International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319 – 6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 9; September 2017; Page No. 6017-6020
DOI: http://dx.doi.org/10.24327/ijcar.2017.6020.0855

Research Article

EVALUATION OF EFFICACY OF LEMONGRASS GEL AS A LOCAL DRUG DELIVERY WITH CHLORHEXIDINE GEL IN CHRONIC PERIODONTITIS -A COMPARATIVE STUDY

Prabahar C.S and Nivetha R

Ultra's Best Dental Science College and Dental Hospital, Madurai-Chennai Highways, Ultra Nagar, Madurai, Tamilnadu

A R T I C L E I N F O

Article History:

Received 12th June, 2017
Received in revised form 14th July, 2017 Accepted 22nd August, 2017
Published online 28th September, 2017

Key words:

Chronic Periodontitis, Lemongrass essential oil gel, Chlorhexidine gel, local drug delivery, nonsurgical periodontal therapy.

A B S T R A C T

Chronic periodontitis is defined as "an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment loss, and bone loss."The primary aim to treat periodontitis is the elimination of specific periodontal pathogens with adjunct use of local and systemic antibiotics along with scaling and root planing. Natural extracts such as lemongrass recently become very popular because unwanted side effects and resistance of microorganisms are seen with antibiotics. Medicinal plant usagein phytosciences have been developed. This leads to the choice of using antimicrobial therapy. *Cymbopogon citratus*, (lemongrass) is used in the treatment of periodontitis. Chlorhexidine acts as the "Gold standard" agent for chemical plaque control. Antiseptic activity of chlorhexidine helps in the control of plaque. This study evaluates the efficacy of local drug delivery of lemongrass gel in comparsion with the chlorhexidine gel in the treatment of chronic periodontitis.

INTRODUCTION

Periodontitis is an inflammatory disease which is fundamentally initiated by chronic bacterial infection involving the progressive destruction of gingiva, periodontal ligament, cementum and alveolar bone. Gold standard treatment for non surgical therapy of chronic periodontitis is the Scaling and root planning.

Lemongrass essential oil has a wide range of antimicrobial effects such as anti-amoebic, antifungal, anti-mycobacterial, and antibacterial against both gram-positive and gram-negative organisms. ≤2% Lemongrass oil inhibits the growth of microorganisms. Though many comparisons have been made to evaluate the efficacy of various locally delivered chemotherapeutic agents as an adjunct to scaling and root planing (SRP) in the treatment of chronic periodontitis, there is a need for a study to evaluate the efficacy of sub-gingivally delivered lemongrass oil gel in comparsion with the chlorhexidine gel in the treatment of chronic periodontitis. In this study, we are evaluating the effect of lemongrass gel as compared to Chlorhexidine gel as an adjunctive treatment to scaling and root planing.

MATERIAL AND METHODS

The present study was conducted in the Outpatient Department of Periodontology, Best Dental College and Hospital, Madurai, Tamil Nadu.

Corresponding author:* **Prabahar C.S
Ultra's Best Dental Science College and Dental Hospital, Madurai-Chennai Highways, Ultra Nagar, Madurai**,** Tamilnadu

Based on the following inclusion and exclusion criteria 20 chronic periodontitis patients were selected with the age group of 18 -65 years.

Inclusion criteria

The inclusion criteria for the patients were**:**(1) Age 18 - 65 years(both males and females); (2) Systemically healthy subjects; (3) No history of active periodontal treatment (surgical & non-surgical) or Antibiotic therapy or oral prophylaxis for the past 6 months; (4) Probing pocket depth of more than and equal to 5m; (5) Minimal presence of 16 natural teeth other than third molars.

Exclusion criteria

The exclusion criteria for the patients were**:** (1) Good general health with no history of any systemic disease;(2) Pregnancy or lactation or hormone replacement therapy at the time of study; (3) Regular use of mouthwash/other chemical plaque control agents; (4) Taking any medications known to affect the outcomes of periodontal therapy; (5) Using any form of tobacco habits.

Informed consent

All participants were explained about the need and design of the study. After obtaining the written informed consent the subjects were enrolled.

Study design

After examining the oral cavity of all the participants, the sites were selected and assigned randomly into 2 groups as follows.

