



ISSN:2456-9836  
ICV: 60.37

## Research Article

# Effect Of Locally Delivered Ginger Gel As An Adjunct To Scaling And Root Planing In The Treatment Of Chronic Periodontitis: A Clinical Study

Dr. Shyam Sunder Salavadhi<sup>1</sup>, Dr. Srikanth Chintalapani<sup>2</sup>, Dr. Arpita Ramishetti<sup>3</sup>, Dr. Aishwarya Arya G<sup>4</sup>,  
Dr. Gayathri Muralidharan<sup>5</sup>, Dr Kotya Naik Maloth<sup>6</sup>

<sup>1</sup>Reader, Department of Periodontics, Mamata Dental College, Khammam, Telangana, India.

<sup>2</sup>Professor and Head, Department of Periodontics, Mamata Dental College, Khammam, Telangana, India

<sup>3</sup>Professor, Department of Periodontics, Mamata Dental College, Khammam, Telangana, India.

<sup>4</sup>Post graduate student, Department of Periodontics, Mamata Dental College, Khammam, Telangana, India

<sup>5</sup>Senior Lecturer, Department of Periodontics, Mamata Dental College, Khammam, Telangana, India.

<sup>6</sup>Senior Lecturer, Department of Oral Medicine and Radiology, Mamata Dental College, Khammam, Telangana, India.

## ARTICLE INFO

## ABSTRACT

### Article History:

Received on 08<sup>th</sup> Jan, 2019

Peer Reviewed on 24<sup>th</sup> Jan, 2019

Revised on 13<sup>th</sup> Feb, 2019

Published on 27<sup>th</sup> Feb, 2019

### Keywords:

Chronic Periodontitis, Local Drug Delivery, Rhizome Of Ginger, Scaling And Root Planing

**Abstract:** Vegetal agents are been utilized as ameliovatives since ancient times. Ginger has been shown to have certain medicinal properties like suppression of inflammation, inhibition of oxidation, inhibition of the growth of micro organisms and amplification of immunity. The aim of the present pilot investigation was to ascertain the validity of locally deposited ginger gel as an auxillary to mechanical debridement in subjects with periodontitis through clinical assessment.

**Subjects and Methods:** Thirty subjects were arbitrarily divided into two groups based on the probing depth (PD)  $\geq 5$  mm and clinical attachment level (CAL)  $\geq 3$  mm. In group A patients an inactive drug was placed into the pocket after mechanical debridement where as in Group B patients Ginger gel was delivered into the pocket. The effectiveness of ginger gel was analysed by assessing the clinical parameters like Gingival index (GI), PD, CAL at baseline and 3 months.

**Results:** Patients in Group B showed significantly greater mean reductions in GI, and PD and mean gain in CAL compared with those in group 1 from baseline to 3 months. Gain in CAL was significantly greater in Group B at 3months.

**Conclusion:** Ginger gel was very effective in reducing pocket depth and gingival bleeding, further it effectuated gain in CAL in patients with chronic periodontitis.

Br J Phar Med Res Copyright©2019, **Shyam Sunder Salavadhi** et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

**Corresponding Author:** Dr. Shyam Sunder Salavadhi, Reader, Department of Periodontics, Mamata Dental College, Khammam, Telangana, India.

**INTRODUCTION:**

Herbaceous perennials like Ginger (*Zingiber officinale*) which belongs to the family Zingiberaceae have been used as medicaments since the day of yore. Raw or pickled form of ginger has been used as salubrious aid because it has been proclaimed to expand a mixture of effects which are robust and health fostering. In addition the root of the ginger is very effective in the remedy of communicable diseases.<sup>[1,2]</sup> Periodontitis is an eco-genetic disorder is believed to cause due to the inflammatory process that sets in the supporting tissues of the teeth.<sup>[3,4,5]</sup> The resultant combined action of the bacteria and the host would emulate the assimilation of the bony process of the maxilla and mandible. In addition it entails the widening of the periodontal ligament (PDL) space which would lead to periodontal pocket formation and/or recession of gingiva.<sup>[6,7]</sup>

