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Evaluation of Pain Experience During and After Scaling and Root Planing (SRP) Using Local / Topical Anesthetic Agents: A Comparative Study.

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ABSTRACT

To evaluate the pain experience of the patient during and after scaling and root planing (SRP) using local or topical anesthetic agents. A total of 30 Chronic Periodontitis patients participated in this study. Three quadrants in each patient were randomly allotted to receive non-surgical periodontal therapy i.e. scaling & root planing (SRP) with 2% lidocaine injection (Group 1) or topical application of 8% Lidocaine + 0.8% Dibucaine (Group 2) or 2% lidocaine gel (Group 3). Pain was assessed midway through the treatment and immediately after treatment (post-operatively) using Visual Analogue Scale (VAS). The patients were asked about pain /discomfort following treatment after one day and their preference for the anesthetic if any. ANOVA followed by Bonferroni's post hoc Analysis was used to compare the mean pain score in all the three study groups. Paired t-tests were used to analyse pain scores during and after treatment in each groups. The inter-group comparisons of mean pain score in all the 3 study groups during procedure and post-operatively among the groups were statistically significant(< 0.05) but pain scores during the procedure between group 2 and group 3 were not statistically significant (0.061). The experience of pain or discomfort one day post operatively was significantly higher in Group1 (2% Lidocaine Injection) 70% compared to Group 2 (8% Lidocaine + 0.8% Dibucaine) 36.70% and group 3 (2% Lidocaine Topical) 46.70%. Though 56.70% of the patients in the study preferred (8% Lidocaine + 0.8% Dibucaine) anesthetic gel for procedure over 2% Lidocaine anesthetic Injection and 2% Lidocaine Topical. Lidocaine Injection 2% was more effective in controlling pain during scaling and root planing than 8% Lidocaine + 0.8% Dibucaine and 2% Lidocaine Topical, but 8% Lidocaine + 0.8% Dibucaine anesthetic gel had less pain/discomfort one day post-operatively and most preferred anesthetic when compared with other two as it avoided postoperative numbness, fear from needle prick and favourable taste of the anesthetic gel.

Keywords: Anesthetic gel; Dibucaine; Discomfort; Lidocaine; Pain; Scaling and root planning (SRP).

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INRODUCTION

Periodontal disease is a chronic inflammatory disease that causes destruction of the periodontal tissues that surround and support the teeth. Mechanical debridement i.e. scaling and root planing is mandatory to eliminate and to arrest the further progression of periodontal tissue destruction.

Painful experiences often accompany diagnostic and therapeutic procedures involving periodontal tissues (Pihlstrom et al. 1999).[1] Patients vary in their ability to tolerate painful or stressful dental procedures (Klages et al. 2004).[2]

Scaling is often associated with discomfort if not pain; sub-gingival scaling and root planing appear to be more painful than supragingival scaling that differs in its severity from one person to another. It is often necessary to use local anaesthesia during subgingival scaling and root planing (SRP) to control pain and discomfort.[3]

Injectable anesthetics are effective in controlling pain even though patients avoid due to fear of the needle, as well as for the prolonged numbness of adjacent tissues, such as the lips and tongue. Topical anaesthetics have been used in dentistry to reduce or eliminate discomfort associated with needle penetration (Hutchins et al. 1997, Alqareer et al. 2006) and control pain during periodontal procedures.[4, 5]

When compared with placebo, topically applied lidocaine-containing bioadhesive patches (Carr & Horton 2001) significantly reduce pain.6 Anaesthetic in a thermosetting agent (Donaldson et al. 2003; Jeffcoat et al. 2001) was also shown to be effective in controlling pain during scaling and root planing.[7, 8] Topical anaesthetics may also be preferred because they produce less post-procedure numbness (van Steenberghe et al. 2004).[9] Precaine® is a topical anesthetic containing (8% lidocaine + 0.8% dibucaine) that is commercially available. This product has proved to be reliable in reducing pain during intraoral procedures like palatal injections, inferior alveolar nerve block and gingival depigmentation using laser.

