



EFFICACY AND SAFETY PROFILE OF LEMON GRASS OIL AND CHLORHEXIDINE MOUTHWASH AS AN ADJUNCT TREATMENT AGAINST GINGIVITIS AND PLAQUE CONTROL

Rabbia Jabbar^{1*}, Kanwal Nazir Arbab², Ayesha Iftikhar³, Amber Javaid⁴, Muhammad Sheraz Alam⁵, Muhammad Usman⁶

^{1*}Senior Lecturer, Department of Pharmacology, Rehman College of Dentistry, Peshawar

²Assistant Professor, Department of Community Dentistry, Rehman College of Dentistry, Peshawar

³Assistant Professor, Department of Pharmacology, Rehman Medical College, Peshawar

⁴Assistant Professor, Department of Pharmacology, Peshawar Medical College, Peshawar

⁵Associate Professor, Department of Oral Biology, Rehman College of Dentistry, Peshawar

⁶Lecturer, Department of Pharmacology, Kabir Medical College, Peshawar

*Correspondence: Dr. Rabbia Jabbar

*E-mail: rabbiajabbar@hotmail.com

ABSTRACT

Background: Gingivitis, a common disease owing to plaque deposition, especially in the elderly population, may progress to periodontitis. Chlorhexidine-based mouthwashes and lemongrass oil, which has antibacterial and anti-inflammatory properties, are effective treatments for this malady, although its efficiency has not been thoroughly investigated.

Objective: To compare the effect of 0.25% lemongrass oil mouthwash versus 0.25% chlorhexidine mouthwash on plaque formation and gingivitis.

Study Design: Quasi experimental.

Place and Duration of Study: Department of Periodontology, Peshawar Dental College, Peshawar from 1st February 2022 to 31st July 2022.

Methodology: One hundred and six gingivitis patients were enrolled and divided into two groups. The lemongrass oil mouth wash (Group A) was given 0.25%, and the chlorhexidine mouthwash 0.25% was received by the other Group, B. Plaque index and gingival index scores were measured at the beginning, on day 14, and then 21 days later. For 21 days, both groups used their treatments twice daily.

Results: Both mouth treatments considerably reduced plaque and gingivitis. However, lemongrass oil mouthwash caused considerably fewer side effects than chlorhexidine. There was potential in using lemongrass oil mouthwash, suggesting a natural choice to the supra hygienic oral wash solution.

Conclusion: Due to their low side effect profile and matched efficacy, alternative management must be investigated for gingivitis.

Key words: Chlorhexidine mouthwash, Dental inflammation, Gingivitis, Lemon grass oil, Plaque

INTRODUCTION

Gingivitis and plaque control are important aspects of oral hygiene and one's well-being. In this respect, the primary mechanical cleaning with the use of brushing and flossing has a foundation while mouthwashes serve as an additional treatment.^{1,2} However, it is also critical to know which

mouthwash is the most efficient and has no side effects for the oral cavity.³ One of the comparisons that can be made is between lemongrass oil and chlorhexidine mouthwash. Chlorhexidine is a commonly used product with a strong anti-plaque and anti-gingivitis effect whose safety is being questioned due to the possibility of staining, change in taste, and inhibition of the oral cavity microbiome.⁴

Lemon grass oil is obtained from lemon grass plant and there is evidence that reveal the benefit of lemongrass oil in oral health care.^{5,6} From previous studies, pronounced bacteriostatic effect of the plant extract and other specific significant antimicrobial activity confirms the possible use of this plant in place of chemical preparations for the treatment of the oral cavity.^{7,8} Lemon grass oil also has a good and attractive fragrance that is refreshing to many and also helps to freshen up the mouth. The use of lemongrass oil can effectively be utilized in combating bacteria but the depth and the strength of the oil may differ due to its quality.⁹

Whereas, chlorhexidine mouthwash, is a synthetic formula that prescribe broad acceptance in dental practice on account of its powerful bactericidal properties.¹⁰ It is good for eradicating a wide variety of bacteria and is usually recommended to be used for managing periodontal illness and avoiding brand-new plaque buildup.⁴ Chlorhexidine mouthwash therefore appears to be a highly effective and predictable antiseptic agent regarding control of oral bacteria when applied in manners recommended by dentists.¹¹ Drawbacks have also been noted to include discoloration of the teeth and distortion of taste buds when the medication is taken for a long term.¹² While, lemon grass oil mouthwash is consider as organic remedies to avoid the effects of the chemicals used in treatment.¹³

Consequently, there is the need of studies that show natural alternatives with the same efficiency and a lesser number of side effects. In this aspect, lemongrass oil seems to have antimicrobial and anti-inflammatory properties that may have an application in oral health.¹⁴ Various studies showed that it reduces plaque and gingivitis, but the direct comparison with chlorhexidine is insufficiently covered.¹¹⁻¹³

Therefore, knowing its efficiency could help to move towards the sustainable oral products without the risk of damage. Hence the present study will provide the comparison of lemongrass oil and chlorhexidine mouthwash for effective, safe and potentially sustainable interventions for gingivitis and plaque control. The findings presented in the current paper would provide for the evidence-based practices.