Machine driven disruption of dental plaque with or without concomitant application of systemic or local chemotherapeutics and surgical therapy are used in the treatment of periodontal diseases.<sup>[8]</sup> The mechanical debridement of plaque derived components such as SRP is one of the common methods employed in the treatment of periodontitis. However it is conjoined with hovering rate of reappearance of periodontal diseases which might flounder the total liquidation of periodontal pathogens.<sup>[9]</sup> These discrepancies are mostly observed in areas of furcation involvement and on areas where instrumental accessibility is impeded.<sup>[9,10]</sup>

The use of natural products has served as a major source of drugs for centuries and is well-established as an alternative to health problems.<sup>[11]</sup> Furthermore, the application of drugs directly into the pocket limits the drug in the target site thereby achieving a much higher concentration.<sup>[12,13]</sup> The present investigation was carried out to determine whether locally delivered ginger gel in combination with SRP would resolve gingival inflammation in compared with a locally delivered placebo gel as an adjunct to SRP in patients with CP.

**Subjects and Methods:**

This study was a randomized clinical trial, single blinded with a 3-month follow-up. The protocol was

approved by institutional ethical committee, and the study was carried out according to the principles laid down in the declaration of Helsinki on experimentation involving human subjects. The subjects who participated in this trial were selected from department of Periodontics. A total of 30 subjects in the age group of 35-65 years participated in the study after signing on informed consent.

Subjects who showed clinical evidence of moderate or severe chronic periodontitis according to criteria described by Armitage (1999)<sup>[14]</sup> were included in the study. Subjects who were diagnosed as aggressive periodontitis were not included in this trial. Subjects who have received antibiotic therapy or those who require antibiotic premedication were not included in the study. Individuals with systemic ailments and those subjects who were not able to provide consent to participate in this study were excluded. In addition, patients who have received the periodontal therapy < 6-months prior to baseline visit, and those subjects who have undergone periodontal surgery were not included in the study.

A clinical examination was carried out to determine the periodontal status. 30 subjects who met the inclusion criteria were enrolled in the study. A customized acrylic occlusal stent with vertical grooves were fabricated for each subject on a study model to standardize the readings. Vertical grooves were made to guide the probe penetration vertically in the same plane. The pocket depths were measured from the crest of the marginal gingiva to the base of the pocket using UNC-15 periodontal probe. CAL was measured from the cemento-enamel junction (CEJ) to the bottom of the pocket. Measurements were rounded to the nearest millimetre.

Thirty patients were randomly divided into 2 groups: Group A (SRP + Placebo gel) and Group B (SRP + Ginger gel). All the measurements were carried out by a calibrated periodontist who was blinded to the treatment groups. Treatment of the included subjects was done by another clinician.

***Preparation of Ginger Gel:***

Step 1: 70 gms of pure ginger powder is taken and kept in Soxhlate apparatus of 20 days in the pharmacology lab

Step 2: Ginger extract was collected and dried for 5 days in petridishes.

Step 3: This ginger extract was mixed with Hydroxy propyl methyl cellulose and poly vinyl chloride to make it into gel form. [Figure 1 a and b]

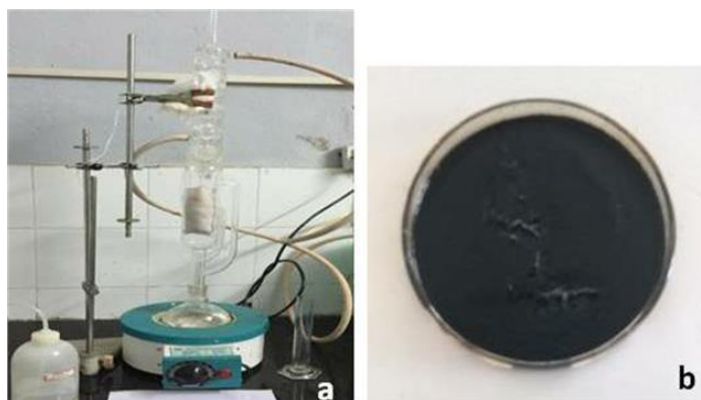
Patients were arbitrarily divided by toss of coin into two groups.

