100.0	
unos kiselih napitaka i hrane • Intake of acidic food and drinks	23	69.7	7	21.2	3	9.1	33	100.0	
recentni ispuni/protetički rad • Recent restoration/prosthesis	16	100.0	-	-	-	-	16	100.0	
bez sekundarnih čimbenika • No secondary factors	-	-	19	90.5	2	9.5	21	100.0	
Broj preosjetljivih zuba po pacijentu • Number of hypersensitive teeth per patient									
Do 5 • Up to 5	27	28.1	59	61.5	10	10.4	96	100.0	p(2) = 0.011*
Više od 5 • More than 5	17	16.3	61	58.7	26	25.0	104	100.0	
Ukupno • Total	44	22.0	120	60.0	36	18.0	200	100.0	

li kod mehaničke stimulacije, a najveća razlika u procjenama zabilježena je za termički podražaj (Tablica 6.).

U Tablici 7. prikazan je intenzitet termičke i mehaničke stimulacije. U toj se tablici ističe činjenica da su aritmetičke sredine niže kod ispitanika sa samo cervikalnom preosjetljivošću, a veće su kod sudionika s objema vrstama preosjetljivosti, s velikom razlikom između njih. Podaci za mehanički podražaj pokazuju statistički znatnu razliku između svake vrste preosjetljivosti, a kod termičkog podražaja bila je slična razlika između ispitanika sa cervikalnom preosjetljivošću i onih s korijenskom te objema vrstama.

U Tablici 8. predstavljene su statističke obrade razlika između početne i konačne procjene prema vrsti podražaja i preosjetljivosti. Iz te je tablice jasno sljedeće: sve su aritmetičke sredine pozitivne, što upućuje na tendenciju ocjena prema većim vrijednostima kod konačne procjene u odnosu na početnu, ocjene boli kod mehaničkog podražaja pokazale su aritmetičke sredine u rasponu od 0,43 do 0,55 prema vrsti preosjetljivosti, a kod termičkog podražaja aritmetičke su sredine bile u rasponu od 0,86 do 0,95, iako nema dokaza o znatnoj razlici među vrstama preosjetljivosti za bilo koji podražaj (p>0,05).

Postotak sudionika sa cervikalnom preosjetljivošću najveći je među onima s gornjim prednjim zubima (76,2%), korijenski je oblik rjeđi među ispitanicima s visokim ocjenama boli kod svih skupina zuba (12,5%), a najveći postotak sa cervikalnom preosjetljivošću bio je među onima kojima je bio dijagnosticiran gingivitis. Postoci radikularnog tipa bili su među najvećima kod onih i s gingivitisom i kroničnim parodontitisom, a postotak ispitanika sa cervikalnim tipom bio je 100 posto kod onih s restoracijom/protezom. Usporedba postotaka unosa kiselih i korozivnih napitaka te hrane s ostalim čimbenicima dala je raspon od 76,6 posto i 90,5 posto, najveća razlika u postocima između onih s manje od pet zuba i onih s više zuba zabilježena je upravo u skupini s objema vrstama preosjetljivosti, s najvećom vrijednošću kod sudionika s više od pet zuba (25,0 % x 10,4%) (Tablica 9.). Sve varijable u Tablici 9. pokazuju značajnu povezanost s vrstom preosjetljivosti (p<0,05).

Rasprava

U literaturi je kao česta opisana pojava dentinske preosjetljivosti, posebice kod pacijenata s parodontnom bolešću i nakon liječenja supragingivne i subgingivne preosjetljivosti. To se slaže s rezultatima u ovom radu u kojem je ta simptomatologija ustanovljena kod više od polovice uzoraka (3, 6, 7, 18).

