

# Comparison between Soft Gelatin Capsule Containing Ibuprofen and Ibuprofen Regular Tablet in Pain Control Following Scaling and Root Planing

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## Abstract

**Aim:** Scaling and root planing (SRP) is a major component of periodontal therapy which is often accompanied by painful experiences for the patient. The objective of the present study is to evaluate the pain control of two available types of ibuprofen, soft gelatin capsules and tablets, following SRP in patients with chronic periodontitis.

**Methodology:** 75 patients with chronic periodontitis, undergoing routine periodontal SRP were selected. Following probing the amount of pain perceived was recorded as the baseline pain using visual analog scale (VAS). Further, they received either 800 mg ibuprofen tablet, 800 mg ibuprofen capsule or placebo and the pain level was measured thirty minutes thereafter. Participants underwent SRP procedure and the pain levels were recorded immediately and then at 30 and 60 minutes after SRP.

**Results:** The mean VAS pain scores assessed immediately, thirty minutes and an hour after SRP for both ibuprofen and ibuprofen capsule groups were lower than placebo. Significant difference in the pain parameter only immediately after SRP between three groups were observed ( $p=0.012$ ). The mean VAS pain score difference after thirty minutes and an hour upon SRP with baseline was insignificant in all study groups ( $p\leq 0.0001$ ). However, the mean VAS pain score measured an hour after SRP showed significant difference between both NSAID groups and placebo group ( $p=0.012$ ).

**Conclusions:** Soft gelatin ibuprofen capsules are well suitable for pain management during SRP procedure in patients with chronic periodontitis due to reported rapid onset of action and less gastrointestinal intolerance.

## Key Words

Ibuprofen, pain, scaling and root planning, soft gelatin capsule.

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## Introduction

Chronic periodontitis is a common inflammatory disease of the gums and related bones, characterized by a painless, slow progression. It may occur in most age groups, but is most prevalent among adults and seniors worldwide (1, 2).

The primary objectives of therapy for patients with chronic periodontitis are to halt disease progression and to resolve inflammation. The beneficial effects of scaling and root planing (SRP) combined with personal plaque control in the treatment of chronic periodontitis have been validated (3-6).

Periodontal scaling procedures or even diagnostic procedures like probing of pocket depths are often accompanied by painful experiences for the patient. Therefore most of the periodontal scaling procedures performed involve some kind of anesthesia and are either a nerve block or infiltration. Although the nerve block/infiltration anesthesia provides sufficient elimination of pain, the main drawbacks are the pain of needle insertion, duration of action and inconvenience due to soft tissue anesthesia, which may limit patient acceptance (7).

A less painful treatment might increase patient compliance and may give a better prognosis for periodontal therapy (8). The ideal anaesthetic agent is characterized by comfortable and pain-free administration, fast onset, adequate duration, and minimal adverse effects. Non-steroidal anti-inflammatory drugs (NSAIDs) meet most of these criteria and their efficacy for dental surgery pain is well established. Ibuprofen is one of these drugs that display potent anti-inflammatory properties as well as strong analgesic (9-11) and anti-pyretic activity (12, 13).

After oral administration of regular-release tablet preparations, ibuprofen is almost completely absorbed from the gastrointestinal tract (14). Peak serum concentrations and maximal analgesic effect normally occur within 1 to 2 hours of administration, and the plasma half-life is approximately 2 hours. Different brands of regular-release tablets may, however, show great differences in pharmacokinetic behaviour due to different galenical formulations, which has been demonstrated on several occasions (15). Liquid formulations or faster dissolving ibuprofen salts (e.g. lysine or arginine salts) demonstrate faster absorption and higher peak serum concentrations compared to standard ibuprofen tablet formulations, which contain the active ingredient as the free acid (16).

There are few controlled clinical trials on drug efficacy for pain control during non-surgical periodontal treatment.