Test Group A included 15 patients treated by SRP with Ginger gel. [Figure 2]

Control Group B included 15 patients treated by SRP with placebo gel. [Figure 3]

Patients were advised not to perturb the treated zone with the tongue, finger or toothpick for 1 week. Further they were asked not to chew any hard or sticky foods for at least 1 week.

*Figure 1: 70 gms of ginger powder in oxalate apparatus (a) Extract dried in Petridish (b)*



*Figure 2: Local Drug Delivery (LDD) of Ginger gel pre-operative (a), LDD of Ginger gel (b), 3-months post-operative (c)*



*Figure 3: Local Drug Delivery (LDD) of Placebo gel pre-operative (a), LDD of placebo gel (b), 3-months post-operative (c)*



**RESULTS:**

All statistical interpretation was executed using SPSS version 18 statistical analyses software. The results were averaged out for each parameter. Paired t-test was used to compare the clinical parameter at different intervals for both the groups. [Table 1 and 3] Independent sample t-test was done to measure the intergroup comparisons for both the groups. [Table 2] All the clinical parameters, i.e., gingival index, probing depth, and clinical attachment level showed significant slump after treatment.

The mean GIs in the Group A and B at baseline and after 3 months were 2.35 and 0.79, and 2.78 and 1.17 respectively, were statistically valid ( $P < 0.001$ ). The mean PDs in the both the groups at baseline and after 3 months were 5.67 and 2.33 respectively, and 4.03 and 4.67, respectively, which showed statistically compelling results ( $P < 0.001$ ). The mean CALs in both the groups at baseline after 3 months were 1.99 and 0.41, precisely, and 0.96 and 0.53, explicitly, which showed numerically substantial results ( $P < 0.001$ ). [Table 1]

*Table 1: Means probing pocket depth, clinical attachment level and gingival index at baseline and 3months for both test and control groups*

Group		Baseline		3months		p-value
		Mean	SD	Mean	SD	
Test	GI	2.35	0.30	0.79	0.21	<0.001; Sig
	PD	5.67	1.12	2.33	0.45	<0.001; Sig
	CAL	1.99	0.68	0.41	0.39	<0.001; Sig
Control	GI	2.78	0.18	1.17	0.26	<0.001; Sig
	PD	4.03	0.62	4.67	0.59	<0.001; Sig
	CAL	0.96	0.38	0.53	0.31	<0.001; Sig

The comparison within the group's results showed that the mean GIs in the test and control groups at baseline were 2.10 and 2.65, respectively, which were not significant, and after 3 months were 1.92 and 2.26, respectively, which showed statistically significant results ( $P < 0.001$ ). The mean PDs in the test and control groups at baseline were 5.23 and 4.86, respectively, which were not significant, and after 3

months were 2.66 and 4.34, respectively, which showed statistically significant results ( $P < 0.001$ ). The mean CALs in the test and control groups at baseline were 1.21 and 0.78, respectively, which showed statistically significant results ( $P < 0.045$ ) and after 3 months were 0.32 and 0.49, respectively, which were statistically not significant. [Table 2]

*Table 2: Intergroup comparison of pocket depth, clinical attachment level, and gingival index at baseline and 3 months between test and control groups.*

		Group				p-value
		Test		Control		
		Mean	SD	Mean	SD	
Baseline	GI	2.10	0.34	2.65	0.18	0.73; NS
	PD	5.23	1.17	4.86	0.62	0.034; Sig
	CAL	1.21	0.65	0.78	0.38	0.042; Sig
3 months	GI	1.92	0.28	2.26	0.26	<0.001; Sig
	PD	2.66	0.42	4.34	0.56	<0.001; Sig
	CAL	0.32	0.39	0.49	0.31	0.473; NS

The clinical parameter difference in both the test and control groups from baseline to 3 months showed that the mean GIs in both the groups were 1.36 and 0.43, respectively, the mean PDs in both the groups were

2.04 and 0.39, respectively, and the mean CALs in both the groups were 0.62 and 0.26, respectively, which showed statistically significant results ( $P < 0.001$ ). [Table 3]

