

Research Article

Factors Influencing Pain Experienced During Scaling and Root Planing: A Correlative Pilot Trial

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Abstract

Background and aims. Scaling and root planing is one of the most commonly performed procedures in a dental clinic. Most patients consider the procedure annoying and some experience pain. Understanding the factors which relate to experience of pain during the procedure is important for the treatment of periodontal diseases. The present study made an attempt to find factors which are correlated with pain during periodontal instrumentation.

Materials and methods. The data for the present study was collected from the control group of a double-blind split mouth study comparing the effect of intrasulcularly applied 20% Benzocaine with a placebo in reducing pain during scaling and root planing. Heft Parker Visual Analog Scale was used to record the level of pain experienced by the 16 control participants during instrumentation. Pearson's correlation was used to find factors related to pain.

Results. Subgingival calculus was negatively correlated with experience of pain while age, gender, severity of periodontitis, and supragingival calculus were found to have no correlation.

Conclusions. Severity of periodontitis, age and gender do not affect the experience of pain due to periodontal instrumentation.

Key words: Dental scaling, pain measurement, periodontitis, root planing, visual analog scale.

Introduction

Nonsurgical therapy—scaling and root planing (SRP)—is the most commonly used procedure for treating gingivitis and periodontitis.¹ Although the available literature is limited, there is sufficient evidence to document that some patients may find both

the nonsurgical and the surgical treatments painful.²⁻⁵ Scaling is associated with discomfort if not pain; subgingival scaling and root planing appear to be more painful than supragingival scaling. Many methods are employed to reduce the pain associated, including use of anesthetics and relaxation techniques. Yet no studies have evaluated the role of factors which increase

pain experience. Knowledge of factors associated with experience of pain will lead to better pain management by trying to modify them.

The aim of the present study was to:

1. find out if pain was associated with scaling and root planing
2. find factors correlated with experience of pain during scaling and root planing.

Materials and Methods

The efficacy of a topical anesthetic delivered subgingivally during scaling and root planing was investigated in 21 periodontitis patients attending the Department of Periodontics, Chhattisgarh Dental College and Research Institute, INDIA. A balanced, randomized, double-blind, split-mouth design was used. Pain intensity was evaluated on a 170-mm Heft Parker Visual Analog Scale (VAS). Persons who had second premolar, first molar and second molar teeth and of which who had at least two probing depths of ≥ 5 mm on both sides of either jaw, with no medical contraindications for probing, scaling or root planing, aged 18-50 years (both inclusive) were invited to participate in the study. They were enrolled after giving informed consent. The Institutional Ethics Committee gave the approval for the study. The study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2000.

The arch, maxillary or mandibular, was selected based on the availability of paired sites, as test and control. Patients with pain, mobility, abscess or endodontic infection were excluded. Patients were also excluded if they were sensitive to benzocaine, currently on any analgesic or if they had taken any antibiotics during the past 6 months or were pregnant or had preferred injectable anesthetics.

The participants were explained the VAS based on Heft Parker⁶ to record their pain on a line of 170 mm. The line had no numerical markings but had various perceptions of pain with the left extreme position of line as no pain and right extreme as maximum pain that could be ever experienced with moderate as the midpoint. Participants could place a mark anywhere on the VAS scale and use the verbal descriptors as a guide. Each participant mark was assigned a value between 0 and 170 mm on the VAS.

The side where the anesthetic was applied (test side) was selected by a flip of a coin by SJ. The opposite side was considered the control where the placebo, oral use petroleum jelly of the same flavor as the anesthetic was placed. The first side to be instrumented was always the left. The study was blinded to the therapist NW and the participants. The two sides were

instrumented at least 7 days apart. The patients were free to withdraw from the experiment anytime during the procedure and were excluded.

Evaluation parameters

Baseline VAS pain scale value was recorded by the participant. Scaling and root planing was accomplished for the selected three teeth during the same appointment. As determined by the therapist, NW, a recording on the pain scale was taken as intraoperative, midway during the procedure, and a recording, post-operatively, after completion of the procedure. Examiner SS did the pain scale recording. The same procedure was repeated on the right side.

