Original Article

Efficacy of Lavender Oil as a Topical Analgesic Agent in Pain Reduction during Periodontal Probing: A Split-mouth Study

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ABSTRACT

Background: Initial periodontal examination, which includes full-mouth periodontal probing, is one of the discomforting procedures for a patient. Anesthetic agents are frequently used to achieve topical analgesia while probing. Lavender oil is an herbal agent with minimal side effects observed to show anesthetic properties. To evaluate the anesthetic effect of lavender oil as compared to 5% lignocaine gel, a placebo gel, and no gel application in the management of pain during probing in periodontitis patients. **Materials and Methods:** Thirty subjects with generalized periodontitis were enrolled in the study, each having at least four pockets with a periodontal pocket depth of ≥4 mm. The four sites were randomly assigned as follows: Group A - no gel application; Group B - glycerine; Group C - lavender oil; and Group D - 2% lignocaine gel. Thirty seconds after the topical application of the respective gels, periodontal probing was performed using an UNC-15 probe. The Visual Analog Scale and verbal rating scale were recorded during probing. **Results:** No statistically significant result was found between lavender oil and lignocaine gel used for pain management during periodontal probing ($P \geq 0.05$). **Conclusion:** Topically applied lavender oil is effective for pain control during pocket probing in patients with periodontitis.

Keywords: Analgesic, Lavender oil, Periodontal probing.

Introduction

Gingiva, periodontal ligament, cementum, and alveolar bone consist of the periodontium. Loss of both soft and hard tissue attachments around teeth may result in periodontal disease. This attachment loss is a result of an immune-inflammatory host response due to microbial dysbiosis.[1] Periodontal disease can be diagnosed based on both clinical and radiographic parameters. Clinical examination primarily involves visual assessment of the periodontal soft tissues and the use of a periodontal probe. Periodontal probing also enables the clinician to detect subgingival calculus and root surface irregularities. The probing depth is considered an indirect measure of the inflammatory status of the patient, as inflamed periodontal tissues exhibit a reduced resistance to probing, perceived as increased probing depth. The periodontal pocket is defined as a pathologically deepened gingival sulcus around a tooth at the gingival margin.[2] Periodontal probing is painful for most of the patients due to inflamed and vascularized periodontal tissues. The inflammatory cells infiltrate into the connective tissue at the base of the pocket, due to which periodontal probing elicits a pain response. The level of periodontal inflammation influences how painful and uncomfortable the procedure is.[3] The Visual Analog Scale (VAS), which is a valid, highly dependable, and simple to use tool, is frequently used to quantify or analyze pain in studies.

There are currently very few chairside methods for reducing discomfort during periodontal probing. One approach is local anesthesia using the infiltration technique; however, this has the drawback of a longer duration of anesthesia and requires numerous penetrations for complete mouth probing, making it impracticable. Jellies, sprays, and ointments are some of the more recent innovations used to accomplish this goal. Patients appreciate these methods more than traditional injection techniques since they are more patient-friendly, easy to apply, and do not cause lingering numbness.[4] Currently, many intrapocket anesthetic gels are available, including lidocaine, prilocaine, lignocaine, and benzocaine. However, there is a dearth of usage of natural herbal compounds with anesthetic

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properties, such as peppermint, tulsi, ginger, and clove, which are locally available but not marketed commercially. Evidence from allied medicinal sciences has discussed role of preparations from few herbal plants, and essential oils such as clove oil, eugenol, and thymol as topical analgesic agents.[5] One such essential oil, lavender oil, has been described in the literature as an aromatherapy agent and has been proven to decrease anxiety and alleviate pain during the administration of a local anesthetic agent in a dental operatory.

Materials and Methods

The study was a split-mouth clinical trial that compared the action of herbal essential oil to lignocaine gel while probing in untreated periodontitis patients. The study was conducted in the Department of Periodontology and Oral Implantology at Pacific Dental College and Hospital, Udaipur, Rajasthan, in February 2024 and completed in March 2024.

Thirty participants (17 males and 13 females) aged 18–65 years of age were recruited from the Outpatient Department of Periodontics of Pacific Dental College and Hospital, Udaipur, in relation to their periodontal condition. The participants were informed about the procedure, and verbal consent was obtained.

At the screening visit, the examiner performed a routine thorough intra-oral and extra-oral examination along with recording detailed case history and, if indicated, radiographic examination to identify patients with periodontitis.

Inclusion criteria were: (i) 18–65 years of age. (ii) Generalized probing depth ≥4 mm. (iii) Patients should not have undergone SRP/detailed periodontal treatment in the previous 12 months. (iv) Patients who had given written consent. The following participants were excluded from the study: (i) Those suffering from any systemic diseases. (ii) Pregnant and lactating women. (iii) Allergy from herbs or lignocaine allergy. (iv) Those taking non-steroidal anti-inflammatory drugs or analgesics in the 3 days before participation in the study.

