



Original Research Article (Clinical)

## Effectiveness of ginger on pain following periodontal surgery – A randomized cross-over clinical trial



Pallavi Menon <sup>a, \*</sup>, Jayachandran Perayil <sup>a</sup>, Angel Fenol <sup>a</sup>, Maya Rajan Peter <sup>a</sup>, P. Lakshmi <sup>b</sup>, Reshma Suresh <sup>a</sup>

<sup>a</sup> Department of Periodontics, Amrita School of Dentistry, Kochi, Amrita Vishwa Vidyapeetham, India

<sup>b</sup> Department of Periodontics, Manipal Academy of Higher Education, Manipal, India

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### ABSTRACT

**Background:** Ibuprofen is one of the generally prescribed Non-steroidal anti-inflammatory drugs (NSAIDs) for postoperative pain after periodontal surgery, but are contraindicated in certain patients. Ginger, which is the rhizome of *Zingiber officinale*, being a common herbal drug having anti-inflammatory as well as analgesic activities can be an efficient substitute for synthetic agents like Ibuprofen.

**Objectives:** To compare the effectiveness of ibuprofen and dried ginger powder on pain and gingival inflammation following open flap debridement.

**Materials and methods:** Ten systemically healthy individuals with chronic generalized periodontitis were selected for this single-blinded randomized cross-over clinical trial and underwent open flap debridement in at least two quadrants. Each quadrant was randomly allocated to receive either Ibuprofen (400 mg) or Ginger powder capsules (400 mg) thrice daily for three days. Subjects were requested to note down the pain score on the Visual Analogue Scale (VAS) provided in a printed format, for the first eight hours after surgery and on the following two days, and gingival inflammation was assessed after one week, using Modified Gingival Index (MGI).

**Result:** The difference in the VAS score and MGI between the two groups was not of statistical significance.

**Conclusion:** Effectiveness of ginger powder for the management of pain and gingival inflammation following open flap debridement is comparable to that of ibuprofen.

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## 1. Introduction

Pain, which is “an unpleasant, sensory and emotional experience, is mostly associated with tissue injury or infection and seeks medical management” [1]. It is mostly a subjective perception and hence individual variation exists.

Pain after periodontal surgery, being an acute form of dental pain with mild to moderate severity, is a common occurrence [2]. After the surgical procedure, it has been noticed that pain peaks immediately on the day following surgery [3]. This produces discomfort among patients necessitating the need for pain management as an essential part of periodontal therapy.

The anti-inflammatory and the pain-relieving effects of Non-Steroidal Anti-inflammatory Drugs (NSAIDs) in various conditions has been established previously and are one of the over the counter drugs that has been prescribed and dispensed [4]. It has been accepted as one of the most common pain control measures in dentistry. Ibuprofen, belonging to the class of propionic acid derivatives of NSAIDs, has shown to effectively control pain after periodontal surgery in various studies [5–8]. However, these drugs produce side effects such as gastrointestinal, renal and cardiovascular implications [9]. Hence, contraindications of these drugs include, gastrointestinal diseases, disorders associated with bleeding, and kidney dysfunctions, necessitating the requirement of a drug which is less harmful and safer.

Various herbal drugs as a part of complementary and alternative medicine has been emerging for the management of pain.

\* Corresponding author.

E-mail: [menon.pallavi.92@gmail.com](mailto:menon.pallavi.92@gmail.com)

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Ginger, the rhizome of *Zingiber officinale*, a herbal drug used in Ayurvedic and Chinese medicine, that is known for its analgesic and anti-inflammatory effect, maybe a potential source for replacing synthetic drugs like NSAIDs [10]. Ginger consists of numerous active components of which, zingiberene (sesquiterpene hydrocarbon) is one of the chief constituent. It is a part of ginger oil which is produced from powdered ginger that has undergone steam distillation [11]. Studies on rhizome extracts have shown that active gingerols are produced from the predominant constituents in ginger which may convert to paradol, zingerone and shogaols [12]. Numerous properties, like hypotensive, antitussive, analgesic and antipyretic properties are associated with compounds like 6-shogaol and 6-gingerol [13]. They have also shown to have potential to be developed into an anti-carcinogenic agent as well [14,15].

Animal studies have shown that dried ginger when prescribed orally reduce acute inflammation [16–18].

Also, clinical studies have shown that ginger relieved pain in osteoarthritis patients [19,20].

No studies, as per our knowledge, have assessed the effectiveness of ginger powder on pain and inflammation that arises after periodontal surgery. Hence, the present research was conducted for comparing the effectiveness of ginger powder and ibuprofen on pain and gingival inflammation following open flap debridement.