U ovom je radu mjerenje intenziteta boli bilo provedeno kada se pacijent tužio na bol nakon primjene mehaničkog podražaja sondom i termičkog podražaja mlazom hladnog zraka. Rezultati su pokazali statistički značajnu razliku između testova kod početne i konačne dijagnoze, osobito za termički podražaj, što je u skladu s ostalim radovima u kojima je objavljena učinkovitost takvih testova, čak i s pacijentovim subjektivnim odgovorom (2, 5, 12, 17, 18, 29, 30).

U literaturi je postignut konsenzus o etiološkom odnosu preosjetljivosti, posebice korijenskoj te parodontne bolesti, s obzirom na to da bolesti poput kroničnog parodontitisa i

The intensity of the thermal and mechanical stimuli at each evaluation is shown in Table 7. This table highlights the fact that the mean levels were lower when patients had cervical hypersensitivity alone and higher where they had both types, with a significant difference between them. The mechanical stimulus shows a statistically significant difference between each type of hypersensitivity, while for the thermal stimulus there was a similar difference between those who had cervical hypersensitivity and those with the other two types.

Table 8 presents the statistics of the difference between the initial and final evaluations by type of stimulus and type of hypersensitivity. This table highlights the following findings: the mean values were all positive, indicating that the scores tended to be higher at the final evaluation than at the initial one; the mechanical stimulus showed means that ranged from 0.43 to 0.55 according to the type of sensitivity; and the thermal stimulus means ranged from 0.86 to 0.95, albeit without any evidence of a significant difference between the types of hypersensitivity for any of the stimuli (p> 0.05).

The percentage of patients with cervical hypersensitivity was highest among those with upper anterior teeth (76.2%); the radicular type was less frequent among those who had high sensitivity in all groups of teeth (12 5%); the highest percentage with the cervical type occurred among those who were diagnosed with gingivitis; the percentages for the radicular type were highest among those who had both gingival recession and chronic periodontitis; the percentage with the cervical type was 100.0% in those who had a restoration/prosthesis; the percentages of intake of acidic and corrosive food compared with other secondary factors ranged from 76.6% to 90.5%; the largest percentage difference between those with fewer than and those with more than five teeth was recorded in those who had both types of hypersensitivity, with the highest value among those who had more than five teeth (25.0% x 10 4%) (Table 9). All the variables shown in Table 9 reveal a significant association with the type of hypersensitivity (p <0.05).

Discussion

A high prevalence of dentin hypersensitivity, specifically in patients with periodontal disease and after treatments such as supragingival and subgingival instrumentation was found in the literature consulted. This finding is consistent with this study, in which more than half the sample had this symptomatology(3,6,7,18).

In the present study, after a patient complained of pain an examination was carried out to measure its intensity by means of mechanical and thermal stimuli using, respectively, an explorer and the air blast from a triple syringe. The results showed a statistically significant difference between the tests at the initial and final diagnoses, especially for the thermal stimulus, which is in agreement with other studies when they reported the effectiveness of such tests, even with a subjective response from the patient (2,5,12,17,18,23,29,30).

There is, in fact, a consensus in the literature on the etiologic relationship of hypersensitivity, especially the radicular

gingivne recesije u svojim umjerenim i izrazitim oblicima često završavaju gubitkom pričvrstka, što rezultira otkrivenom površinom korijena. Struganjem i poliranjem korjenova tijekom parodontne terapije uklanja se kamenac, ali i dentin te cement zahvaćeni bolešću. U ovom radu analizirali smo i pacijente s marginalnim kroničnim gingivitisom jer su se tužili na preosjetljive zube, što je potvrđeno cervikalnim pregledom. Ti su nalazi u skladu s opisima u literaturi u kojima se ističe kako parodontna bolest i liječenje vode prema visokoj dentinskoj preosjetljivosti i/ili zuba s preosjetljivim korijenima (1-3, 6, 7, 9, 12, 18-27, 30, 31).

