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Dentin hypersensitivity after manual and ultrasonic scaling

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Abstract

Introduction: This study aimed to evaluate the dentinal hypersensitivity (DH) after manual and ultrasonic scaling.

Materials and Methods: In this study 900 teeth were assessed. Plaque index and gingival recession were measured. Prior to scaling and root planning (SRP), DH was measured clinically using a periodontal probe and air jet. The patients reported the discomfort using the Visual Analogue Scale (VAS). Later the teeth in the two opposite quadrants were manually scaled and the other two quadrants were ultrasonically scaled. After 2 weeks, DH was reevaluated with the same two methods. The data were analyzed using the SPSS.

Results: The DH of 900 teeth in 34 patients was included. 67.6% (23) of participants reported pre-scaling DH and 85.3% (29) experienced post-scaling DH. The prevalence of DH had no significant difference before and after SRP in manual group and ultrasonic group. Also, after SRP, no significant difference was observed between manual and ultrasonic scaling.

Conclusion: Manual and ultrasonic methods did not increase DH after SRP compared to baseline. Post-scaling DH was not significantly different between the manual and ultrasonic SRP. DH was related to gingival recession. So that, pre-and post- scaling DH were higher in patients with gingival recession.

Keywords: Dentin hypersensitivity; Scaling and root planning, Periodontal diseases

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Introduction

Dentin Hypersensitivity (DH) is the short and sharp painful response of teeth to the external stimuli following the exposure of dentin to the oral environment due to the loss of enamel or cementum (1,2). Gingival recession, root planning and periodontal surgery can expose the dentin, therefore, mechanical, osmotic and thermal changes of intra-tubular fluids can reach the pulp sensory nerves through dentinal tubules and cause pain (3,4).

In the cervical area of teeth, the cementum is extremely thin and actions such as scaling and root planning (SRP) may remove this thin cementum and lead to DH (5). Few studies have reported the prevalence of DH in periodontal patients to vary from 8 to 35% (6,7). DH is more common in females than males and is mostly observed in patients of 20-40 years (8). DH has been mainly reported in canine and first premolars, incisors and second molars, and molars, respectively (9,10).

These questions that whether SRP increases DH and whether the prevalence of DH after manual and ultrasonic scaling are different are important and affect patients' comfort. However, not many studies have answered these questions. Considering the effect of experiencing pain and DH on patients' comfort and satisfaction after receiving SRP, the aim of this study was to evaluate the DH after manual and ultrasonic scaling in order to use more appropriate treatment methods in patients with dentin sensitivity.

Materials and Methods

In this study 900 teeth of patients referred to the periodontology department of dental school were assessed. The patients were included in the study if they were systemically healthy, had no periodontal diseases, needed SRP in at least two quadrants, had no history of orthodontic treatment during the last three months and had no history of DH.

Patients with parafunction and those taking drugs such as analgesics, anti-inflammatory drugs, psychotropic drugs, gingival enlargement and use of hypersensitivity toothpaste were excluded from the study. Teeth were excluded from the study if they were endodontically treated, had caries, restoration, veneer and crown.

One researcher measured the following indices. Silness & Löe plaque index (PI) was recorded in four areas (mesio-buccal, disto-buccal, mid-buccal and mid-lingual) of the studied teeth. Gingival recession (GR) was also measured by a probe in the mid-buccal and mid-lingual areas.

Prior to SRP, DH was measured clinically using Williams No.14 periodontal probe (Germany, Treffurt, Delab) and air spray. The periodontal probe was moved on the bare surface or CEJ of the tooth with a 0.45N force. The patient reported the discomfort using the Visual Analogue Scale (VAS). After 20 minutes, air spray (60 psi, 22°C) was used on the bare surface or CEJ of the tooth from a 1cm distance for 2-3 seconds. Again, the patient reported discomfort using VAS (Figure 1 and 2).

Figure 1. The assessment of DH with periodontal probe. The periodontal probe was moved on the bare surface or CEJ of the tooth.

Figure 2. The assessment of DH with air spray. The air spray was used on the bare surface or CEJ of the tooth from a 1cm distance for 2-3 seconds.

After initial evaluations, another researcher, scaled the teeth in the two opposite quadrants manually and the other two quadrants with ultrasonic. In manual scaling, Sickle Scalers (Joya Electronics, Tehran, Iran) and Universal Curette (Joya Electronics, Tehran, Iran) were used to remove supra and subgingival calculus, respectively. In ultrasonic scaling, a piezoelectric device (Switzerland-Nyon-EMS) with a frequency of 18000-50000 Hz and medium degree power was used to remove supra and subgingival calculus.

Patients were instructed to brush their teeth twice a day using a soft toothbrush and Rolling method; floss once a day; rinse their mouth with 0.2% CHX mouthwash, and use the given toothpaste during the study. Two weeks after the intervention, DH was reevaluated with the same two methods.

The data were analyzed using SPSS version 22. The Mann-Whitney U test, Spearman's Correlation were applied at the significance level of 0.05.

Results

In this study, the DH of 900 teeth in 34 patients satisfying the inclusion criteria were assessed after manual and ultrasonic SRP. The mean age of patients was 30.64±7.56 years. 58.8% (20) of patients were female and 41.2% (14) were male.

64.7% (22) of patients brushed their teeth once a day, 32.4% (11) brushed their teeth twice a day and 2.9% (1) brushed their teeth three times a day. 8.8% (3) of participants smoked and 91.2% (31) were non-smokers.