*Table 3: Difference of clinical parameters in test and control group from baseline to 3 months*

Difference	Group				p-value
	Test		Control		
	Mean	SD	Mean	SD	
GI	1.36	0.31	0.43	0.19	<0.001; Sig
PD	2.04	0.88	0.39	0.14	<0.001; Sig
CAL	0.62	0.32	0.26	0.11	<0.001; Sig

## DISCUSSION:

The primary objective of the periodontal treatment is to reduce the microbial load, for the improvement of the clinical parameters. Scaling and root planing remain the standard periodontal therapy with numerous other agents being currently used as adjunctive therapeutic modalities. This study was intended to evaluate the effectiveness of Ginger gel when used along with SRP as LDD. The result of present study showed statistically significant improvements in clinical parameters at 3 months of examination compared to baseline. Ginger gel resulted in significant reduction in pocket depth when compared to placebo gel, due to its anti-inflammatory, antibacterial properties.<sup>[15]</sup>

The anti-inflammatory property of ginger can be explained by its inhibiting Cyclooxygenase-2 and lipooxygenase pathway. It strongly inhibits prostaglandin synthesis.<sup>[16,17]</sup> Effie et al (2001)<sup>[16]</sup> carried out a study to evaluate the role of synthetic analogues of ginger in the inhibiting of Cyclooxygenase-2 (COX-2) enzyme activity in the intact cell. They have revealed that the ginger constituents and the synthetic analogues act as potent COX-2 inhibitors which might support the use of ginger in the treatment of multitude inflammatory conditions. Furthermore, the synthetic analogues exhibit a potent inhibition of COX-2 in a concentrated and structure dependent manner which might be beneficial in the treatment of pain.<sup>[16,17]</sup>

Ginger contains gingerol, shogaol like components, suppression the action of 5-Lipoxygenase or prostaglandin synthetase enzyme which inhibits synthesis of prostaglandin, leukotriene and pro-

inflammatory cytokines such as Interleukin-1 (IL-1), tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-8 (IL-8).<sup>[16,17]</sup>

Pan et al (2008) in his study concluded that shogaol can down-regulate inflammatory iNOS and COX-2 gene expression. It also induces apoptosis in cells through modulation of mitochondrial functions by production of reactive oxygen species (ROS).<sup>[18,19]</sup> Jung et al (2009) in his study concluded that rhizome hexane fraction extract of *Z. officinale* inhibited the excessive production of nitric oxide (NO), prostaglandin E2, Tumor necrosis factor- $\alpha$ , Interleukin 1 $\beta$ <sup>[20]</sup>

The results of the present study have revealed a significant reduction in the probing depth and bleeding on probing which might be because of resolution of inflammation due to the COX-2 inhibitory effect of the ginger analogues.

Park et al (2008)<sup>[21]</sup> in his study stated that ethanol and n-hexane extracts of ginger exhibited antibacterial activities against three anaerobic Gram-negative bacteria, Porphyromonas gingivalis (P.gingivalis) ATCC 53978, Porphyromonas endodontalis and Prevotella intermedia, causing periodontal diseases.

Awad SM et al (2017)<sup>[22]</sup> stated that ginger extracts were effective against P.gingivalis with bacteriostatic and bactericidal actions, nonetheless, alcoholic extract was more active than aqueous extract and P.gingivalis was more sensitive than Aggregatibacter actinomycetem comitans to both extracts.

Awad SM et al (2017)<sup>[23]</sup> stated in a study conducted to test the effect of aqueous and alcoholic ginger extracts on the growth of Aggregatibacter actinomycetem comitans

in comparison to 0.2% chlorhexidine gluconate mouth wash and distilled water in vitro, determination of ginger extracts minimum inhibitory concentration and minimum bactericidal concentration and detection of active ingredients of ginger extracts by using the high-performance liquid chromatography as well as chemical elements.

Ahmad Saada MM *et al* (2015)<sup>[24]</sup> compared the tested antibiotics fresh and powdered ginger extracts and concluded that a higher antibacterial effect against *S.mutans* at all concentrations than that against *A. Actinomycetem comitans*.