Out of the patients examined, 30 met the inclusion criteria and were enrolled in the study. The quadrants were randomly divided using the coin toss method into four groups: Group A - No gel application, Group B - Glycerine, Group C - Lavender oil, and Group D - Lignocaine gel (30 sites in each group). Commercially available Lignocaine Ointment (Xylocaine® 5%), lavender essential oil, and Glycerin (Allied's Glycerin Min 98%) were used.

Procedure

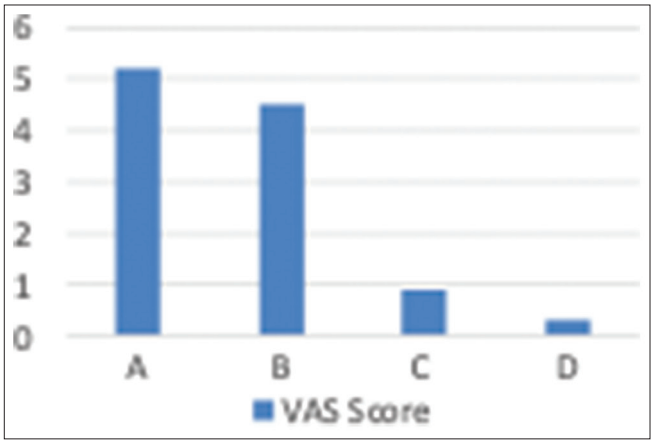
Due to the split-mouth study design, anesthetic gels were administered to respective quadrants. Using cotton rolls, the quadrant was dried, isolated appropriately, and rendered saliva-free. Gels were applied topically with the help of applicator tips and left in place for 30 s before starting to probe. A UNC-15 probe was used to quantify the depth of the periodontal pockets at six different locations on each tooth. The gels were removed using a water spray once all the measurements had been taken and recorded. Independent data for each group were collected using the VAS (Graph 1) and Numerical Rating Scale (NRS) (Graph 2), which measures pain intensity on a scale.

Statistical analysis

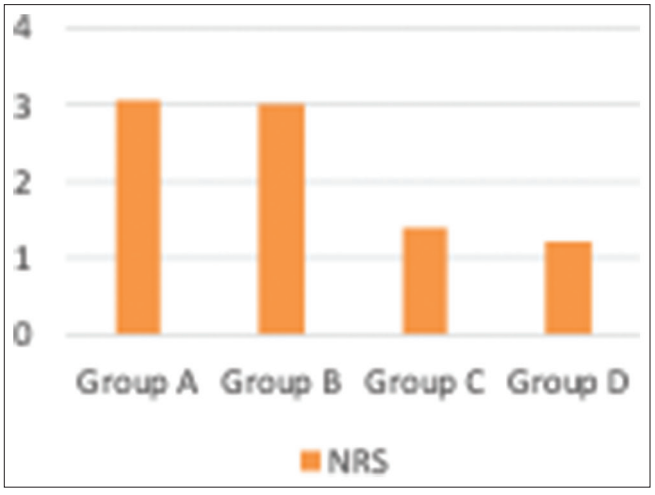
The recorded data were compiled, and descriptive statistics and data analysis were performed using SPSS software version 2.0 by an experienced statistician. Overall mean values of clinical parameters of eligible sites were calculated, and groups were compared. As the data were normally distributed, the significance of differences among all the groups was tested by analysis of variance (ANOVA). *Post hoc* significance was also evaluated to calculate significance between each group. $P \leq 0.05$ was considered statistically significant.

Results

A total of 30 participants successfully completed the study without experiencing any adverse effects from the topical gels. Pain perception was measured using the VAS and the NRS for each of the four treatment groups. ANOVA results showed a statistically significant difference among the groups (P = 00.000) (Table 1). *Post hoc* analysis revealed that the



Graph 1: Comparison of mean visual analog scale score



Graph 2: Comparison of mean numerical rating scale score

Table 1: Comparison of mean VAS score

VAS score	Mean	Standard deviation	Standard error	*P*-value
Group A	5.20	1.91	0.35	00.000*
Group B	4.53	1.40	0.25	
Group C	0.90	0.84	0.15	
Group D	0.30	0.79	0.14	

VAS: Visual Analog Scale

difference between Group C (lavender oil) and Group D (Lignocaine) was not statistically significant ($P > 0.05$), indicating equivalent effectiveness (Table 2). In contrast, Groups A and B had significantly higher pain scores than Groups C and D ($P \leq 0.001$), confirming the analgesic benefit of both lavender oil and lignocaine gel. Similar to the VAS outcomes, ANOVA showed significant differences across the groups ($P = 00.000$) for NRS scores (Table 3). *Post hoc* testing again revealed that Group C and Group D were not significantly different from each other ($P > 0.05$), while both were significantly different from Group A and B ($P \leq 0.001$) (Table 4).