MATERIALS AND METHODS

This quasi experimental study was conducted at the Department of Periodontology, Peshawar Dental College, Peshawar from 1st February 2022 to 31st July 2022. One hundred and six gingivitis patients were enrolled and divided into two groups. A sample size calculation was performed using G-power software taking level of statistical power 80% and acceptable level of significance i.e., alpha, was 0.05. The lemongrass oil mouth wash (Group A) was given 0.25%, and the chlorhexidine mouthwash 0.25% was received by the other Group, B. Participants were recruited through dental clinic patients. Eligible participants received detailed information about the study protocol and risks. The demographic information (age, gender, ethnicity), medical history (relevant systemic conditions, medications), oral health history (previous dental treatments, smoking habits), clinical periodontal assessment (Gingival Index, Bleeding on Probing, Plaque Index) was collected. Potential participants were screened for eligibility based on pre-defined criteria, including 18-45 years of age, diagnosed with mild to moderate gingivitis based on established clinical indices (e.g. Gingival Index, Bleeding on Probing), plaque index score above a specified threshold, no history of allergic reactions to lemongrass or chlorhexidine, no current use of other mouthwashes or medications affecting oral health (e.g. antibiotics, other antiseptics), non-smokers or at least 3 months smoke-free, no systemic conditions affecting oral health (e.g. uncontrolled diabetes). The patients excluded from this study were pregnant or lactating women, history of severe periodontal disease, any medical condition requiring antibiotic prophylaxis, participation in another clinical trial within the past 3 months, uncontrolled systemic diseases potentially affecting oral health (e.g. diabetes, uncontrolled HIV), and

inability to understand or comply with study instructions. Gingival Index (GI) and Plaque index (PI) was used to validate clinical index assesses the degree of inflammation. All clinical examinations were conducted by trained examiners. Standard protocols for GI and PI assessments were followed to ensure consistency and minimize measurement error.

The collected data was analyzed using SPSS-25. The change in GI scores from baseline to post-intervention was compared between groups using student t- test. The alpha level for hypothesis testing was set at 0.05, indicating a 5% chance of concluding there is a significant difference when there is none (Type I error).

RESULTS

There were 27 males and 26 females in group A while in group B, 24 males and 29 females respectively. PI for each coverage category i.e., no plaque, 1/3, 1/3-2/3, and >2/3 for group A and B were 0.0, 8, 24 and 68% and 0.0, 4, 11 and 85%, respectively at baseline. This was 24.5, 30.2, 26.4 and 18.9%, in group A and 11.3, 15.1, 17 and 56.6 % at group B at day 14, respectively. And, 56.6, 34.0, 1.9 and 7.5%, in group A and 37.7, 30.2, 13.2 and 18.9%, at group B at 21st day, respectively (Table 1).

Beside plaque index, patients with normal gingiva, mild inflammation, moderate inflammation and severe inflammation in group A were 0.0, 0.0, 28.3 and 71.7 % and, in group B were 0.0, 0.0, 22.6 and 77.4, respectively at baseline. This was 18.9, 18.9, 9.4 and 52.8 % in group A and 7.5, 13.2, 20.8 and 58.5 % in group B at day 14, respectively. And, 47.1, 34, 3.8, and 15.1% in group A and 45, 15, 21 and 19 % in group B at 21st day, respectively (Table 2).

At baseline, mean plaque index score of patients were 1.64 and 1.79 in group A and B. At 14th day, this turns down by showing 1.08 and 1.12 in group A and B, respectively, at 21st day, significant decline observed i.e. 1.01 and 1.2 in group A and B, respectively. Whereas Gingival Index score was found were 2.02 and 2.16 at baseline, 1.64 and 1.74 at 14th day and 1.48 and 1.58 at 21st day in group A and B, respectively (Tables 3-4). Moreover, incidence of Swelling of the lips, tongue, or throat, dry mouth, tooth and tongue staining, changes in taste and irritation of the gums were found in group B significantly (Table 5).