Giriraju *et al* (2013)<sup>[25]</sup> evaluated in an *in vitro* antimicrobial potential of 10% ginger extract against streptococcus mutans, *Candida albicans*, and *Ebnterococcus faecalis* and concluded that 10% ethanolic ginger extract was found to possess antimicrobial potential against all the three pathogens used in the study.

Mayari *et al* (2016)<sup>[26]</sup> conducted a study to evaluate the efficacy of a polyherbal mouthwash containing hydroalcoholic extracts of *Zingiber officinale*, *Rosmarinus officinalis* and *Calendula officinalis* (5% v/w) compared with chlorhexidine and placebo mouthwashes in subjects with gingivitis and concluded that Polyherbal mouthwash containing hydroalcoholic extracts of *Z. officinale*, *R. officinalis* and *C. officinalis* (5%) was effective in the treatment of gingivitis and its efficacy was comparable to that of chlorhexidine mouthwash.

Limitations in the present study were, it was carried out with small sample size for short period and microbial analysis was not carried out.

#### CONCLUSION:

The remarkable betterment in the shrinkage of the pocket depth may be ascribed due to the ability of ginger to dwindle the bacterial load and inflammation. Thus, it can become an important part of the preventive and therapeutic treatments available for the periodontal diseases. However, future long term studies with large patient number along with micro analysis to prove the efficacy of ginger are warranted.

#### REFERENCES:

1.Park EJ, Pizzuto JM. Botanicals in cancer chemoprevention. *Cancer Metast Rev.* 2002;21: 231–55.

2. Shukla Y, Singh M. Cancer preventive properties of ginger: A brief review. *Food Chem Toxicol.* 2007;45:683–90.
3. Jiang H, Xie Z, Koo HJ, McLaughlin SP, Timmermann BN, Gang DR. Metabolic profiling and phylogenetic analysis of medicinal *Zingiber* species: Tools for authentication of ginger (*Zingiberofficinale* Rosc.) *Phytochemistry.* 2006;67:232–44.
4. Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (*Zingiber officinale* Roscoe): A review of recent research. *Food Chem Toxicol.* 2008;46: 409–20.
5. Nicoll R, Henein MY. Ginger (*Zingiber officinale* Roscoe): A hot remedy for cardiovascular disease? *Int J Cardiol.* 2009;131:408–9.
6. World Workshop in Periodontics. Vol. 1. Chicago: American Academy of Periodontology; 1996. *Annals of Periodontology*; p. 1.
7. Slots J, Bragd L, Wikström M, Dahlén G. The occurrence of *Actinobacillus actinomycete comitans*, *Bacteroidesgingivalis* and *Bacteroides intermedius* in destructive periodontal disease in adults. *J Clin Periodontol.* 1986;13:570-7.
8. Heitz-Mayfield LJ, Lang NP. Surgical and nonsurgical periodontal therapy. Learned and unlearned concepts. *Periodontol 2000* 2013;62:218-231.
9. Slots J, Jorgensen MG. Effective, safe, practical and affordable periodontal antimicrobial therapy: Where are we going, and are we there yet? *Periodontol 2000* 2002; 28:298-312.
10. Stambaugh RV, Dragoo M, Smith DM, Carasali L. The limits of subgingival scaling. *Int J Periodontics Restorative Dent* 1981;1:30-41.
11. Shale TL, Stirk WA, van Staden J. Screening of medicinal plants used in Lesotho for anti-bacterial and anti-inflammatory activity. *J Ethno pharmacol.* 1999;67:347–54.
12. Greenstein G. Local drug delivery in the treatment of periodontal diseases: Assessing the clinical significance of the results. *J Periodontol* 2006;77:565-578.
13. Soskolne WA. Subgingival delivery of therapeutic agents in the treatment of periodontal diseases. *Crit Rev Oral Biol Med* 1997;8:164-174.