U mnogobrojnim je radovima opisana višečimbenična priroda etiologije preosjetljivosti i moguća povezanost s nekoliko sekundarnih čimbenika. U našem smo istraživanju također zabilježili tu činjenicu. Naime, pacijenti čiji su zubi imali izložene korjenove, a na kojima su bile retencijske kvačice mobilnih proteza, ili su to bili zubi-nosači nasuprot bezubim grebenima, pokazivali su najveći stupanj preosjetljivosti. Slične rezultate zabilježili smo i kod pacijenata s velikom unosom kiselih napitaka i prehrane. Valja istaknuti da je kod pacijenata kojima je bila postavljena dijagnoza gingivne recesije vezana uz to patološko stanje, zabilježeno i nekoliko sekundarnih čimbenika poput neodgovarajuće tehnike četkanja te abnormalne insercije frenuluma i malokluzije. To onemogućuju provedbu mjera higijene, što vodi prema retenciji plaka zbog čega se pojačava preosjetljivost (5, 6, 10, 11, 32-34).

Analizom odnosa preosjetljivosti i dobi, čini se kako se ta patoza može pojaviti u svim dobnim skupinama, što se potvrđuje i kod mladih pacijenata s gingivnom recesijom (11). Prema stajalištima drugih autora (16, 18, 31) velika je učestalost u dobnoj skupini od 20 do 39 godina. S obzirom na spol, kod žena se češće javlja preosjetljivost (35), a prema nekim autorima (17, 30, 31) ipak je češća kod muškaraca. Rezultati u ovom radu u skladu su sa citiranim autorima koji su uočili preosjetljivost kod svih pacijenata, bez obzira na spol i dob, iako je prevalencija određenih preosjetljivosti ipak veća, posebice kada je prisutna i parodontna bolest.

U ovom smo radu zaključili da je većina pojedinaca imala više od pet zuba s bolnim simptomima, što ističe činjenicu da je ta patološka pojava vezana za parodontnu bolest u skladu s Martinez-Ricarteuom i suradnicima (27) koji u svojem istraživanju opisuju koliko je važno postaviti dijagnozu preosjetljivosti, osobito kod parodontoloških pacijenata. Analizirali smo i skupine preosjetljivih zuba te zabilježili najveći postotak kod donjih prednjih zuba, a slijedi svaki zub u različito kategoriziranim skupinama, te zaključujemo kako tu patološku pojavu možemo naći na bilo kojem zubu. Ti su rezultati u skladu s onima iz literature (2, 12, 17, 29, 31, 32).

Ističemo kako je vremenski interval između testova za verifikaciju intenziteta preosjetljivosti 30 dana nakon supragingivne i subgingivne instrumentacije. Rezultati tih testiranja pokazali su kako većina pacijenata i nakon toga razdoblja osjeća bol. Ti su nalazi u skladu s mnogobrojnim radovima objavljenima u literaturi, a koji isto tako pokazuju da je preosjetljivost općenito manje izražena prije liječenja i može postupno opadati ili perzistirati, čak se i pojačati u nekim slučajevima u intervalima od 60 dana (20, 22, 23, 25).

type, with periodontal disease, since diseases such as chronic periodontitis and gingival recession in their moderate and severe forms tend to lead to the loss of attachment, thereby exposing the root surface. Periodontal treatment by scaling and planing promote the removal of calculus and, as a result, the dentin and cementum affected by the disease. In this study, we also analyzed patients with marginal chronic gingivitis, since patients with this disease have reported hypersensitive teeth, confirmed by an examination of the cervical type. These findings are consistent with reports in the literature demonstrating that periodontal disease and treatment lead to a high prevalence of dentin hypersensitivity and/or teeth with hypersensitive roots (1-3, 6,7,9,12,16,18-27,30,31).