Table 1: Effects of 0.25 percent lemongrass oil and 0.2 percent chlorhexidine on tooth surfaces

Variable	Baseline		Day 14		Day 21	
	Group A (n=53)	Group B (n=53)	Group A (n=53)	Group B (n=53)	Group A (n=53)	Group B (n=53)
No plaque on the tooth surface	0 (0)	0 (0)	13 (24.5%)	6 (11.3%)	30 (56.6%)	20(37.7)
1/3 rd of the tooth surface covered	4 (8%)	2 (4%)	16 (30.2%)	8 (15.1%)	18 (34%)	16(30.2)
Between 1/3 rd and 2/3 rd of the tooth surface covered	13 (24%)	6 (11%)	14 (26.4%)	9 (17%)	1 (1.9%)	7(13.2)
More than 2/3 rd of the tooth surface covered	36 (68%)	45 (85%)	10 (18.9%)	30 (56.6%)	4 (7.5%)	10(18.9)

Table 2: Effects of 0.25 percent lemongrass oil and 0.2 percent chlorhexidine on gingiva

Gingiva	Baseline		Day 14		Day 21	
	Group A (n=53)	Group B (n=53)	Group A (n=53)	Group B (n=53)	Group A (n=53)	Group B (n=53)
Normal	0 (0)	0 (0)	10 (18.9%)	4(7.5%)	25 (47.1%)	24 (45%)

Mild	0 (0)	0 (0)	10 (18.9%)	7(13.2%)	18 (34%)	8 (15%)
Moderate	15 (28.3%)	12 (22.6%)	5 (9.4%)	11(20.8%)	2 (3.8%)	11 (21%)
Severe	38 (71.7%)	41 (77.4%)	28 (52.8%)	31(58.5%)	8 (15.1%)	10 (19%)

Table 3: Mean comparison of plaque score and gingival score at Baseline, Day 14th and 21st day in group A and B

Variable	Group A		Group B
Baseline	PI	1.64±0.653	1.79±0.743
	GI	2.02±0.843	2.16±0.692
14th Day	PI	1.08±0.513	1.12±0.579
	GI	1.64±0.70	1.74±0.65
21 st Day	PI	1.01±0.57	1.2±0.56
	GI	1.48±0.53	1.58±0.569

Table 4: Comparison between 0.25 percent lemongrass oil and 0.25 percent chlorhexidine in the treatment of plaque score and gingival score

Group A		Mean	SD	Significance
PI	Base line	1.64	0.653227	0.000
	21st Day	1.01	0.575882	
GI	Base line	2.02	0.843312	0.000
	21st Day	1.48	0.536748	
Group B		Mean	SD	Significance
PI	Base line	1.79	0.743135	0.000
	21st Day	1.2	0.556796	
GI	Base line	2.16	0.692	0.000
	21st Day	1.58	0.569546	

Table 5: Adverse effects of 0.25% lemongrass oil mouthwash and 0.2% chlorhexidine mouthwash

Adverse effect	Group A	Group B	P-Value
Swelling of the lips, tongue, or throat	-	5	<0.05
Dry mouth	3	4	>0.05
Tooth and tongue staining	-	6	<0.05
Changes in taste	-	2	<0.05
Oral infections	-	-	<0.05
Irritation of the gums	-	1	<0.05

DISCUSSION

Self-performed mechanical plaque control procedures are ineffective, which contributes to the high incidence of gingivitis.¹⁵ Conversely suitable supra-gingival plaque control has been shown to be a prerequisite for preventing periodontitis and gingivitis. CHX is among the most widely used mouthwashes.¹⁶ Despite the fact that it does have some drawbacks, there has been a recent surge in interest in alternative medicine as a result. Essential oil classification includes antidepressant, antioxidant, antiseptic, bactericidal, fungicidal, astringent, nervine, and sedative properties associated with lemongrass oil.¹⁷

Although, chlorhexidine is one of the most effective antiseptic agents in this context, it causes staining of teeth and alters taste sensation, as well as causing irritation to the oral mucosa when used in the long term and, therefore, another option needs to be sought.¹⁸ Hence, among all the essential oils,

lemongrass oil, which has antimicrobial, anti-inflammatory, and antioxidant effects, would be a suitable alternate.¹⁹

The current study provides a thorough description of plaque coverage on the surfaces of teeth and the prevalence of gingival inflammation in patients from Groups A and B throughout various intervals. The similar has been reported in previous research. Scientist has evidently proven that lemongrass oil and chlorhexidine mouthwashes are effective for improving oral hygiene and reducing plaque and gingival inflammation. However, mode of action, the rate of action, and the age of formulation need to be studied.^{14,18-21}

It is vital to note that chlorhexidine is a primary antimicrobial mouthwash that demonstrates good potential in plaque control and prevention of gingivitis. This encourages the need for safe natural or herbal products considering the lemongrass oil mouthwash. That neutral difference suggests that lemongrass oil mouthwash offers a safer alternative to chlorhexidine mouthwash with fewer side effects.²²

CONCLUSION

A mouthwash containing 0.25% lemongrass oil was similarly efficacious as a mouthwash containing 0.25% CHX in enhancing PI and GI. Both 0.25% CHX mouthwash and 0.25% lemongrass oil mouthwash were equally effective in alleviating gingivitis and acting as an antiplaque agent. Thus, it is possible that lemongrass oil mouthwash could promote gingival health and plaque control, serving as an alternative to CHX and a supplement to mechanical plaque control.

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