14. Gary C. Armitage. Development of a Classification System for Periodontal Diseases and Conditions *Ann Periodontol* 1999;4:1-6.
15. [Mashhadi](#) NS, [Ghiasvand](#) R, [Askari](#) G. Anti-Oxidative and Anti-Inflammatory Effects of Ginger in Health and Physical Activity: Review of Current Evidence. *Int J Prev Med*. 2013;4: S36-42.
16. Effie T, Tran VH, Liu-Brennan D, Roufogalis BD, Duke CC. Effect of ginger constituents and synthetic analogues on cyclooxygenase-2 enzyme in intact cells. *Bioorganic Chem*. 2001;29: 156–63.
17. Verma SK, Singh M, Jain P, Bordia A. Protective effect of ginger, *Zingiber officinale* Rosc on experimental atherosclerosis in rabbits. *Indian J Exp Biol*. 2004;42:736-8.
18. Pan MH, Hsieh MC, Kuo JM, Lai CS, Wu H, Sang S, et al. [6]-Shogaol induces apoptosis in human colorectal carcinoma cells via ROS production, caspase activation, and GADD 153 expression. *Mol Nutr Food Res*. 2008;52:527–37.
19. Chen BH, Wu PY, Chen KM, Fu TF, Wang HM, Chen CY. Antiallergic potential on RBL-2H3 cells of some phenolic constituents of *Zingiber officinale* (Ginger) . *J Nat Prod*. 2009;72: 950–3.
20. Jung HW, Yoon CH, Park KM, Han HS, Park YK. Hexane fraction of *Zingiberis Rhizoma Crudus* extract inhibits the production of nitric oxide and proinflammatory cytokines in LPS-stimulated BV2 microglial cells via the NF kappaB pathway. *Food Chem Toxicol*. 2009; 47:1190–7.
21. Park M, Bae J, Lee DS. Antibacterial Activity of [10]-Gingerol and [12]-Gingerol isolated from Ginger Rhizome against Periodontal Bacteria. *Phytother. Res*. 2008;22:1446-9.
22. Awad SM, Ahmed MA. Antibacterial Effect Of Aqueous And Alcoholic Ginger Extracts On Periodontal Pathogen *Porphyromonus Gingivalis*-In Vitro Study. *Int J Advan Biolo Research* 2017;7: 65-71.
23. Awad SM, Ahmed MA. Antibacterial Effect of Aqueous and Alcoholic Ginger Extracts on Periodontal Pathogen *Aggregatibacter Actinomycetem Comitans*: An in Vitro Study-Part 1. *Tikrit J Dental Sciences* 2017;5:1-10.
24. Ahmad Saada MM, Ali Khattab NM, Moness Ali AM. Antibacterial activity of ginger extract on selected oral pathogens: An In-vitro study. *Egypt Dent J* 2015; 61:1-5.
25. Giriraju A, Yunus GY. Assessment of antimicrobial potential of 10% ginger extract against streptococcus mutans, *Candida albicans*, and *Escherichia coli*: An in vitro study. *Indian J Dent Res* 2013;24:397-400.
26. Mahyari S, Mahyari B, Emami SA, Bizhan MN, Jahanbakhsh SP, Sahebkar A, Mohammadpour AH. Evaluation of the efficacy of a polyherbal mouthwash containing *Zingiber officinale*, *Rosmarinus officinalis* and *Calendula officinalis* extracts in patients with gingivitis: A randomized double-blind placebo-controlled trial. *Complementary Therapies in Clinical Practice* 2016;22:93-8.

**How To Cite This Article:**

**Shyam Sunder Salavathi, Srikanth Chintalapani, Arpita Ramishetti, Aishwarya Arya G, Gayathri Muralidharan, Kotya Naik Maloth** *Effect Of Locally Delivered Ginger Gel As An Adjunct To Scaling And Root Planing In The Treatment Of Chronic Periodontitis: A Clinical Study* *Br J Pharm Med Res*, Vol.04, Issue 01, Pg.1567 - 1573, January - February 2019. ISSN:2456-9836 Cross Ref DOI : <https://doi.org/10.24942/bjpmr.2019.409>

Source of Support: Nil

Conflict of Interest: None declared

Your next submission with [British BioMedicine Publishers](#) will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats ( Pdf, E-pub, Full Text)
- Unceasing customer service



Track the below URL for one-step submission

<http://www.britishbiomedicine.com/manuscript-submission.aspx>