A number of studies have demonstrated that the etiology of hypersensitivity is multifactorial in nature and may be associated with several types of secondary factors. This fact was recorded in the present study, in which that patients who had teeth with root exposure as a support for RPD clasps or abutments of edentulous ridges had the highest degrees of hypersensitivity, as did those who habitually had a high intake of acidic foods and drinks. It is noteworthy also that in patients who had a tooth diagnosed with gingival recession related to this pathological condition, several other secondary factors were present, such as improper brushing, abnormal insertion of frenum and malpositioned teeth, which hampered hygiene, leading to the retention of plaque, which exacerbates sensitivity (5,6,10,11,32-34).

By analyzing the relationship of hypersensitivity to age, it appears that in all age groups this pathosis may be present, as observed in young patients who had gingival recession (11). According to other researchers (16,18,31), the greatest incidence occurs in those aged 20-39 years. Regarding gender, females had more hypersensitivity (35), while other researchers (17,30,31) reported a higher percentage in males. The results of this study agree with the authors cited above, whose samples revealed the presence of hypersensitivity in all patients, regardless of gender and age, although it was more prevalent in certain types of hypersensitivity and when periodontal disease was recorded.

It was also found in this study that most individuals had more than five teeth with painful symptoms, underlining the fact that this pathosis is related to periodontal disease, which is in agreement with Martínez-Ricarte et al. (27), when they report the importance of diagnosing this pathological condition, particularly in periodontal patients. We also analyzed the groups of hypersensitive teeth, recording the highest percentages for the lower anterior incisors, followed by every kind of tooth in the various groups categorized, thereby showing that any tooth may be affected by this pathosis. These results are in agreement with those of the literature consulted (2,12,17,29,31,32).

It is important to emphasize the time interval used for repeating the tests in order to verify whether or not the hypersensitivity is intense 30 days after the supragingival and subgingival instrumentation procedures. The findings revealed that even after this time most patients were still experiencing pain. This finding is consistent with a number of reports in the literature that reveal that this hypersensitivity is gener-

Nakon uvida u veliku prevalenciju preosjetljivih zuba i/ili korjenova kod parodontoloških pacijenata uključenih u naš uzorak, predlažemo da stomatolozi i specijalisti veću pozornost posvete kliničkom pregledu i uzmu u obzir sve moguće sekvele koje nastaju zbog dentinske preosjetljivost.

Zaključak

Prema metodologiji i rezultatima dobivenima u studiji, zaključili smo sljedeće: intenzitet preosjetljivosti povećao se i trajao je 30 dana nakon supragingivne i subgingivne instrumentacije; češća je korijenska preosjetljivost; sekundarni čimbenik najviše vezan uz preosjetljivost zub bila je retencijska kvačica parcijalnih protetičkih radova; najjače pogođena skupina su donji prednji zubi.

ally lower before therapy and may gradually subside or persist, even becoming more intense at intervals of up to 60 days (20,22,23,25).

In view of the high prevalence of hypersensitive teeth and/or roots in periodontal patients in this sample, it is suggested that greater attention on the part of the professional be paid to the clinical examination, which should take into consideration all the possible sequelae resulting from dentin hypersensitivity.

Conclusion

According to the methodology and the results of this study, the following conclusions may be drawn: the intensity of hypersensitivity increased and persisted for 30 days following the supragingival and subgingival instrumentation procedures; the radicular type was more prevalent; most patients had more than five hypersensitive teeth; the secondary etiological factor most associated with hypersensitive teeth was the RPD clamps; and the lower anterior teeth were the most affected group.

Abstract

Objective: To evaluate the intensity of dentin hypersensitivity before and after the procedures of supragingival and subgingival instrumentation. **Method:** The convenience sample consisted of 200 patients of both genders, aged 18-71 years, who had chronic marginal gingivitis, gingival recession and moderate and/or severe chronic periodontitis. The hypersensitivity was diagnosed by clinical examination and measured by means of mechanical (dragging the probe over the exposed dentin) and thermal (air blast from a triple syringe) stimuli in sensitive areas. **Results:** The data revealed several types of hypersensitivity in the same individual, with the highest percentage in the tooth root; the largest percentage in the sample had chronic periodontitis; most patients had more than five hypersensitive teeth; increased hypersensitivity was found after supragingival and subgingival instrumentation; the presence of secondary factors exacerbating the sensitivity was recorded; and all variables associated with hypersensitivity had statistical significance ($p < 0.05$). **Conclusion:** It is concluded that hypersensitivity is a common condition in patients with periodontal disease, which is more pronounced after initial periodontal therapy and when associated with other local factors.

