

# Evaluating the Efficacy of Green Tea and Chlorhexidine Mouthwashes in Relieving Post-extraction Complications like Pain and Hemorrhage

Wahidujjaman, AKM Habibullah, Mahmudul Hasan, and Mozammel Hossain

## ABSTRACT

This cross-sectional observational study aimed to evaluate the effectiveness of green tea and chlorhexidine mouthwashes in reducing post-extraction complications such as pain and bleeding. The studied sample consisted of 80 people with an average age of 43.67 ( $\pm 4.78$ ) years. Tooth extraction is shown to all participants. After the tooth extraction, the green tea group was advised to bite the pictures of the gauge into the green tea, take a bite, and rinse their mouths with green tea mouthwash the next day. Subjects with another group bite soaked in chlorhexidine saline solution after tooth extraction and chlorhexidine mouthwash. Operation time, hemostasis time, VAS pain after tooth extraction and total number of analgesics were recorded. Descriptive statistics were calculated, and chi-square t-tests and independent samples were performed using SPSS 22. The results showed that there was no significant difference in age, sex, and time of surgery between the two groups. The mean VAS was significantly lower in the green tea group compared to the chlorhexidine group. In addition, the green tea group also showed a shorter time for complete hemostasis and less analgesic consumption than the chlorhexidine group. It can be concluded that green tea is significantly effective in reducing the time of complete hemostasis and pain after tooth extraction. Thus, by conducting additional studies, green tea can be found to be therapeutically useful for the treatment of post-extraction bleeding and pain.

**Keywords:** Chlorhexidine mouthwash, green tea, hemorrhage, pain, tooth extraction.

**Published Online:** June 7, 2023

**ISSN:** 2684-4443

**DOI:** 10.24018/ejdent.2023.4.3.258

**Wahidujjaman \***

Oral & Maxillofacial Surgery Department, Bangabandhu Sheikh Mujib Medical University, Bangladesh.

(e-mail: jaman.dentist@gmail.com)

**AKM Habibullah**

Oral & Maxillofacial Surgery Department, Bangabandhu Sheikh Mujib Medical University, Bangladesh.

(e-mail: dr.mithu.bsmmu@gmail.com)

**M. Hasan**

Oral & Maxillofacial Surgery, Bangabandhu Sheikh Mujib Medical University, Bangladesh.

(e-mail: dr.hasan\_42ddc@yahoo.com)

**M. Hossain**

Conservative Dentistry and Endodontics Department, Bangabandhu Sheikh Mujib Medical University, Bangladesh.

(e-mail:

mozammelresearch@gmail.com)

*\*Corresponding Author*

## I. INTRODUCTION

In the daily practice of dentistry, tooth extraction is performed frequently, and postoperative complications after tooth extraction remain an important problem for clinicians. Therefore, post-extraction pain and bleeding are common complications that begin when the local anesthetic wears off after surgery. Various protocols have been proposed to alleviate this pain. However, none of these were based on Chinese medicine [1]-[3]. Anti-inflammatory drugs, including NSAIDs, are commonly prescribed to control postoperative pain [4], [5], and saline manometer pressures to control bleeding. Mouthwash is commonly prescribed after tooth extraction due to its antibacterial effect.

Chlorhexidine is the most widely used antiseptic in dentistry for its broad-spectrum antibacterial effectiveness [6]. However, recently tea is an ancient beverage made from *Camellia Sinensis* leaves. Various studies have shown that green tea is very rich in polyphenols including catechins, which have antioxidant, antidiabetic, antimutagenic, antiviral, antibacterial, and anti-inflammatory properties [7]. Thus, green tea may have some therapeutic uses and can be used as an effective mouthwash or hemostatic pack. Green tea has been reported to be effective in periodontal disease

from various previous studies [8]-[11]. Romoozi *et al.* [12] in their study found that green tea mouthwash was more effective than chlorhexidine in reducing the gingival index ( $p > 0.05$ ). Furthermore, Foruzanfar *et al.* [13] suggest that green tea extract can prevent plaque formation and reduce gingivitis after crown lengthening surgery.

Due to its antibacterial and anti-inflammatory properties, it was also prescribed to patients after periodontal surgery. Ashgour *et al.* [14] reported that daily green tea rinses may be useful in controlling postoperative complications after molar impact surgery, including pain. In addition, the need for painkillers will be reduced. The mean VAS after green tea gargling was statistically lower than placebo at 3-7 postoperative days ( $P$ -value  $< 0.05$ ). Furthermore, Rasul *et al.* [15] in a study showed that green tea extract was significantly effective in preventing tooth extraction and bleeding caused by tooth extraction and reducing subsequent leakage (6 vs. 29,  $P = 0.001$ ). Thus, rinsing with green tea may be beneficial in controlling post-extraction complications.

Several studies have been conducted internationally to compare the effectiveness of green tea and chlorhexidine mouthwash in controlling post-extraction complications. However, there is no such study in our country to investigate the benefits of green tea extract in controlling postoperative

complications. The aim of this study was to evaluate the effectiveness of green tea and chlorhexidine mouthwashes in reducing post-extraction complications such as pain and bleeding.

### II. MATERIALS AND METHOD

The study sample included 80 subjects (38 men and 42 women) in the age range of 18-70 years. All participants performed tooth extraction. Smokers, users of painkillers, users of antibiotics within the last 2 weeks, patients with systemic diseases, and patients with panoramic X-ray lesions were excluded from the study. Subjects were randomly assigned to groups before tooth extraction. Subjects used the indicated mouthwash (green tea and chlorhexidine) provided by the researcher. Meanwhile, neither subjects nor researchers were able to determine the type of mouthwash after tooth extraction.

