

The Prevalence of Dentine Hypersensitivity and Gingival Recession among Jordanian Patients at JUST Dental Teaching Center

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Abstract

Aims: to determine the prevalence of gingival recession and dentine hypersensitivity among the study population, and evaluate the distribution of dentine hypersensitivity among various types of teeth in mild, moderate and severe degrees of gingival recession. Relationship between the severity of gingival recession and dentine hypersensitivity was also evaluated. **Materials and Methods:** Clinical examination was conducted on six hundred and seventy-six patients (283 males and 393 females). Their ages ranged from 18 to 74 years old (mean 35.4, SD = 11.2). A valid and reliable questionnaire was filled by the participated patients. **Results:** The prevalence of gingival recession was 79.0%, and the prevalence of dentine hypersensitivity within the patients with gingival recession was 23.6%. The most common teeth affected by dentine hypersensitivity were the lower incisors. Dentine hypersensitivity was more commonly found in teeth with mild recession. **Conclusion:** Increased gingival recession does not necessarily mean increased incidence of dentine hypersensitivity.

Keywords

Dentine Hypersensitivity

1. Introduction

Gingival recession is a phenomenon where the location of the gingival marginal tissue is apical to the Cemento-enamel junction (CEJ) with exposure of the root surface [1]. The reported prevalence of gingival recession has

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varied widely according to the type of study performed and the age group studied as well as other factors. It has ranged from 0.5% to 100% in various studies with different age groups and populations [2]-[22]. In Norway, Sagnes and Gjermo reported gingival recession prevalence to be 51% [11]. Albandar and Kingman [4] conducted a study in the USA and reported an overall prevalence of 58%. In another study in the USA, Lohse *et al.* [2] reported gingival recession prevalence of 75.0%. In a Finnish study, Vehkalahti [10] found that 68% of subjects aged 30 years or older had gingival recession. In Germany, two studies found gingival recession in 76% and 87% of middle aged adults [12] [13]. Banting *et al.* reported 90% prevalence in older institutionalized subjects [3]. Gingival recession is more common in older subjects but can be found in the young as well. It is found in the subjects with both good and poor oral hygiene alike [10] [20] [21]. Gingival recession can be aesthetically displeasing if it occurs on anterior teeth. The exposed root surface is also more prone to developing root caries as well as dentine hypersensitivity. Dentine hypersensitivity is a short, sharp pain arising from exposed dentine in response to stimuli, typically thermal, evaporative, tactile, osmotic or chemical and which cannot be ascribed to any other dental defect or pathology [23]. The reported prevalence of dentine hypersensitivity has also varied according to the type of study as well as the population studied and has ranged from 4% to 74% [24]-[34]. Some studies have reported that gingival recession and subsequent root surface exposure allow more rapid and extensive exposure of dentinal tubules because the cementum layer overlying the root surface is thin and easily removed and could lead to dentine hypersensitivity [35]. Recession will uncover the root dentine but other cofactors are required to give rise to the open dentine tubules responsible for the pain experienced [36]-[38].

The main aims of this study were to determine the prevalence of gingival recession in the study population, the prevalence of dentine hypersensitivity in teeth with gingival recession, and to evaluate the relationship between size of recession and dentine hypersensitivity.

2. Materials and Methods

This descriptive cross-sectional study was conducted at the Jordan University of Science and Technology (JUST) Dental Teaching Centre in Irbid/northern Jordan.

Each patient was examined for gingival recession and interviewed for socio-demographic variables, oral hygiene habits, dentine hypersensitivity-related variables and previous periodontal therapy. Those patients who presented with gingival recession were also examined for presence of relevant dentine hypersensitivity.

A permission to conduct the study at the Dental Teaching Center was obtained from the General Director of Health of Irbid-Jordan.

During the study period between June and August 2004, adult subjects (≥ 18 years) attending the above dental center were included in the study. Whereas, the following exclusion criteria were followed:

- 1) Patients with orthodontic appliances because these patient do not represent the norm with regard to gingival condition.
- 2) A history of any disease requiring drugs such as analgesics, tranquilizers or mood altering medications because these drugs alter the patients' sensation and reception of pain.
- 3) Uncontrolled systemic diseases.
- 4) Teeth with crowns, caries, restorations or needing root filling as all of these conditions interfere with the perception of dentine hypersensitivity.
- 5) Abutment teeth for bridge or denture.

Six hundred and seventy six patients participated in this study. All participants gave verbal consent to participate in the study and were interviewed and examined.

All subjects were seated in a dental chair, interviewed by the investigator or her assistant (a qualified well trained oral hygienist who was well informed about the study objectives and procedures, and was trained on administering the questionnaire), using a structured questionnaire which was specifically prepared for the purpose of the study. The questionnaire contains information regarding socio-demographic factors, oral hygiene habits and dentine hypersensitivity-related characteristics (**Appendix 1**). The questionnaire was pilot-tested before its use in the study. It is considered valid and reliable.