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Key words
Dentin Sensitivity; Periodontal Diseases; Dental Caries; Dental Scaling

References

1. Sobral MA, Garone Netto N. Aspectos clínicos da etiologia da hipersensibilidade dentinária cervical. Rev Odontol Univ Sao Paulo. 1999 Apr;13(2):189-95.
2. Rees JS, Addy M. A cross-sectional study of buccal cervical sensitivity in UK general dental practice and a summary review of prevalence studies. Int J Dent Hyg. 2004 May;2(2):64-9.
3. Sobral MA, Garone Netto N, Luz MA. Fatores etiológicos da hipersensibilidade dentinária cervical. RPG Rev Pos-Grad. 1996;3(1):7-15.
4. Garcia G, Rosell FL, Sampaio JE. Tratamento da hipersensibilidade dentinária avaliação de efetividade do uso do selante associado à água de hidróxido de cálcio. RGO (Porto Alegre). 1996;44(4):237-9.
5. Andrade M. Escravo da dor. Rev ABO Nac. 1998;6(2):122-4.
6. Péret AC, Costa JE. Recessão gengival: etiologia. Rev do CROMG. 1999;5(2):122-7.
7. Moretzsohn M, Campos I. Hipersensibilidade dentinária: ainda um problema? Rev Bras Odontol. 2001;58(4):232-4.
8. Taaní Q, Awartaní F. Avaliação clínica da sensibilidade cervical dentinária (CDS) em pacientes assistidos em clínicas odontológicas generalistas (GDC) e clínicas especializadas em periodontia (PSC). J Clin Dent. 2003;4:18-24.
9. Yui KC, Benetti AR, Valera MC, Gomes AP. Hipersensibilidade dentinária: etiologia, mecanismos de ação, diagnóstico e tratamento. Rev. odontol. Univ. Cid. Sao Paulo. 2004;16(1):63-71.
10. Naylor FV, Scaramucci T, Arana-Chávez VE, Sobral MA. Sensibilidade da dentina cervical: o efeito de algumas bebidas ácidas. Periodontia. 2006;16(4):58-63.
11. Sykes LM. Dentine hypersensitivity: a review of its aetiology, pathogenesis and management. SADJ. 2007 Mar;62(2):066-71.
12. Bamise CT, Olusile AO, Oginni AO. An analysis of the etiological and predisposing factors related to dentin hypersensitivity. J Contemp Dent Pract. 2008 Jul 1;9(5):52-9.
13. Brannstrom M. The hydrodynamic theory of dentinal pain: sensation in preparations, caries, and the dentinal crack syndrome. J Endod. 1986 Oct;12(10):453-7.
14. Bramante AS, Vale IS. Hipersensibilidade dentinária: etiologia e mecanismo de ação. Rev Fac Odontol Bauru. 1996;4(1/2):67-70.
15. Krüger CR. Hipersensibilidade dentinária: mecanismos, permeabilidade e técnicas de dessensibilização. JBC J Bras Clin Estet Odontol.2001;5(25):48-54.
16. Irwin CR, McCusker P. Prevalence of dentine hypersensitivity in a general dental population. J Ir Dent Assoc. 1997;43(1):7-9.
17. Bamise CT, Olusile AO, Oginni AO, Dosumu OO. The prevalence of dentine hypersensitivity among adult patients attending a Nigerian teaching hospital. Oral Health Prev Dent. 2007;5(1):49-53.
18. Gillam DG, Seo HS, Bulman JS, Newman HN. Perceptions of dentine hypersensitivity in a general practice population. J Oral Rehabil. 1999 Sep;26(9):710-4.
19. Tammaro S, Wennström JL, Bergenholtz G. Root-dentin sensitivity following non-surgical periodontal treatment. J Clin Periodontol. 2000 Sep;27(9):690-7.
20. Ferreira ST, Sampaio JE, Sampaio A. Sensibilidade dentinária: formas de tratamento. Rev ABO Nac. 2001;9(3):151-6.