It has been shown that ibuprofen arginine was safe and superior to placebo for alleviating pain during non-surgical periodontal treatment. Its painless administration and quick onset of action make it a suitable option for pain control in a general dental office (1). The objective of the present study is to evaluate the pain control of two available types of ibuprofen, soft gelatin capsules and tablets, following SRP in patients with chronic periodontitis.

## Materials and Methods

A total of 75 volunteers between the ages of 29 and 41, recruited from the Department of Periodontology, School of Dentistry, Babol University of Medical Sciences, Iran, participated in this double-blind clinical trial study. They presented with chronic periodontitis, defined as having at least one tooth with a pocket depth of 4 to 5 mm. They were divided into three groups with 25 patients in each.

In order to qualify for the study, patients had to have a minimum of five teeth in each quadrant and the degree of periodontal disease had to be homogenous. All participants had experienced scaling and root planing (SRP) previously but none of the subjects had received periodontal debridement within the preceding 12 months. Exclusion criteria included the following, intake of analgesics within 2 days before the investigation, serious medical conditions, dentine hypersensitivity, abscesses and gross caries, contraindications for ibuprofen, oral pain before treatment and a positive pregnancy test. Following recruitment all subjects were given verbal and written information concerning the study and gave their written consent prior to the clinical examination. The study was approved by local ethics review board and was performed in agreement with the declaration of Helsinki. Thirty minutes before treatment, probing was done and the amount of pain perceived was reported and documented as the baseline pain using visual analog scale (VAS). Further, groups were randomly assigned to receive either soft gelatin ibuprofen capsules (800mg), ibuprofen tablets (800 mg) and placebo(lactose), all were packaged in identical capsules with the same color and size and then encoded by a third person unaware of the study protocol. Thirty minutes after drug delivery the subjects reported the amount of pain following the initial probing.

Participants underwent SRP procedure with Slimlines instruments by Cavitron (Cavitrons SPS Ultrasonic, power setting 1/4 (end of Blue zone) zone), tips FSI-SLI and FSI-10 (Dentsply, Konstanz, Germany), tips chosen based on operator's assessment. Patients had to record their subjective

pain levels at pre-defined time points according to the following schedule: immediately (i.e. at 0 min.) after SRP, and then pain levels at 30 and 60 minutes after SRP.

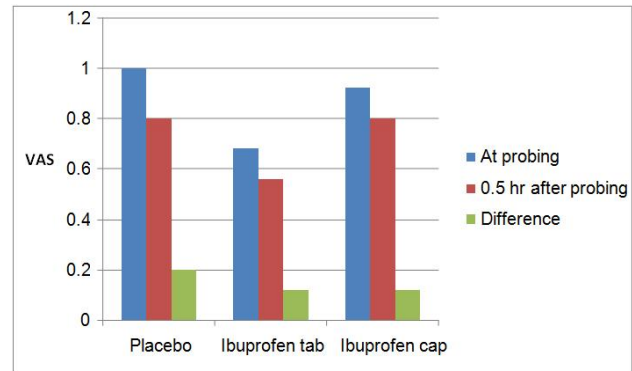
### Statistical Analysis

VAS scores were analysed using the Kruskal-Wallis test and Wilcoxon signed rank test. Time-dependent data were analyzed by the Friedman test. The difference between data was considered statistically significant at  $p < 0.05$ .

### Results

All 75 patients recruited into the study completed the trial. The mean  $\pm$  SD of VAS of pain scores, assessed upon probing prior to SRP before drug administration were  $1.00 \pm 0.16$ ,  $0.68 \pm 0.10$  and  $0.92 \pm 0.16$  in placebo, ibuprofen tablet and ibuprofen capsule groups, respectively.

The mean  $\pm$  SD of VAS of pain scores, assessed upon probing prior to SRP, thirty minutes after drug administration were  $0.80 \pm 0.17$ ,  $0.56 \pm 0.13$  and  $0.80 \pm 0.15$  in placebo, ibuprofen tablet and ibuprofen capsule groups, respectively (Fig. 1).