67.6% (23) of participants reported pre-scaling DH and 32.4% (11) of participants experienced no DH before SRP. 85.3% (29) experienced post-scaling DH and 14.7% (5) reported no HD after SRP (Table1).

According to the results, the DH had no significant difference before and after SRP in both groups (manual and ultrasonic groups). Also, after SRP, no significant difference was observed between manual and ultrasonic scaling (Table 2).

In ultrasonic group, post- scaling DH was significantly related with GR and was not statistically associated with PI and oral health (P=0.015, P=0.432 and P=0.096, respectively). In manual group, post- scaling DH was significantly related with GR and was not statistically associated with PI and oral health. (P=0.002, P=0.077 and P=0.742, respectively).

Table 1. The cause of DH pre and post-scaling.

Causes	Pre scaling DH	Post scaling DH
Coldness	14.7% (5)	35.3% (12)
Warmness	8.8% (3)	17.6% (6)
Coldness and warmness	0% (0)	26.5% (9)
Tooth brushing	8.8% (3)	0% (0)
Sour foods	2.9% (2)	0% (0)
Sweet foods	11.8% (4)	0% (0)
Coldness and tooth brushing	2.9% (1)	0% (0)
Coldness and sweet foods	8.8% (3)	0% (0)
Warmness and tooth brushing	0% (0)	2.9% (1)
Warmness and sweet foods	0% (0)	2.9% (1)
Tooth brushing and sweet foods	2.9% (1)	0% (0)
No DH	32.4% (11)	14.7% (5)

Table 2. The mean of pre-and post- scaling DH according to manual and ultrasonic scaling.

	Pre scaling DH	Post scaling DH	Changes
Manual	0.88±0.15	2.6±0.21	1.72±0.17
Ultrasonic	0.95±0.15	2.38±0.19	1.43±0.18
P-value	0.749	0.482	0.231

Discussion

The results of current study showed that the post-scaling DH was not significantly different between manual and ultrasonic SRP. Gaspar et al. assessed the post scaling DH in two groups (manual and ultrasonic scaling) including 14 patients. In their study, the DH was measured by scratching a periodontal probe on the root surface and by an air spray. VAS was used to record patients' discomfort and pain. Based on the results of Gasper et al. the DH was not significantly different between the manual and ultrasonic groups. This finding was in accordance with the current study (11). In another study by Puglisi et al. the DH was

compared among four groups of hand instrument, piezoelectric ultrasonic (Satelec®), diamond burs (Intensiv Perioset®), and piezosurgery ultrasonic (Mectron®) including 17 patients. The results of Puglisi et al. showed no significant difference between the four study groups in terms of post-scaling DH (12). This finding was in agreement with the study of Tunkel et al. who concluded that there was no difference between the DH of hand instrument or ultrasonic scaling devices in the treatment of chronic periodontitis (10).

The results showed that the DH increased during the two-week period after SRP in both hand instrument and ultrasonic groups, however, this increase was not statistically significant. Unlike the current study, Gaspar et al. claimed that DH increased significantly in the study groups during the first week. Similar to Gaspar et al., Tammaro et al. found that DH increased significantly after both manual and ultrasonic scaling one week after SRP. While in this study and in the study of Gaspar et al. DH did not significantly increase two weeks after the SRP compared to the baseline. It can be concluded that during the first-week post SRP, the root is exposed to the oral environment and is more sensitive. As time passes, the naked root is covered with the gingiva and the DH is decreased therefore, the DH is not significantly different compared to the baseline (11,13). The clinical conclusion can be that all patients should be aware that the DH may increase temporarily after SRP.

According to the results of the study, before the SPR, patients with higher PI showed DH more frequently, but not after SRP (either manually or ultrasonically). Singh et al. found no relationship between PI and the DH after SRP, which is similar to this result (14).

In this study, patients with GR showed DH more frequently before and after SRP (either manually or ultrasonically). Dahiya et al. showed that the rate of DH was significantly higher in patients with GR, and concluded that periodontal disease and its treatments such as SRP could increase the incidence of DH (15).

The DH was not associated with poorer oral health in the current study unlike Tammaro et al. who concluded that in patients with good hygiene and regular plaque control, the intensity of DH is greatly reduced after SRP (13).

Finally, according to the results of the present study and previous studies, it can be concluded that DH is a relatively common problem in patients with periodontal diseases and patients receiving periodontal treatment. This increase in sensitivity occurs in the cervical region of the root where the cementum is very thin due to scaling. It should be noted that DH is mostly temporary and an important factor for its reduction or elimination is proper and sufficient plaque control.

It should also be noted that the contradictory results seen in the studies can be due to different follow-up periods, differences in case selection, the type of periodontal disease and also the level of pain threshold of patients. In our study, subjects did not show significant DH before SRP. And after treatment with both hand instrument and ultrasonic, although they experienced more sensitivity, but this difference in sensitivity was still not statistically significant.

Conclusion

The post-scaling DH was not significantly different from pre-scaling DH using both hand instruments and ultrasonics. Post-scaling DH was not significantly different between the manual and ultrasonic groups. Pre- and post- scaling DHs were not related to PI and oral hygiene, but were related to the GR. So that, pre- and post- scaling DH were higher in patients with GR.

Author contributions

EB has supervised on writing the article and edited the manuscript. **MH** has written the article

Conflict of interest

The authors declare that they have no conflicts of interest.

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