21. Orbak R, Canakçi V, Tezel A. Clinical evaluation of an electron-ionizing toothbrush with a tooth paste containing stannous fluoride in treatment of dentine hypersensitivity following periodontal surgery. Dent Mater J. 2001 Jun;20(2):164-71.
22. von Troil B, Needleman I, Sanz M. A systematic review of the prevalence of root sensitivity following periodontal therapy. J Clin Periodontol. 2002;29 Suppl 3:173-7; discussion 195-6.
23. Bergenholtz RT, Hasselgren G. Endodontia e Periodontia. In: Lindhe J, Karring T, Lang NP, editors. Tratado de periodontia clínica e implantologia oral. Rio de Janeiro: Guanabara Koogan; 2005. p. 309-41.
24. Aguiar FH, Giovanni EM, Monteiro FH, Villalba HM, Melo J, Tortamano N. Hipersensibilidade dentária - causas e tratamento. Uma revisão da literatura. Rev Inst Ciênc Saúde. 2005;23(1):67-71.
25. Santos RL, Gusmão ES, Jovino-Silveira RC, Tenório SB, Barbosa RF. Avaliação clínica de dessensibilizantes obliteradores após raspagem periodontal. Rev Bras Ciênc Saúde. 2006;10(2):123-32.
26. Canakçi CF, Canakçi V. Pain experienced by patients undergoing different periodontal therapies. J Am Dent Assoc. 2007 Dec;138(12):1563-73.
27. Martínez-Ricarte J, Faus-Matoses V, Faus-Llácer VJ, Flichy-Fernández AJ, Mateos-Moreno B. Dentinal sensitivity: concept and methodology for its objective evaluation. Med Oral Patol Oral Cir Bucal. 2008 Mar 1;13(3):E201-6.
28. Uchida A, Wakano Y, Fukuyama O, Miki T, Iwayama Y, Okada H. Controlled clinical evaluation of a 10% strontium chloride dentifrice in treatment of dentin hypersensitivity following periodontal surgery. J Periodontol. 1980 Oct;51(10):578-81.
29. Rees JS, Jin LJ, Lam S, Kudanowska I, Vowles R. The prevalence of dentine hypersensitivity in a hospital clinic population in Hong Kong. J Dent. 2003 Sep;31(7):453-61.
30. Al-Wahadni A, Linden GJ. Dentine hypersensitivity in Jordanian dental attenders. A case control study. J Clin Periodontol. 2002 Aug;29(8):688-93.
31. Udoye CI. Pattern and distribution of cervical dentine hypersensitivity in a Nigerian tertiary hospital. Odontostomatol Trop. 2006 Dec;29(116):19-22.
32. Marsilio AL, Rodrigues JR, Borges AB. Effect of the clinical application of the GaAlAs laser in the treatment of dentine hypersensitivity. J Clin Laser Med Surg. 2003 Oct;21(5):291-6.
33. Bánóczy J. Dentin hypersensitivity and its significance in dental practice. Fogorv Sz. 2002 Dec;95(6):223-8.
34. Addy M, Hunter ML. Can tooth brushing damage your health? Effects on oral and dental tissues. Int Dent J. 2003;53 Suppl 3:177-86.
35. Vale IS, Bramante AS. Hipersensibilidade dentinária: diagnóstico e tratamento. Rev Odontol Univ São Paulo. 1997;11(3):207-13.