Group A: Subgingival delivery of lemongrass oil gel in chronic periodontitis

Group B: Subgingival delivery of chlorhexidine gel in chronic periodontitis

The following parameters such as socio-demographic data (Age, Gender, Occupation) and standard clinical periodontal parameters like Plaque index (Silness P. and Loe H. (1964), Gingival index Loe H and Silness J (1963), Probing pocket depth, Clinical attachment level were recorded. William's periodontal probe was used to standardize the measurement of Probing depth and Clinical attachment level.A detailed clinical case history of the patient will be recorded followed by phase I therapy.

Gel preparation

Lemongrass essential oil was obtained by distillation process, and the gel was prepared in the Department of Pharmacology, Best Dental Science college and Hospital Madurai.

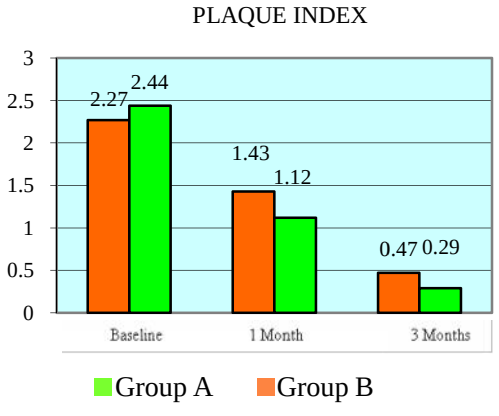
2% Lemongrass essential oil gel was prepared by a method similar to other anti-inflammatory gel formulations. For this preparation, certain quantity of carbopol 934 was soaked in water for a period of 2 hours. Carbopol was then neutralized with triethanolamine (TEA) by stirring. In an pre-weighted amounts of propylene glycol and ethanol, 2% lemongrass essential oil was dissolved. The solvent blend was transferred to carbopol container and agitated for an additional 20 min. Then, the dispersion was allowed to hydrate and swell for 60 min. pH was adjusted with 98% triethanolamine (TEA) until it reaches (6.8-7). During pH adjustment, the mixture was stirred gently with a spatula until a homogeneous gel was formed.

RESULTS

Plaque Index

Table 1 Comparsion of mean plaque index score between Group A (Lemongrass Gel) and Group B (Chlorhexidine Gel) at various time periods.

Parameter	Time Period	Group	Mean	Standard Deviation	p-value*
Plaque Index	Baseline	Group A	2.44	0.51	0.290 Not significant
		Group B	2.27	0.46	
	First Month	Group A	1.12	0.25	<0.001
		Group B	1.43	0.17	Significant
	Third Month	Group A	0.29	0.09	0.002
		Group B	0.47	0.23	significant



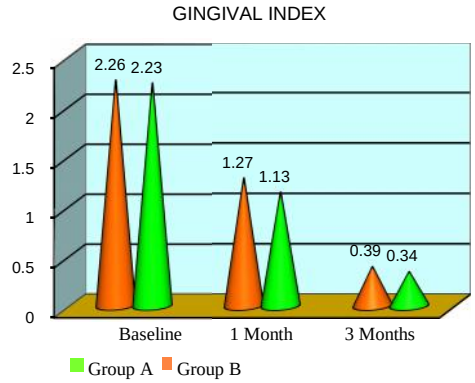
Graph 1

Graph 1 shows the Plaque index at baseline, 1 and 3 months interval. Mean reduction in the Plaque index is observed from baseline to 1 month and from 1 month to 3 months in both the groups.There was more probing depth reduction in lemongrass gel local drug delivery group than chlorhexidine group.

Gingival Index

Table 2 Comparison of mean gingival index score between Group A (Lemongrass Gel) and Group B(Chlorhexidine Gel) at various time periods.

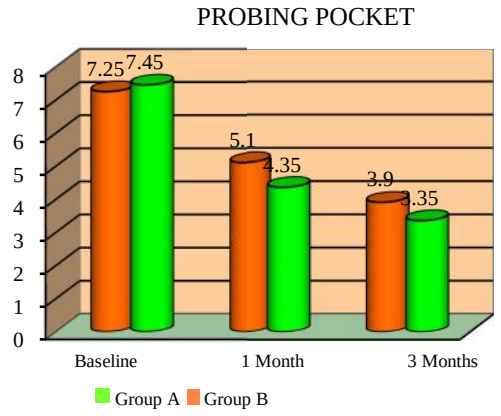
Parameter	Time Period	Group	Mean	Standard Deviation	p-value*
Gingival Index	Baseline	Group A	2.23	0.23	0.678
		Group B	2.26	0.22	Not significant
	First Month	Group A	1.13	0.15	<0.001
		Group B	1.27	0.23	Significant
	Third Month	Group A	0.34	0.09	0.048
		Group B	0.39	0.08	Significant



Graph 2

Table 3 Mean and standard deviation of Probing pocket depth at baseline, first month and third month (in mm) for both Group A (Lemongrass Gel) and Group B (Chlorhexidine Gel).