After completion of the questionnaire by the investigator or her assistant, the whole dentition was examined clinically. Using a dental mirror, all tooth surfaces were examined both facially and lingually keeping in mind the "tooth exclusion criteria". Gingival recession was measured using a standardized Michigan 0 periodontal probe with Williams markings. The patient was asked if he/she suffered of dentine hypersensitivity and was also asked to specify the degree of sensitivity (mild, moderate or severe), this was noted. Dentine hypersensitivity

presence was then tested clinically on all teeth with gingival recession via an air stream from the 3-in-1 syringe of the dental chair. The syringe was held 2 - 3 mm away from the tooth with recession, and an air stream of 1 second duration affirmed or disaffirmed what the patient reported. The results of the clinical test was then noted on the questionnaire. The degree of the clinically tested hypersensitivity was assessed by the practitioner who observed the patients' reaction while performing the air-stream test. Before using the air-stream test all teeth were inspected visually to assure they didn't belong to the exclusion criteria.

Gingival recession was noted and categorized according to Millers classification of gingival recession (Miller *et al.*, 1985) into either m I, m II, m III or m IV. The surface area of the gingival recession was also measured. A standardized Michigan 0 periodontal probe with Williams markings was held vertically against the tooth measuring the distance between the CEJ and the deepest point on the recessed gingival margin. This measured the vertical dimension of the recession in millimeters. Then the width of the defect in was measured in millimeters by holding the probe horizontally against the defect at its widest area measuring the distance between the mesial and distal margins of the recessed gingival margin. Thus this score was noted as "Depth × Width" mm². For statistical purposes, gingival recession area was divided into mild, moderate and severe as follows:

- Upper and lower molars: mild = 1 - 7 mm², moderate = 8 - 21 mm², severe ≥ 22 mm².
- Upper and lower premolars, canines and upper central incisors: mild 1 - 5 mm², moderate, 6 - 15 mm², severe ≥ 16 mm².
- Upper laterals: mild = 1 - 4 mm², moderate = 5 - 12², severe ≥ 13 mm².
- Lower centrals and laterals: mild = 1 - 3 mm², moderate = 4 - 9 mm², severe ≥ 10 mm².

Silness-Loe Plaque index [39] was noted only at the area of the recession.

The Dentine hypersensitivity was evaluated using a self-reported method: upon questioning, the participant reported that he/she had dentine hypersensitivity.

And dentine hypersensitivity was also clinically tested via the presence of a positive response in the participant upon using the air-blow test.

All data collected was analyzed using Statistical Package for Social Sciences (SPSS) for data analysis (Version 18). Descriptive statistics including frequency distribution and cross tabulations were calculated. Chi-square test was used in bivariate analyses to test the statistical significance of the relationships that were investigated.

To control the effect of potential confounding variables, multivariate logistic regression analyses were performed. The effect of each variable in the model was simultaneously adjusted for the effect of all other variables. Multivariate logistic regression analyses were performed for gingival recession and dental hypersensitivity as dependent variables. Level of significance was set at $p \leq 0.05$.

3. Results

Six hundred and seventy six subjects participated in this study. 58% were females and 42% were males. The age range was between 18 - 74 years, with a mean of 35.4 years (SD = 11.2). Of the 676 subjects, gingival recession was evident in 534 subjects, *i.e.* prevalence was 79.0%. Males presented more with gingival recession than females as seen in **Table 1**. More than 88% of males had gingival recession compared to 72% of females.

Of the 534 subjects with gingival recession, 126 subjects clinically tested positive to the presence of DH, *i.e.* a prevalence of dentine hypersensitivity of 23.6% among persons with gingival recession (**Table 2**). Females presented more frequently with dentine hypersensitivity than males (54.8% and 45.2% respectively).

Distribution of Dentine Hypersensitivity in Various Types of Teeth

Table 3 shows that dentine hypersensitivity was most commonly found on the lower central incisors followed by lateral incisors both facially and lingually. Upper first molars also presented with dentine hypersensitivity though only facially and to a lesser extent than the lower incisors. There was a symmetric distribution in general between right and left.

4. Relationship between the Severity of Gingival Recession and Dentine Hypersensitivity

It can be concluded from **Table 4** that maxillary anterior teeth with mild recession had more dentine hypersensitivity than their mandibular opponents (15.4% compared to 10.2%). This ratio was the reversed in moderate and

Table 1. Percentage of gingival recession in the present population.

	Gingival Recession (GR)		
	Present n (%)	Absent n (%)	Total n (%)
Male	251 (88.7%)	32 (11.3%)	283 (100%)
Female	283 (72.0%)	110 (28.0%)	393 (100%)
Total	534 (79.0%)	142 (21.0%)	676

Table 2. Number and prevalence of dentine hypersensitivity by clinical examination among the population with gingival recession.