## 2. Materials and methods

### 2.1. Study population

The protocol of this research obtained approval from the Institutional Ethics Committee, Amrita Institute of Medical Sciences, Kochi, Kerala and the trial registration was done on the Indian Clinical Trials Registry (Reg. No.: CTRI/2018/09/015587). Since no other study comparing the effectiveness of ginger powder and ibuprofen on pain and gingival inflammation following open flap debridement could be located, this randomized single blinded cross-over clinical trial was conducted as a pilot study on a total of 10 patients having chronic generalized periodontitis and those who have to undergo full mouth open flap debridement, over a duration of 6 months (April 2018–October 2018).

Patients who reported to the Out Patient section of the Department of Periodontics in Amrita School of Dentistry, Kochi, Kerala, and fulfilling the inclusion and exclusion criteria were selected. All those who consented to be a part of this research were requested to give a written informed consent.

The inclusion criteria for this study was presence of at least 20 natural teeth, subjects with chronic generalized periodontitis involving more than 30% of teeth with at least 4 posterior teeth having pocket depth  $\geq 5$  mm, age group between 30 and 60 years.

Patients with any systemic disease, acute gingival or periodontal disease, patients who require regeneration procedures, subjects taking NSAIDs for the past three months, known allergies to the study medication, subjects with history of peptic ulceration, pregnant women/lactating mother, patients who smoke or chew any form of tobacco were excluded.

### 2.2. Study design

Fig. 1 shows the outline of the study procedure. Scaling and root planing was done on all selected participants. On the day scheduled for open flap debridement, pain and gingival status were assessed before the commencement of surgery. Maxillary quadrants alone were selected to avoid bias in perception of pain. Open flap debridement was performed using conventional flap technique under routine local anaesthesia (L.A.) (2% lignocaine & 1:2,00,000 epinephrine). Post-operative instructions were given to the patient.

Each of the two maxillary quadrants of the same participant was randomly allocated using the lottery method to receive either one capsule of ginger [*Sunthi (Z. officinale)*; Himalaya® Drug Co., India] containing 400 mg of dried ginger rhizome powder or one capsule of ibuprofen 400 mg [Brufen® 400; Abbott Healthcare Pvt. Ltd., India] thrice daily for three days. First dose was administered immediately after completion of surgery and before termination of the anaesthetic effect. Rescue medication in the form of acetaminophen (500 mg with at least 4 h intervals) was allowed when required after surgery for all patients. Time and number of rescue medications was recorded.

A10-point Visual Analogue Scale (VAS) was given in a printed format to all subjects and they were instructed to mark the score of pain, at one hour intervals in the first eight hours after surgery and for the next two days (two times - morning and evening).

A wash out period of three days was given between the course of the two drugs (based on plasma half-lives of ibuprofen and ginger) [21,22].

Gingival inflammation was assessed at baseline and after 1 week, using Modified Gingival Index (MGI) given by Lobene, 1986 [23].

To ensure single blindness of the study, a blinded investigator evaluated all the parameters.

### 2.3. Statistical analysis

Mann–Whitney U- test was used to test the statistical significance of the difference in the mean post-operative pain scores of both the groups (ginger powder and ibuprofen) as well as for the difference in the mean MGI scores in both groups. A statistical software [IBM SPSS 20 (SPSS Inc, Chicago, USA)] was made use of for the analysis.

p-value less than 0.05 was regarded as the level of significance.

## 3. Results

Ten compliant patients (six females and four males) between the ages of 30–60 years (mean age  $46.67 \pm 6.47$ ) completed the study. None of them reported any side effect or allergy to any of the medications given. Also, all subjects reported to not have consumed rescue medication during the entire study. The amount of L.A. and duration of surgery was approximately the same for all the surgical procedures (Table 1).

Almost all participants from both groups reported pain only on the day the surgical procedure was conducted. Hence, pain scores after every 1 h interval, on the day of surgery was only compared. The difference in the mean pain scores in both groups at every one hour interval was not of statistical significance. At the eighth hour, the mean value of the score of pain in the ginger group was  $2.4 \pm 1.07$  which was higher than the ibuprofen group ( $1.5 \pm 0.97$ ) showing a statistically significant difference (Table 2 and Fig. 2).

The difference in the mean MGI scores between both groups on Day 0 and on Day 7 was not of statistical significance (Table 3).

## 4. Discussion

Pain and inflammation that arises after periodontal surgeries is very common and the control of it is of great importance to the periodontist and the patient. Various NSAIDs have been investigated for this purpose [8,24,25], and Ibuprofen being the most commonly prescribed drug for dental pain management has shown to be very effective after periodontal surgeries [5].