Parameter	Time Period	Group	Mean	Standard Deviation	p-value*
Probing Pocket Depth	Baseline	Group A	7.45	0.94	0.486
		Group B	7.25	0.85	Not significant
	First Month	Group A	4.35	0.49	<0.001
		Group B	5.1	0.55	Significant
	Third Month	Group A	3.35	0.67	0.004
		Group B	3.9	0.45	Significant



Graph 3

Graph 2 shows the Gingival index at baseline, 1 and 3 months interval. Mean reduction in the gingival index is observed from baseline to 1 month and from 1 month to 3 months in both the groups.

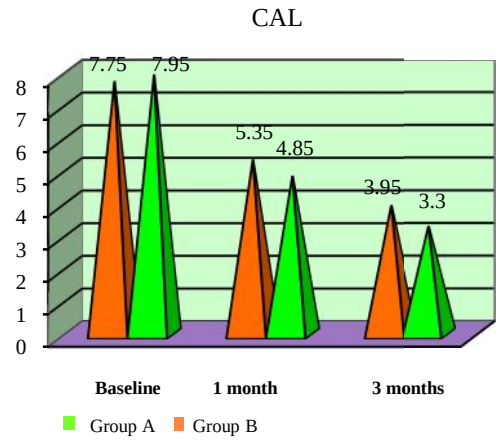
Probing Pocket Depth

Graph 3 shows the significant reduction in Probing depth in Group A compared to group B.

Clinical Attachment Level

Table 4 Mean and standard deviation of clinical attachment level at baseline, first month and third month (in mm) for both Group A(Lemongrass Gel) and Group B(Chlorhexidine Gel).

Parameter	Time Period	Group	Mean	Standard Deviation	p-value*
Clinical Attachment Level	Baseline	Group A	7.95	0.83	0.438
		Group B	7.75	0.78	Not significant
	First Month	Group A	4.85	0.49	0.017 significnt
		Group B	5.35	0.75	
	Third Month	Group A	3.3	0.66	0.001
		Group B	3.95	0.51	Significant



Graph 4

There was significant gain in clinical attachment level in Group A as compared to the group B at 1 and 3 months.

DISCUSSION

Local drug delivery of certain antimicrobial agents along with scaling and root planing provides some additive effects in probing pocket reduction and clinical attachment level gain comparing to scaling and root planning alone.Eventhough there are many antimicrobial agents commercially available for local drug delivery, there are certain factors such as safety, efficacy and economical which makes to focus towards the usage of natural extracts.

Therefore the aim of our study is to compare the efficacy of local drug delivery of lemongrass gel with chlorhexidine gel in chronic periodontitis. Results of the present study shown that the local drug delivery of lemongrass gel is effective compared to chlorhexidine gel.

Carbopol mucoadhesive polymer used for gel formulation helped to obtain effective 2% concentrations, adequate subgingival delivery of the lemongrass gel and sufficient contact time for its antimicrobial activity. These results are in accordance with the study of Ambika S. *et al* (2001) where they compared both the lemongrass and chlorhexidine mouthwashes groups and found that the 0.25% lemongrass oil mouthwash is effective as compared to 0.2% chlorhexidine mouthwash due to the additional property of oil pulling and the protective layer of oil on the smooth surface of the tooth and makes plaque deposition difficult. The viscosity of the oil probably inhibits bacterial adhesion and plaque co-aggregation. The other possible mechanism might be the saponification or the "soap-making" process that occurs as a result of the alkali hydrolysis of fat.

Also in this study, 2% lemongrass essential oil was used in the gel preparation to achieve both antimicrobial and antioxidant activities which in coincidence with the study of Susanto *et al* (2010) where they found that the lemongrass essential oil increased the salivary sulfhydryl glutathione (GSH)levels one of the nonenzymatic antioxidants which plays an important role in protection against oxidative stress and accelerate the gingivitis healing process and also effective in the treatment of periodontal diseases[2].