**Figure 1.** The mean pain score as assessed by a VAS scale (0-10) prior to SRP before and after drug administration.

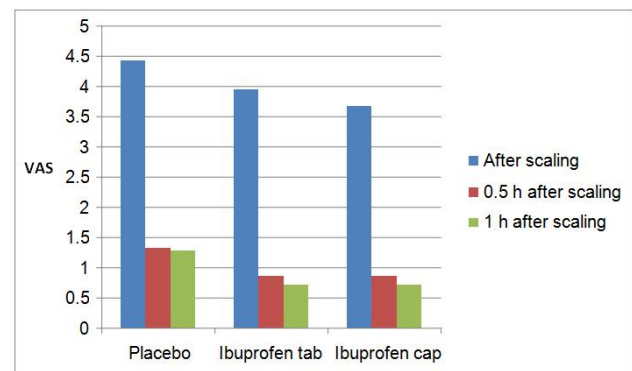
**TABLE 1.** Mean  $\pm$ SD of VAS pain scores at different time points in three study groups

Groups	Placebo	Ibuprofen tablet	Ibuprofen capsule
Upon probing,prior to SRP, before drug administration	1.00 $\pm$ 0.16	0.68 $\pm$ 0.10	0.92 $\pm$ 0.16
Upon probing,prior to SRP, 30 minutes after drug administration	0.80 $\pm$ 0.17	0.56 $\pm$ 0.13	0.80 $\pm$ 0.15
Immediately after SRP	4.44 $\pm$ 0.20	3.96 $\pm$ 0.18	3.68 $\pm$ 0.18
30 minutes after SRP	1.32 $\pm$ 0.21	0.88 $\pm$ 0.16	0.88 $\pm$ 0.13
60 minutes after SRP	1.28 $\pm$ 0.29	0.72 $\pm$ 0.14	0.72 $\pm$ 0.14

The mean  $\pm$  SD of VAS of pain scores, assessed immediately, thirty minutes and an hour after SRP for ibuprofen tablet group were  $3.96 \pm 0.18$ ,  $0.88 \pm 0.16$ , and  $0.72 \pm 0.14$ , respectively.

The mean  $\pm$  SD of VAS of pain scores, assessed immediately, thirty minutes and an hour after SRP for ibuprofen capsule group were  $3.68 \pm 0.18$ ,  $0.88 \pm 0.13$ , and  $0.72 \pm 0.14$ , respectively.

The mean  $\pm$  SD of VAS of pain scores, assessed immediately, thirty minutes and an hour after SRP for placebo group were  $4.44 \pm 0.20$ ,  $1.32 \pm 0.21$ , and  $1.28 \pm 0.29$ , respectively (Fig. 2).



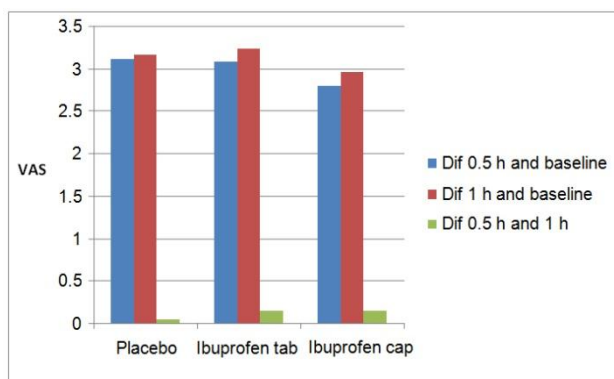
**Figure 2.** The mean pain score as assessed by a VAS scale (0-10) at 0, 30 and 60 minutes after SRP following drug administration.

Following Friedman analysis, VAS pain score difference immediately after SRP showed significant difference with thirty minutes and an hour after SRP ( $p < 0.0001$ ).

Significant difference was observed in the pain parameter only immediately after SRP between three groups ( $p = 0.012$ ).