Local anesthetic injection is considered as a gold standard for controlling the pain during dental procedure, although various topical anesthetic gels have been used to controlled pain during various dental procedures. So, this study was carried out to evaluate the pain and discomfort experience during and after scaling and root planing (SRP) using local and topical anesthetic agents.

MATERIALS AND METHODS

A total of 30 patients with chronic periodontitis (21 males and 9 females; age range: 25 to 50 years) were included in the study. The study was conducted in Department of Periodontology, Rajarajeswari Dental College and Hospital, Bangalore. The treatment procedure was explained to the patient and written consent was obtained. Ethical clearance was obtained from Institutional Ethical Committee Review Board. Patients with minimum age 25 years who were systemically healthy, able to comprehend the visual analogue scale and had at least three dental quadrants each with two or more non-adjacent pockets $\geq$ 5mm were included in the study. Exclusion criteria included patients with abscess and endodontic infections, patients requiring antibiotic prophylaxis before root planing, patients allergic to lidocaine or currently under medication such as analgesics. In each patient, three sites (each in different quadrants) were randomly allotted to one of the following groups. Group 1 included the sites that received scaling & root planing (SRP) with LA injection. Group 2 included the sites that received scaling & root planing (SRP) with topical application of 8% lidocaine gel+0.8% Dibucaine gel (Figure 1). Group 3 included the sites that received i.e. scaling & root planing (SRP) with 2% lidocaine gel (Figure 2).

Before scaling and root planning, each subject completed a medical and dental history questionnaire and underwent periodontal examination. Participants were individually instructed about the Visual Analogue scale (VAS). VAS is usually a horizontal line, 100 millimetres in length anchored by word descriptors at each end, as illustrated in Figure 3.[10] The patient marks a point on the horizontal line according to his or her perception of the current state of pain. The VAS score is determined by measuring in millimetres from the left hand end of the line to the point that the patient mark. Pain was assessed during the treatment i.e. approximately midway through treatment (intra-operatively) and immediately after treatment (post-operatively).

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Figure 1: 8% Lidocaine + 0.8% Dibucaine anesthetic gel

Figure 2: 2% Lidocaine anesthetic gel

Single operator performed the subgingival scaling & root planing (SRP) and assessed the main outcome. SRP was performed after administration or application of the anesthetic for the selected three groups in the same appointment. The patients were asked to indicate the intensity of pain experience during the treatment with the aid of the Visual Analogue Scale (VAS) [10] five minutes after the onset of the procedure i.e. mid-way during the procedure (intra-operative) & immediately after the completion of treatment. The day following the completion of treatment; patients were asked about the pain /discomfort from the treatment and their preference of the anesthetic (as per their comfort) were recorded.

Figure 3: Visual Analogue scale (VAS). Horizontal line,100 millimetres in length.

Statistical Analysis

The statistical analysis was done using SPSS version 15.0 statistical analysis software. ANOVA followed by Bonferroni's post hoc Analysis were used to compare the mean pain score in all the three study groups. Paired t-tests were used to analyse pain scores during and after treatment in each groups. Chi-square test was done to compare the pain/discomfort following treatment and preferred anesthetic method by patients. In this study $p \leq 0.05$ was considered to be significant.

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RESULTS

Thirty patients (21 males and 9 females) in the age range of 25 to 50 years (mean35.07±6.44) participated in the study and they were equally allocated to the groups. **Table 1**.shows the inter-group comparisons of mean pain score in all the 3 study groups using ANOVA followed by Bonferroni's post hoc analysis during and after treatment. As the table shows, the pain scores during the procedure and after treatment (post-operatively) among groups were statistically significant ($p \leq 0.05$). However, the comparison of pain scores during the procedure between group 2 and group 3 were found to be not statistically significant.