Severity of DH	Female n (%)	Male n (%)	Total n (%)
Mild	44 (63.8%)	35 (61.4%)	79 (62.7%)
Moderate	21 (30.4%)	13 (22.8%)	34 (27.0%)
Severe	4 (5.8%)	9 (15.8%)	13 (10.3%)
Total	69 (54.8%)	57 (45.2%)	126 (100.0%)
DH (overall)	69 (24.4%)	57 (22.7%)	126 (23.6%)

Table 3. Dentine hypersensitivity in the upper and lower jaws, both facial and lingual.

Tooth Number	Upper Jaw		Lower Jaw		
	DH n (%)		Tooth Number	DH n (%)	
	Right	Left		Right	Left
Facial			Facial		
7	7 (1.3%)	7 (1.3%)	7	5 (0.9%)	1 (0.2%)
6	18 (3.4%)	14 (2.6%)	6	5 (0.9%)	9 (1.7%)
5	10 (1.9%)	9 (1.7%)	5	7 (1.3%)	6 (1.1%)
4	15 (2.8%)	9 (1.7%)	4	13 (2.4%)	15 (2.8%)
3	6 (1.1%)	9 (1.7%)	3	15 (2.8%)	12 (2.2%)
2	5 (0.9%)	10 (1.9%)	2	24 (4.5%)	29 (5.4%)
1	17 (3.2%)	12 (2.2%)	1	35 (6.6%)	37 (6.9%)
	Right	Left		Right	Left
Lingual			Lingual		
7	3 (0.6%)	0 (0.0%)	7	0 (0.0%)	0 (0.0%)
6	10 (1.9%)	5 (0.9%)	6	1 (0.2%)	2 (0.4%)
5	1 (0.2%)	0 (0.0%)	5	5 (0.9%)	3 (0.6%)
4	2 (0.4%)	1 (0.2%)	4	5 (0.9%)	4 (0.7%)
3	4 (0.7%)	2 (0.4%)	3	6 (1.1%)	1 (0.7%)
2	4 (0.7%)	4 (0.7%)	2	20 (3.7%)	25 (4.7%)
1	2 (0.4%)	3 (0.6%)	1	30 (5.6%)	29 (5.4%)

Table 4. Dentine hypersensitivity (DH) in anterior and posterior teeth by degree of recession.

		Gingival Recession		
		Mild	Moderate	Severe
		n (%)	n (%)	n (%)
ANTETIOR	Upper Jaw			
	DH present	36 (20.9%)	15 (19.2%)	6 (30.0%)
	DH absent	136 (79.1%)	63 (80.8%)	14 (70.0%)
	Lower Jaw			
	DH present	57 (13.9%)	72 (21.6%)	23 (42.6%)
	DH absent	354 (86.1%)	262 (78.4 %)	31 (57.4%)
	p-value (chi-square)	0.034	0.650	0.324
POSTERIOR	Upper Jaw			
	DH present	35 (8.3 %)	44 (14.5%)	5 (18.5%)
	DH absent	385 (91.7 %)	260 (85.5%)	22 (81.5%)
	Lower Jaw			
	DH present	20 (7.0 %)	37 (22.4%)	4 (23.5%)
	DH absent	304 (93.0 %)	202 (77.6%)	13 (76.5%)
	p-value	0.001	0.744	0.688

severe recession, where maxillary anterior teeth had a lower percent of dentine hypersensitivity than mandibular. A statistically significant relationship was only found between dentine hypersensitivity and mild gingival recession in anterior teeth ($p = 0.034$). Moderate and severe recession extents failed to reach significance in their relation with dentine hypersensitivity.

On the other hand, no large differences were found between the percentages of dentine hypersensitivity in posterior teeth of the upper and lower jaws in various recessions (Table 4). No significant relationship was found between any degree of gingival recession in posterior teeth and dentine hypersensitivity ($p = 0.246$, $p = 0.744$ and $p = 0.688$ for mild, moderate and severe gingival recession respectively).

5. Discussion

The prevalence of gingival recession in the present study population (age range 18 - 74 years) was found to be 79.0%. In comparison, other studies that dealt with gingival recession in various populations reported a wide range of prevalence. Miller *et al.* [39] reported that over 50% of the employed population sampled had at least one site of recession as compared to 88% in an older population confined to senior centers.

In the present study, the prevalence of dentine hypersensitivity among subjects with gingival recession was 23.6%. This is comparable to a study by Fischer *et al.* in a study in Brazil who reported a dentine hypersensitivity prevalence of 25% [28]. Moreover, Jensen *et al.* reported a dentine hypersensitivity prevalence of 30% upon clinical examination [25].