In this study, in order to assess whether the effectiveness of dried ginger powder on pain and inflammation after open flap debridement is comparable to that of Ibuprofen, a randomized

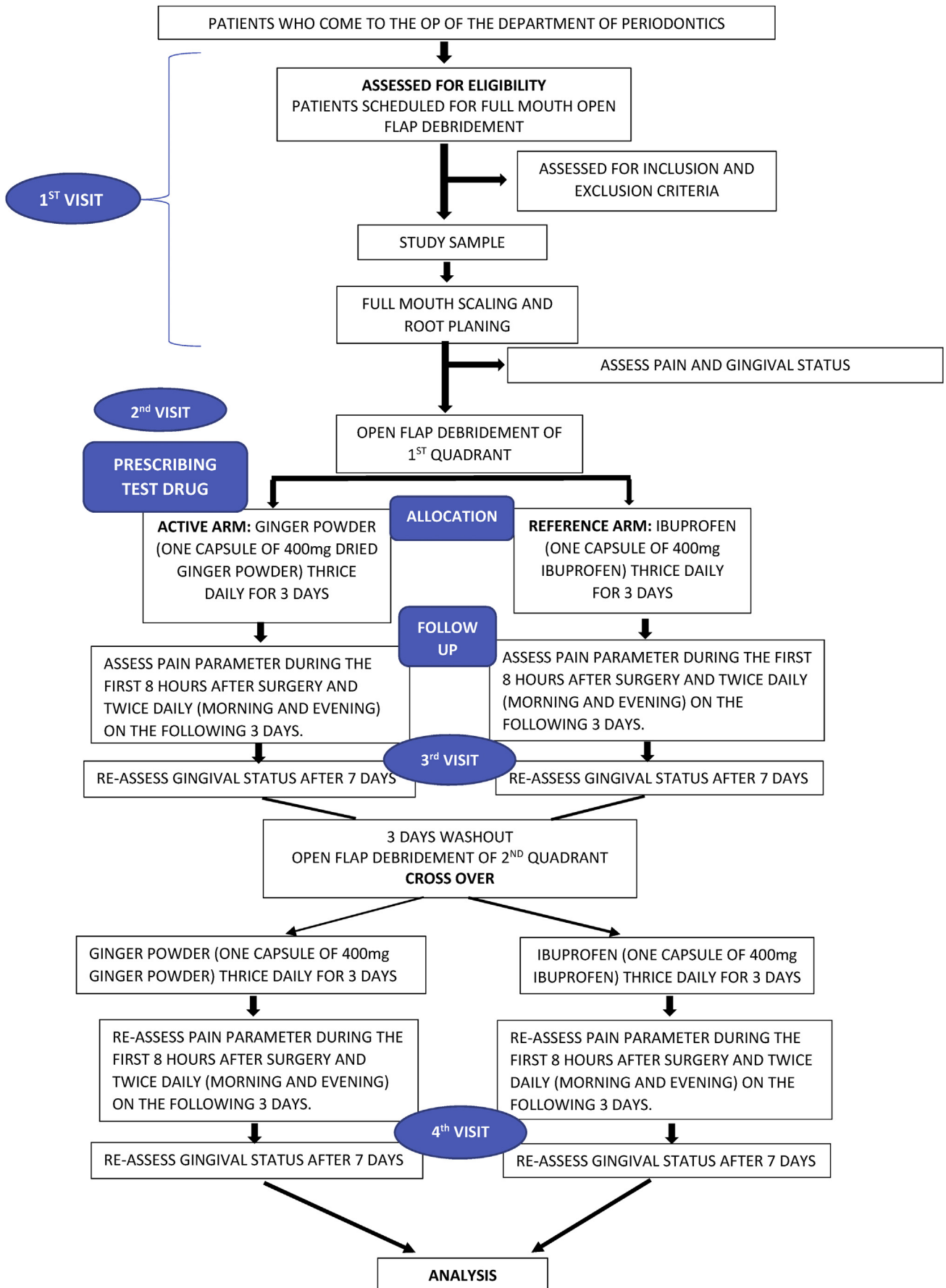


Fig. 1. Flowchart showing the outline of the study procedure.

**Table 1**  
Demographic characteristics of the study subjects, duration of surgery and amount of L.A. used.

Demographics		
	Ibuprofen	Ginger
<b>GENDER</b>		
Male	4	4
Female	6	6
<b>Age (in years) [Mean±SD]</b>	46.67 ± 6.47	46.67 ± 6.47
<b>Duration of surgery (in hours) [Mean±SD]</b>	2.08 ± 0.38	2 ± 0.55
<b>Amount of L.A. (in ml) [Mean±SD]</b>	4.32 ± 0.50	4.23 ± 0.41

SD – Standard deviation; L.A. – Local anaesthetic solution; ml – millilitres.