Anesthetic procedure

The anesthetic, 20% Benzocaine gel was used as test substance and petroleum jelly as placebo. Examiner NG delivered the anesthetic substance intrasulcularly with the help of a 1.2-cc syringe and a blunt canula. The placebo was similarly placed but care was taken not to inject subgingivally. Instrumentation was started 1-2 minutes after application of the test substance or placebo. Following antiseptic mouthwash, instrumentation with the use of only hand instruments (curettes and sickles) was completed on one side.

The following information was collected through interview and clinical examination before start of instrumentation. The patient age, gender, occupation, and education were recorded through interview. All the following recordings were made on the selected three teeth on both sides (test and control)

Supragingival calculus was recorded with the following criteria:

- 0: no calculus
- 1: calculus present less than 1/3 of the crown
- 2: calculus less than or up to 2/3 of the crown but more than 1/3
- 3: calculus more than 2/3 of the crown.

Subgingival calculus was recorded with the following criteria:

- 0: no calculus
- 1: subgingival flecks of calculus but not a continuous band
- 2: continuous band of subgingival calculus present.

The deepest level of attachment from the cementoenamel junction to the base of the pocket was recorded.

The deepest probing depth was recorded.

The analysis was carried out based on the average of the above recordings.

The time elapsed at intra-operative break (intra-operative time) since the first pain recording after start of instrumentation and after completion of instrumen-

tation from the start of instrumentation (post-operative time) were recorded for both control and test sides.

The pain scale recording was carried out on three occasions, baseline, intraoperative and postoperative for test and control.

Statistical analysis

Correlation analysis was carried out by Pearson's correlation analysis. Independent student's t-test was used to test differences in mean values.

Results

The study was carried out between June and December 2009. Out of 21 participants, 5 participants' data was incomplete for correlation analysis; hence correlation analysis was carried out for 16 participants' control data.

There was significantly more pain after completion of instrumentation (Table 1).

Subgingival calculus was negatively correlated with intra- and post-operative pain score. The correlation with post-operative pain was highly significant (Table 2).

Baseline pain levels were not correlated with intra- and post-operative pain levels. Baseline pain scores had limited value in understanding the pain experienced by a person (Table 3).

Intra- and post-operative pain levels were positively correlated (Table 3).

Age was not correlated with any of the pain scores (Table 4).

No significant difference in mean pain scores between males and females was found, yet females showed higher values for all the three scores (Table 5).

Periodontal disease measured through probing depth and level of attachment had no correlation with any pain scores. Severity of periodontitis did not affect the level of pain experienced (Table 2).

Discussion

The study included 21 patients similar to a study by Stoltenberg.⁷ The most commonly used topical anesthetic agent worldwide, 20% benzocaine gel,⁸ formed the test substance. Placebo was petroleum jelly similar to a study by Carr.⁹ The control side hence could be considered for studying the pain experienced during scaling and root planing. No participant needed more than 2 dose of anesthetic or placebo. Correlation analysis was carried out for 16 participants' control side data.

Table 1. Student's t-test comparing pain scores

	N	Mean	SD	Student's t-test
Baseline pain	16	5.06	9.740	0.0363*
Intra-operative pain	16	12.75	10.109	
Intra-operative pain	16	12.75	10.109	0.0551
Post-operative pain	16	23.50	19.026	
Baseline pain	16	5.06	9.740	0.0017**
Post-operative pain	16	23.50	19.026	

* significant at p=0.05, ** significant at p=0.01

Table 2. Pearson's correlation between pain scores and disease variables

	N	Supra- gingival	Sub- gingival	Probing depth	Level of attachment
Baseline pain	16	-0.410	-0.036	-0.166	-0.165
Intra pain	16	-0.118	-0.385	-0.355	-0.390
Post pain	16	0.008	-0.565*	-0.166	-0.165

* significant at p=0.05, ** significant at p=0.01

Table 3. Pearson's correlation between pain scores

	N	Baseline pain	Intra pain	Post pain
Baseline pain	16	1	0.002	-0.102
Intra pain	16	0.002	1	0.562*
Post pain	16	-0.102	0.562*	1

* significant at p=0.05, ** significant at p=0.01

Table 4. Pearson's correlation between pain scores and duration of instrumentation and age

	N	Time – intra operative	Time – post operative	Age
Baseline pain	16	-0.493	-0.662**	-0.279
Intra pain	16	-0.060	0.131	-0.230
Post pain	16	0.183	0.373	-0.329