Table 1: Comparison of mean pain perception in all the three study groups using ANOVA followed by Bonferroni's post hoc Analysis

Time Period	Groups	N	Pain Score Mean	SD	p-value	Sig. diff	p-value
During treatment	G1 (2% Lidocaine Injection)	30	6.6	12.47	<0.001*	G1 Vs G2	0.015*
	G2 (8% Lidocaine + 0.8% Dibucaine) Topical Gel	30	14.53	9.508		G1Vs G3	<0.001*
	G3 (2% Lidocaine) Topical Gel	30	19.33	9.654		G2 Vs G3	0.061**
After Treatment (postoperative)	G1 (2% Lidocaine Injection)	30	3.87	8.308	<0.001*	G1 Vs G2	<0.001*
	G2 (8% Lidocaine + 0.8% Dibucaine) Topical Gel	30	8.77	6.632		G1 Vs G3	0.05*
	G3 (2% Lidocaine) Topical Gel	30	12.83	8.424		G2 Vs G3	0.042*

***-significant ** - not significant**

The mean pain scores for Group1 (2% Lidocaine Injection), Group 2 (8% Lidocaine + 0.8% Dibucaine) and group 3 (2% Lidocaine Topical) were statistically significant during the procedure as well as post-operatively with $p \leq 0.05$ for all the three groups **(Table 2, 3, 4)**.

Table 2: Comparison of pain perception in Group 1 (2% Lidocaine Injection) using Paired't' test

Time Period	N	Pain Score Mean	SD	SE	p-value
During treatment	30	6.60	12.47	2.28	0.004*
After Treatment (postoperative)	30	3.87	8.31	1.52	

Table 3: Comparison of pain perception in Group 2 (8% Lidocaine + 0.8% Dibucaine) Topical Gel using Paired't' test

Time Period	N	Pain Score Mean	SD	SE	p-value
During treatment	30	14.53	9.51	1.74	<0.001*
After Treatment (postoperative)	30	8.77	6.63	1.21	

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Table 4: Comparison of pain perception in Group 3 (2% Lidocaine) Topical Gel using Paired't' test

Time Period	N	Pain Score Mean	SD	SE	p-value
During treatment	30	19.33	9.65	1.76	<0.001*
After Treatment (postoperative)	30	12.83	8.42	1.54	

*-significant

The experience of pain or discomfort one day after procedure was significantly higher in Group1 (2% Lidocaine Injection) 70% compared to Group 2 (8% Lidocaine + 0.8% Dibucaine) 36.7% and group 3 (2% Lidocaine Topical) 46.70% **(Table .5).**

Table 5: Comparison of Pain / Discomfort one day after the completion of treatment, by different study groups

Study Groups	Distribution	Pain / Discomfort		Chi-Square	P-Value
		Present	Absent		
G1 (2% Lidocaine Injection)	N	21	9	7.026	0.03*
	%	70.00	30.00		
G2 (8% Lidocaine + 0.8% Dibucaine) Topical Gel	N	11	19		
	%	36.70	63.30		
G3 (2% Lidocaine) Topical Gel	N	14	16		
	%	46.70	53.30		

*-significant

Of the total patients, 56.7% preferred (8% Lidocaine + 0.8% Dibucaine) anesthetic gel for procedure, 33% preferred 2% Lidocaine anesthetic Injection and only 10% preferred 2% Lidocaine Topical **(Table .6).**