In the similar way, Koba *et al* (2010) showed that at the concentrations of 1.3% and 1.6%, contents of lemongrass essential oil such as citral (neral and geranial) and citronellal contributes to the antioxidant activity. Due to its antioxidant activity, it has better pocket reduction than chlorhexidine in the treatment of chronic periodontitis.Antioxidant property is also studied by

Anand *et al* (2011) by estimating salivary and gingival crevicular fluid GCF superoxide dismutase levels before and after its administration of lemongrass mouthwash. They found that it have an additive effect on the treatment outcome, when used along with scaling.

Also an effective antiplaque agent of lemongrass oil studied by Kukkamalla *et al* (2012) and found that it was more effective than chlorhexidine.

Carbopol mucoadhesive polymer used in the present study for gel formulation helped to obtain effective 2% concentrations, and also could achieve adequate subgingival delivery of the lemongrass essential oil and sufficient contact time for its antimicrobial activity.

Isolation and characterization of phytochemical extract from lemongrass offers new choice of therapy as an adjunct to mechanical instrumentation in the treatment of chronic periodontitis with moderate to deep periodontal pockets.

CONCLUSION

Local drug delivery of 2% lemongrass gel acts as a new choice of safe and effective adjunct to scaling and root planing in chronic periodontitis patients than Chlorhexidine gel. lemongrass gel with its antibacterial, anti-inflammatory and antioxidant properties seems to be an attractive alternating agent can be used as an adjunct to mechanical nonsurgical periodontal therapy for chronic periodontitis.

References

1. Maya Sanjeev Indurkar, Renu Verma. Effect of ozonated oil and chlorhexidine gel on plaque induced gingivitis: A randomized control clinical trial: *Journal of Indian Society of Periodontology* 2016:32-35
2. Subha Soumya Dany, Pritam Mohanty, Pradeep Tangade, Prashant Rajput, Manu Batra. Efficacy of 0.25% Lemongrass Oil Mouthwash: A Three Arm

Prospective Parallel Clinical Study: *Journal of Clinical and Diagnostic Research.* 2015:9: 13-17
3. M.Y.M. Shoukheba, Sh.A. Ali. The effects of subgingival application of ozonated olive oil gel in patient with localized aggressive periodontitis. A clinical and bacteriological study: *Tanta Dental Journal* (2014)11: 63-73
4. Shivaraj B. Warad, Sahana S. Kolar, Veena Kalburgi, Nagaraj B. Kalburgi. Lemongrass essential oil gel as a local drug delivery agent for the treatment of periodontitis: *Ancient Science of Life* 2013. 32 .205_211
5. Marco Montevecchi1, Antonio Dorigo1, Monica Cricca2, Luigi Checchi. Comparison of the antibacterial activity of anozonated oil with chlorhexidine digluconate and povidone-iodine. A disk diffusion test: *Journal of New Microbiologica*, 2013:36,289-302
6. Kukkamalla MA, Bhat GS, Pentapati KC, Goyal R. Antiplaque efficacy of lemongrass oil mouthwash – an invitro study. *Global Journal of Medical Research.* 2012; 12(7 version 1):18-23.
7. Taweechaisupapong S, Ngaonee P, Patsuk P, Pitiphat W, Khunkitti W. (2012). Antibiofilm activity and post antifungal effect of lemongrass oil on clinical Candida dubliniensis isolate. *South African Journal of Botany*, 78, 37-43.
8. Anand KM, Goyal R, Bhat SGGS, Kamath S, Anand KM, Aggarwal M, *et al*. A novel anti-oxidant lemon grass oil mouthwash- a clinical trial.*Asian J Exp Biol Sci* 2011;2:482-6.
9. Shah, *et al*.: Cymbopogon citratus, stapf (Lemon grass) *Journal of Advanced Pharmaceutical Technology & Research* 2011;3-8
10. Susanto SA, Oktavianti TA, Wijaya Y, Wira V, Paramitta VA. Increased *glutathione* level in saliva of moderate gingivitis patients after lemongrass (cymbopogon citratus) essential oil gargling. *Asia Pac Dent Stud J* 2010; 1:45-52.

How to cite this article:

Prabahar C.S and Nivetha R (2017) 'Evaluation of Efficacy of Lemongrass Gel As A Local Drug Delivery With Chlorhexidine Gel in Chronic Periodontitis -A Comparative Study ', *International Journal of Current Advanced Research,* 06(09), pp. 6017-6020. DOI: http://dx.doi.org/10.24327/ijcar.2017.6020.0855

****