The mean VAS pain score difference after thirty minutes and an hour upon SRP with baseline is shown (Fig. 3).

However, the mean VAS pain score measured an hour after SRP showed significant difference between both ibuprofen groups and placebo group ( $p = 0.012$ ) (Fig. 2).



**Figure 3.** The mean VAS pain score difference after 30 and 60 minutes upon SRP with baseline

## Discussion

The successful treatment of periodontal disease depends on the effective removal of bacterial deposits from the tooth surfaces (17). This can be accomplished by thorough daily oral hygiene measures achieved by the patient (18), and by professionally performed mechanical debridement (3, 6, 19). Many patients avoid professional oral hygiene because of pain during treatment and fear of anaesthetic injection (20, 21). Different options are available for intra-oral pain control in clinical practice, and combinations may be feasible.

Anaesthetic gels are available, but they have a distasteful flavour, which tends to spread in the oral cavity. This problem is reduced by embedding the anaesthetic agent in mucoadhesive patches (22). The rationale for prophylactic NSAIDs administration is that the presence of the drug in the tissues at the time of surgery results in blocking of both synthesis and direct effects of prostaglandins, and thereby limits postoperative pain and other components of surgically induced inflammation.

Studies on clinical efficacy of NSAID premedication, however, seem to suggest that postsurgical pain control is strictly related to many factors, such as patient selection, nature of medication, and drug regimen (10).

The results of the present study have shown that the oral intake of NSAID drugs, ibuprofen tablet and capsule, was significantly more effective in reducing pain compared with placebo following SRP procedure. However there was no significant difference between ibuprofen tablet and capsule regarding pain reduction during and after SRP.

The use of a VAS for pain scoring has been evaluated in several studies for different conditions (23, 24) and therefore the VAS represents an adequate method for measuring subjective pain. We showed in this clinical trial that pain can be diminished by the pre-emptive administration of a single dose of 800 mg ibuprofen tablet or capsule. In a randomized, triple-blind, placebo-controlled trial, the superiority of ibuprofen arginine over placebo for pain control during routine SRP was confirmed (1). In the treatment of pain, a short onset of action is desirable from a medical point of view and, of course, the patient expects pain relief as soon as possible. Increased analgesia in relation to an increase in ibuprofen plasma concentration was demonstrated for the first time by Laska et al. (25). They compared the analgesic activity of ibuprofen aluminium salt with low bioavailability to a regular-release ibuprofen acid formulation. Since that time, the therapeutic advantage of fast-dissolving or soluble forms of ibuprofen has been confirmed in several independent studies.

In a recent study (26) the antinociceptive effects of two oral formulations of ibuprofen, ibuprofen acid tablets and an effervescent formulation, were compared. The effervescent formulation proved to have a maximum mean plasma concentration within 15 to 40 minutes, whereas maximum concentrations were reached 60 to 90 minutes after tablet intake. Ibuprofen produced a dose-related decrease in pain-related potential, indicating its antinociceptive effects. Superior and more consistent effects on pain intensity were observed for the effervescent formulation in comparison with the tablet. Bioequivalence between 200 mg tablets of ibuprofen lysinate and a new 200 mg soft gelatin capsule was demonstrated. In accordance with previous results, in a study by Schettler et al, again the pharmacokinetic differences between standard ibuprofen acid tablets and fast-dissolving formulations were confirmed. The new formulation is likely to show clinical benefit as an ibuprofen preparation in patients with acute pain because of its plasma concentration versus time profile, resulting from the rapid release of the already

dissolved ibuprofen from the soft gelatin capsule(27). Further, although NSAIDs may produce adequate analgesia and anti-inflammatory effects, the unwanted side effects may limit their practicality(28). Gastrointestinal intolerance and adverse CNS manifestations are among the most common side effects seen in NSAID therapy. A major concern when taking any NSAID is the subsequent effect on platelet aggregation (29, 30). In the present study, low dosage and single-dose administration have excluded the occurrence of adverse side effects.

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