Figure 4: Mean pain score during and after treatment

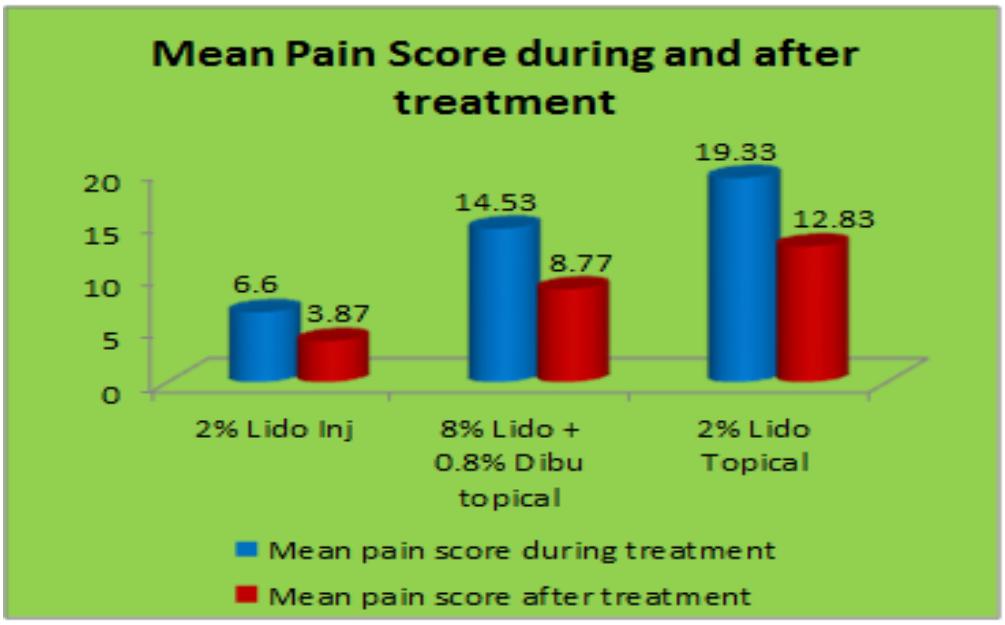

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Table 6: Comparison of preference to the type of Anaesthesia by different study groups

Study Groups	Distribution	Preference		Chi-Square	P-Value
		Preferred	Not Preferred		
G1(2% Lidocaine Injection)	N	10	20	14.7	0.001*
	%	33.30	66.70		
G2 (8% Lidocaine + 0.8% Dibucaine) Topical Gel	N	17	13		
	%	56.70	43.30		
G3 (2% Lidocaine) Topical Gel	N	3	27		
	%	10.00	90.00		