**Table 2**  
Comparison of mean VAS scores between ginger and ibuprofen group on the day of surgery.

Time	Ginger		Ibuprofen		p-value
	Mean	SD	Mean	SD	
1 h	2	1.05	1.7	0.67	0.59
2 h	3	0.94	2.5	0.85	0.27
3 h	2.3	0.82	1.8	0.63	0.13
4 h	1.6	0.69	1.2	0.78	0.32
5 h	0.5	0.7	0.2	0.42	0.30
6 h	0.4	0.69	0.3	0.48	0.88
7 h	1.6	0.96	1.3	0.82	0.38
8 h	2.4	1.07	1.5	0.97	0.04

VAS – Visual Analogue Score; SD – Standard deviation.

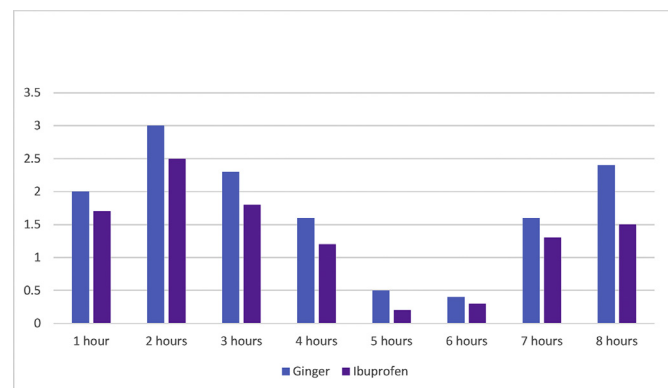
single-blinded cross over clinical trial was performed. Since pain is a subjective parameter and may vary among individuals, pain after surgery of two different maxillary quadrants performed on the same subject was compared.

Studies by Bliddal et al., in 2000 [19] and Haghghi et al., in 2005 [20] compared the effects of ibuprofen and ginger on osteoarthritis subjects and concluded that effect of both on pain was not significantly different on comparison of both the study groups.

A systematic review by Terry et al., in 2011, assessing the usefulness of ginger in pain management showed that the existing trials supported the anti-inflammatory effect of *Z.officinale* components, and hence may decrease the pain perception in conditions like osteoarthritis [26].

Rayati et al., in 2017 [27] compared the effect of ginger powder as an analgesic as well as an anti-inflammatory agent with ibuprofen in post-surgical pain model and concluded that ginger powder is as effective as ibuprofen for the management of post-surgical sequelae after mandibular third molar surgery.

From our study, it was found that the difference in the scores of pain in both groups for the first seven hours after open flap



**Fig. 2.** Graph showing the comparison of the VAS scores between the 2 groups on the day of surgery. VAS – Visual Analogue Score.

**Table 3**  
Comparison of the MGI scores between ginger and ibuprofen groups.

	Ibuprofen (Mean ± SD)	Ginger (Mean ± SD)	p-value
Day 0	1.62 ± 0.30	1.66 ± 0.24	0.809
Day 7	2.09 ± 0.38	2.18 ± 0.28	0.816

MGI – Modified Gingival Index (Lobene, 1986)<sup>20</sup>; SD – Standard Deviation.

debridement was not of statistical significance. Hence, the effectiveness of ginger in reducing pain after open flap debridement, is mostly similar to that of Ibuprofen, though there was a borderline statistically significant difference (p value = 0.04) at the eighth hour, where a higher pain score of 2.4 ± 1.07 was shown in the ginger group compared to 1.5 ± 0.97 in the Ibuprofen group.

Since, the nature of disease condition, type of surgery and clinical parameters assessed in previous studies are different from the present study, an exact comparison is not possible.

The MGI scores also did not show any difference that was of statistical significance, between both the groups, 1 week after the open flap debridement, thereby indicating that the effectiveness of ginger on post-surgical gingival inflammation is similar to Ibuprofen.

The sample size being small and the study being single blinded, i.e., only the investigator was blinded and the subjects were not, since both the drugs provided in the study were not in a similar packaging, thereby not ruling out bias, are few of the limitations. Also, we evaluated the effects of ginger powder only on clinical symptoms and not on specific inflammatory mediators.

## 5. Conclusion

From the current study, a conclusion can be made that dried ginger powder is as effective as Ibuprofen in controlling pain and gingival inflammation that arises after open flap debridement. Even though at most of the one hour intervals post-surgery, pain scores were slightly more in the ginger group in comparison to intensity of pain after intake of Ibuprofen, the difference was not statistically significant. Hence, in patients among whom NSAIDs are contraindicated, dried ginger powder may be used as an alternative to manage pain after periodontal surgery. But more studies with a larger sample size and those assessing the effect of ginger extracts on specific inflammatory mediators needs to be warranted.

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None.

## Conflict of interest

None.

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