* significant at p=0.05, ** significant at p=0.01

Table 5. Student's t-test between pain scores and gender

	Males	females	Student t test
Baseline pain	4.23±9.011	8.67±14.154	1 6 NS
Intra pain	11.85±9.59	16.67±13.65	1 6 NS
Post pain	23.00±19.29	25.67±22.189	1 6 NS

* significant at p=0.05, ** significant at p=0.01

A Visual Analogue Scale¹⁰ (VAS) is a measurement instrument that tries to measure a characteristic that is believed to range across a continuum of values and cannot easily be directly measured. VAS has been used in many studies.¹¹⁻²⁰ The Heft Parker⁶ VAS has been used by Stoltenberg,⁷ Pihlstrom,²¹ and DiRenzo²² and is simple to administer, reliable and valid. It has been used to evaluate dental pain.¹ Saloum¹¹ in his study recorded pain perception levels with a 4-point visual analog scale while others^{12,18} have assessed an

interval VAS scale ranging from 0 to 10. Many studies^{1,12-17,20} have used a 100-mm VAS for pain recording. Van Wijk²³ used numeric pain while Ettlin²⁴ used an electronic visual analogue scale. Braun²⁵ measured the subjective intensities of pain with an intermodal intensity comparison and recorded at intervals of 0.5 s.¹⁹ VAS has recall bias compared to the intermodal comparison; however, the total pain experience and its effect on the participants will be better captured with VAS.

There was significant pain experienced by the participants on completion of scaling and root planing without a topical anesthetic (Table 1). The pain experienced due to scaling and root planing was analyzed to find correlation with other variables. In a study by van Steenberghe,²⁶ SRP was considered to be a painful or at least uncomfortable form of treatment with 8 to 9% reporting severe pain and 10% to 21% reporting moderate pain, especially during a primary appointment.²⁶

Subgingival calculus showed negative correlation with intra-operative and post-operative pain scores (Table 2). Presence of subgingival calculus consistently had a pain-reducing effect. This effect has not been reported elsewhere and might be attributed to the irritating effect of calculus on free nerve endings. However, no relation was found with the disease severity measured by probing depth and level of attachment (Table 2). Hence the effect of subgingival calculus on pain cannot be explained by the pathogenesis of periodontitis. It is to be remembered that all the patients selected had periodontitis in at least 2 of the instrumented teeth. Increasing depth of pocket does not lead to change in level of pain. No studies were found on the effect of subgingival calculus or disease severity on pain during scaling. Further studies on this relationship will help throw more light on the subject.

Baseline pain levels did not show any correlation with intra- and post-operative pain scores, while intra- and post-operative pain scores were positively correlated. Baseline pain scores have limited value in understanding the pain experienced by a person. Age had no correlation with pain scores. In a study comparing occurrence of pain with different periodontal treatment procedures, pain scores decreased with age.²⁶

Though female patients showed higher values for all the three pain scores no significant difference in mean pain scores between males and females was found. It also has to be taken into account that there were only three female patients in the sample. In the study comparing experience of pain with different periodontal treatment procedures, no statistically significant dif-

ferences were found between male and female patients' discomfort during periodontal treatments.¹

Duration of instrumentation did not correlate with the pain scores. Proper instrumentation did not increase pain with respect to time but it should be remembered that only three teeth were instrumented per appointment in our study. No literature was found, which had related the duration of instrumentation with experience of pain.

In a study on pain experience during different periodontal procedures, there was a high correlation between pain experienced at the previous primary probing depth and how painful the current scaling was perceived.²⁶ Our study did not look into this aspect on pain experience.

Conclusion

Fear of pain is a common reason why patient avoids professional dental care, with the sight of an anesthetic needle the most fearful experience in dentistry. Yet it is common experience that the same procedures elicit different levels of pain in different patients. The study made an attempt to better understand the factors related to experience of pain associated with scaling and root planing in periodontitis patients. Age and gender, which are usually related with pain, were not correlated in the present study. Subgingival calculus was negatively correlated with pain. Severity of periodontitis and presence of supragingival calculus did not affect the level of pain experienced.

Clinical implications

Scaling and root planing is associated with pain. Age, sex, severity of periodontitis, and presence of supragingival calculus were not correlated with pain.

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