These findings strongly suggest that lavender oil is as effective as 2% lignocaine gel in managing pain during periodontal probing.

Discussion

Essential oils provide a new, organic, and safe alternative to relatively risky pharmacological agents. Lavender, or Lavandula, belonging to the Lamiaceae family, is one of the most commonly studied medicinal herbs. The flower of the shrub, which is purple–blue in color, has been used to treat various ailments since ancient times. Lavender oil is widely used in a variety of applications, including perfumes, topical treatments, aromatherapy, and massage therapies. A standardized oral preparation called Silexan is also used for the treatment of anxiety disorders.[6]

The main constituents of lavender oil are linalool, linalyl acetate, 1,8-cineole, -ocimene (usually both cis and trans-), terpinen-4-ol, and camphor. Linalool, a major component of lavender oil, is believed to inhibit acetylcholine release and alter ion channel function in the region of the neuromuscular connection. Due to that, linalyl acetate exhibits narcotic function and also performs as a sedative. This indicates the use of this herb as a traditional analgesic, and since massage facilitates absorption of volatile oil by skin, linalool and linalyl acetate are rapidly absorbed by skin massage.[7]

In periodontology, lavender essential oils find their potential place. Its ability to inhibit prostaglandins may contribute to its pain-relieving properties.[8] Due to these inherent effects, lavender essential oils can be a prospective replacement for non-steroidal anti-inflammatory drugs in dentistry. It can also be used locally as an ointment for gingivitis.[9]

Results of the present study showed that the VAS scores and Numerical rating scores obtained were statistically highly

Table 2: *Post hoc* comparison for VAS scores

Comparison	Mean difference	*P*-value
A versus B	0.67	0.054
A versus C	4.30	0.000*
A versus D	4.90	0.000*
B versus A	−0.67	0.054
B versus C	3.63	0.000*
B versus D	4.23	0.000*
C versus A	−4.30	0.000*
C versus B	−3.63	0.000*
C versus D	0.60	0.082
D versus A	−4.90	0.000*
D versus B	−4.23	0.000*
D versus C	−0.60	0.082

VAS: Visual Analog Scale

Table 3: Comparison of mean NRS score

Groups	Mean	Standard deviation	Standard error	*P*-value
Group A	3.06	0.78	0.14	00.000*
Group B	3.00	0.64	0.11	
Group C	1.40	0.49	0.09	
Group D	1.23	0.50	0.09	

NRS: Numerical rating scale

Table 4: *Post hoc* comparison for NRS scores

Comparison	Mean difference	*P*-value
A versus B	0.06	0.67
A versus C	1.66	0.000*
A versus D	1.83	0.000*
B versus A	−0.06	0.67
B versus C	1.60	0.000*
B versus D	1.76	0.000*
C versus A	−1.66	0.000*
C versus B	−1.60	0.000*
C versus D	0.16	0.29
D versus A	−1.83	0.000*
D versus B	−1.76	0.000*
D versus C	−0.16	0.29

NRS: Numerical rating scale

significant between all groups ($P = 0.000$). *Post hoc* analysis revealed that comparison of Group A and Group B and Group C and Group D had a non-significant result ($P > 0.05$), while all other comparisons showed a significant difference. The obtained results indicate that lavender oil can be effectively used as an anesthetic agent in reducing pain during periodontal probing. These results are similar to various studies that used lavender essential oil either as a topical application or aromatherapy to reduce pain and anxiety.

In a study by Pathan *et al*., lavender oil has been used as an adjunct to topical benzocaine anesthesia. They found the oil efficacious in reducing pain.[10] Kim *et al*.[11] studied the effect of lavender oil fumes coated on an oxygen mask to reduce bispectral index (BIS) value by minimizing stress associated

with needle insertion in 30 participants. They observed that the stress and BIS value for perception of stress got reduced significantly ($P < 0.001$) when compared against the control during aromatherapy. In addition, the pain intensity associated with needle insertion was significantly decreased after aromatherapy compared with the control ($P < 0.001$).

In a systematic review by Cai *et al*. in 2021,[12] the overview of selected clinical trials has shown that the aromatherapy used in dental clinics might be more effective to reduce dental anxiety compared to a negative control condition without aromatherapy and has comparable effects on dental anxiety to music intervention. The most commonly used aromatherapy intervention for dental anxiety management is the lavender fragrance.

The result suggests the use of lavender oil as a simple, low-risk, cost-effective, topical intervention with high potential to reduce pain during probing.

Conclusion

The findings of this study suggested that lavender oil can be used as an herbal alternative to Lignocaine for reducing pain during periodontal examination. Additional studies should be conducted on a large scale to understand the anesthetic effect of lavender oil accurately.

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