The teeth mostly presenting with dentine hypersensitivity in the present study were lower central incisors followed by lower lateral incisors both facially and lingually. Upper first molars also presented frequently with dentine hypersensitivity though only facially and to a lesser extent than the lower incisors. There was a symmetric distribution in general between right and left sides. Literature, however, reports that teeth on the corners of the arch (canines and premolars) are mostly affected followed by mandibular incisors and molars [18] [26] [31]

[32]. Addy *et al.* also reported that dentine hypersensitivity occurrence was more common on the left side of the arch compared to the right [18]. This contradiction in results is probably due to different causes of dentine hypersensitivity in the populations studied. In studies reporting that teeth on the corner of the arch are highest in hypersensitivity, the cause was reported to be tooth brushing abrasion. Whereas in the present population, the main cause for hypersensitivity is gingival recession due to periodontal disease and lack of oral hygiene. The same applies for the difference in results regarding arch side; Addy *et al.* studied a population with good oral hygiene and are mostly right handed, and thus brush more vigorously on the left side. The present study investigated a population that does not show sufficient interest in oral hygiene.

It was found that lower anterior teeth with moderate gingival recession had the highest percent of dentine hypersensitivity (17.4%), followed by lower anterior teeth with mild recession (13.4%).

A statistically significant relationship was found between upper and lower hypersensitive anterior teeth with mild gingival recession ($p = 0.001$). Similar results were found with regard to posterior teeth; maxillary and mandibular posterior teeth with mild gingival recession had a significant relationship with dentine hypersensitivity ($p = 0.001$).

A possible reason is that severe recession develops over a relatively long period. So, any dentine hypersensitivity that may have developed at initial root exposure will have subsided by the time severe recession has occurred, since there was enough time for any open dentinal tubules to be occluded. In comparison, mild recession may have developed recently and may therefore be associated with freshly exposed dentinal tubules.

6. Conclusion

The prevalence of gingival recession was 79.0% in this study population. And the prevalence of dentine hypersensitivity within patients with gingival recession was 23.6%. And dentine hypersensitivity was more commonly found in teeth with mild recession.

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Appendix 1

The Relationship between Dentine Hypersensitivity & Gingival Recession

Pt #: _____ **Age:** _____ **Sex:** 1. F 2. M
Years of education _____ **Income** _____ JD/month
Occupation
 1. Professional 2. Handworker 3. Employed 4. Unemployed 5. Student _____
 6. Housewife _____

Toothbrushing & Bad Habits

Type of Toothbrush

1. Soft 2. Medium 3. Hard 4. Don't know

Type of Toothpaste

1. Fluoridated 2. Non-Fl. 3. Whitening 4. DH.-Paste

Frequency of Brushing

1. Zero 2. <1 3. 1 - 2 4. ≥3 times/day

Auxiliary aids

1. None 2. Floss 3. T.pick 4. I.D.Brush 5. Miswak

Method of Brushing

1. Vertical 2. Horizontal 3. Circular 4. M.Bass 5. Haphazard

Bad Habits

1. None 2. Bruxism 3. Nail biting 4. Pen Chewing 5. Other _____

Cig. Smoking

1. No 2. Yes **Amount** _____ cig/day **Duration** _____ yrs

MAXILLARY																
	PI														PI	
F	DH														DH	F
	GR														GR	
Rt		7	6	5	4	3	2	1	1	2	3	4	5	6	7	Lt
	GR														GR	
L	DH														DH	L
	PI														PI	
MAXILLARY																
MANDIBULAR																
	PI														PI	
F	DH														DH	F
	GR														GR	
Rt		7	6	5	4	3	2	1	1	2	3	4	5	6	7	Lt
	GR														GR	
L	DH														DH	L
	PI														PI	
MANDIBULAR																

GR: Gingival Recession, PI: Plaque Index at recession area, DH: Dentine Hypersensitivity, F: Facial, L: Lingual, Rt & Lt: Right & Left side.

Dentine Hypersensitivity

Self report

1. Yes 2. No

Initiating Factor

1. Hot 2. Cold 3. Air 4. Water 5. Brushing

Degree of Severity (Self Rep)

1. None 2. Slight 3. Moderate 4. Severe concern

Degree of Severity (Clin test)

1. None 2. Slight 3. Moderate 4. Severe

Duration of Sensitivity

1. 1 - 3 days 2. 4 - 7 days 3. Wks _____ 4. Mth _____

Use of Desensitizing Agent

1. None 2. DH. Paste 3. M. Wash 4. Professional

Previous Perio Tx

1. None 2. Yes

Type of Previous Perio Tx

1. Sc/Rp 2. P.Surg 3. Antibiotics 4. Other _____

When was the last Tx

1. <1 mth 2. 2 - 3 mths 3. 3 - 6 mths 4. >6 months