*-significant

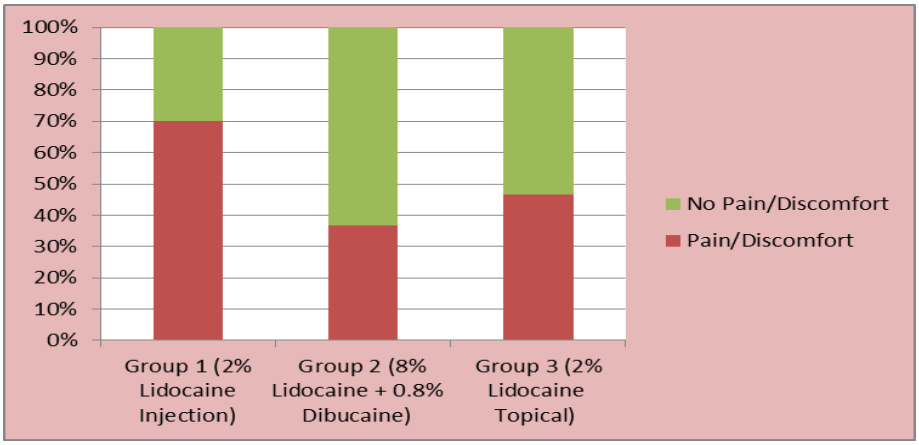

Figure 5: Amount Pain / Discomfort one day after the completion of treatment

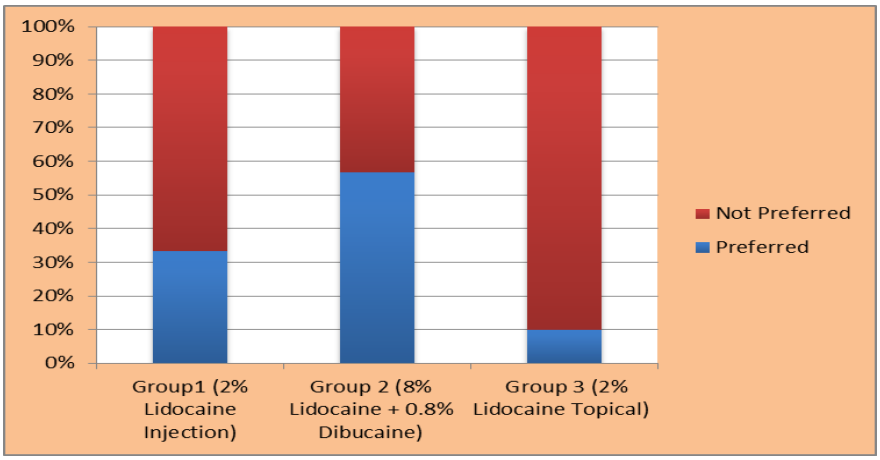

Figure 6: Preference of Anaesthesia by different study groups

DISCUSSION

It is widely accepted that injectable anesthesia is the first choice for routine SRP procedures. However, needles are associated with pain, anxiety and fear. As a result; some patients prefer to bear mild or moderate pain during SRP rather than receiving an injection. In the present study, among the three anesthetic agents, 2% Lidocaine Injection shows less mean pain score of 6.6 during procedure and 3.87 post operatively; compared to 8% Lidocaine + 0.8% Dibucaine(14.53 and 8.77) and 2% Lidocaine Topical (19.33 and 12.83) [Figure .4].

However, the experience of pain or discomfort one day after the procedure was found to be more pronounced with 2% Lidocaine Injection (70%) as compared to 8% Lidocaine + 0.8% Dibucaine (36.70%) topical

and 2% Lidocaine topical (46.70%) [Figure .5]. This finding may be due to the needle prick pain during injection and the post-anesthetic discomfort such as numbness.

In a study by Hassan et al, pain or discomfort during and after non-surgical periodontal therapy is more with 2% Xylocaine when compared to local anesthetic gel (Benzocaine 18.0% and Tetracaine hydrochloride 2.0%).[11] In another study by Nayak R et al., evaluation of three topical anesthetic agents against pain was done wherein 18% Benzocaine, 5% Lignocaine and 5% EMLA were used. Results suggested that benzocaine had the rapidest onset of action followed by lignocaine and EMLA cream.[12] Although some study shows that benzocaine gel is less effective than injected lidocaine in controlling pain during scaling and planing (Stoltenberg et al, 2007).[13]

On the other hand, results of the present study indicated that among all the patient in the study groups 56.70% preferred (8% Lidocaine + 0.8% Dibucaine) anesthetic gel for procedure compared to 33% for 2% Lidocaine anesthetic Injection and only 10% for 2% Lidocaine Topical gel [Figure.6]. Despite significantly lower analgesic efficacy of (8% Lidocaine + 0.8% Dibucaine) anesthetic gel over 2% Lidocaine anesthetic injection, (8% Lidocaine + 0.8% Dibucaine) anesthetic gel was preferred by more than half of the study population. Topical anaesthetics may be preferred over injected anaesthetics for various reasons such as painless application of anaesthetics and minimum post-operative discomfort like numbness. Fear of pain is common reason patients avoid professional dental care (Milgrom et al. 1997), and for some the sight of an anaesthetic needle may be the most fearful experience in dentistry (Kleinknecht et al. 1973).[14, 15]

In this study we have found 2 % Lidocaine injection anaesthesia controlled pain more effectively than the (8% Lidocaine + 0.8% Dibucaine) anesthetic gel and 2% Lidocaine anesthetic gel, but more than half of the study population preferred (8% Lidocaine + 0.8% Dibucaine) because 2 % Lidocaine injection resulted in prolonged postoperative numbness and they are willing to tolerate mild to moderate pain to avoid anesthetic injection. Another reason for preference (8% Lidocaine + 0.8% Dibucaine) is the taste of the gel which is more acceptable than the other anesthetic agent. The limitation of the present study is that the longevity of the effectiveness of the topical anesthetic gel could not be determined.

This study was probably the first which evaluate the pain and discomfort experience during and after scaling and root planing (SRP) using 2 % Lidocaine injection anaesthesia, 8% Lidocaine + 0.8% Dibucaine anesthetic gel and 2% Lidocaine anesthetic gel. Further studies are needed to determine the efficacy of topical anesthetic gel over injected anesthesia.

CONCLUSION

From the present study it can be concluded that 8% Lidocaine + 0.8% Dibucaine anesthetic gel is more efficacious as a topical anesthetic agent. Eventhough injectable anesthetic is more effective in controlling pain; patient's preferred 8% Lidocaine + 0.8% Dibucaine anesthetic gel during SRP rather than receiving an injection, main reason being the pain, anxiety and fear associated with needle prick. 8% Lidocaine + 0.8% Dibucaine anesthetic gel is viable anesthetic option during scaling and root planning.

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