Extraction was performed as a simple tooth extraction without flap elevation, bone removal or tooth incision under local anesthesia (2% lidocaine + 1:80,000 adrenaline). All operations are performed according to a single protocol by experienced surgeons. Before tooth extraction, the patient was prescribed pain medication (ibuprofen 400 mg). After surgery, the subjects in the green tea group soaked the bitten sensor in green tea for 30 minutes, and then rinsed their mouths with green tea gargle 4 times a day for 1 minute each day from the next day. Subjects in the chlorhexidine group bite the saline-soaked transducer after tooth extraction and rinse with chlorhexidine mouthwash in the same manner.

The duration of the operation was determined for each patient. Pain was assessed using the VAS 4 hours after tooth extraction. VAS pain scores were also recorded continuously daily for 1 week. The time of complete hemostasis was determined by the absence of blood spots in the saliva during repeated observations. The total number of analgesics administered within 7 days after surgery was registered.

Demographic variables (age and gender) were also taken into account. Appropriate descriptive statistics calculated for each variable, including mean, frequency, range, or standard deviation. Independent samples chi-square t-tests with 95% confidence intervals were performed for data analysis using SPSS version 22 software.

### III. TABLES AND FIGURES

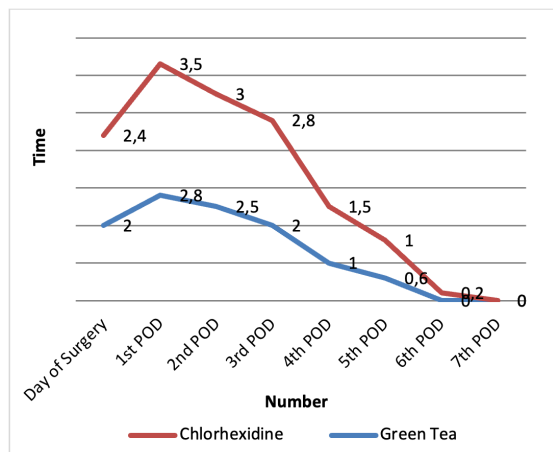


Fig. 1. Number and time of analgesic used.

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF PATIENTS

	N=80		Green Tea		Chlorhexidine		p-value*
			n=40		n=40		
	Mean	SD	Mean	SD	Mean	SD	
Age	43.67	±4.78	42.12	6.44	44.32	4.85	1.000
Male	38	20					1.000
Female	42	20					
Operation Time (min)			20.12	2.88	19.88	3.20	0.984
Complete hemostasis			20.60	5.68	32.4	4.46	0.628

\* Significant at p < 0.05.

TABLE II: POST-EXTRACTION VAS SCORE OF PAIN BETWEEN GROUPS

VAS Score (0 -10)	Green Tea		Chlorhexidine		P value*
	Mean	SD	Mean	SD	
4 hours after surgery	5.28	2.25	8.84	2.58	0.001
1 <sup>st</sup> post-operative day	7.35	3.75	8.68	3.54	0.052
2 <sup>nd</sup> post-operative day	4.63	2.52	7.15	5.36	0.012
3 <sup>rd</sup> post-operative day	3.48	3.64	6.68	3.22	0.008
4 <sup>th</sup> post-operative day	3.22	2.27	5.24	2.29	0.006
5 <sup>th</sup> post-operative day	3.05	2.26	3.92	2.84	0.001
6 <sup>th</sup> post-operative day	2.66	4.21	3.20	3.41	0.852
7 <sup>th</sup> post-operative day	0.57	2.13	1.52	2.54	0.967
Total	4.76	1.14	6.85	2.36	0.001

\* Significant at p < 0.05.

### IV. RESULTS

A total of 80 patients were included in this study. The average age of the participants was 43 years (67±4.78). There were no significant differences in age, sex, or length of surgery between the two groups (Table I). However, a significant difference was observed in the VAS score 4 hours after surgery (P value <0.001).

In descriptive statistical analysis, the mean VAS in group 1 (green tea) was significantly lower than that in group 2 at 4 hours after surgery (P value <0.001). There was also a significant change in VAS scores during the first week in both groups (P-value <0.001). Between-group analysis revealed that the green tea group had a significantly lower mean VAS from days 1 to 7 compared with the chlorhexidine group (Table II).

In addition, a significant difference in the time to complete hemostasis was observed between the groups. The mean time of hemostasis was 20.6 hours in group 1 and 32.4 hours in group 2. A significant change was also observed in the number of analgesics administered 7 days after surgery between the groups (P-value = 0.003). Up to 7 days after surgery, the amount of analgesic with green tea was significantly less than with chlorhexidine (Figure 1). Most analgesics (82.2%) were used during the first 3 days after surgery in both groups. No adverse effects were reported after green tea or chlorhexidine mouthwash.

### V. DISCUSSION

Green tea is very rich in polyphenols, including catechins, which have antioxidant, antidiabetic, antitumorigenic,

antiviral, antibacterial and anti-inflammatory properties [7]. Green tea catechins have antibacterial effects, and in vitro and in vivo studies have shown green tea to be effective against bacteria in periodontal disease and dental caries [1], [8]. Thus, the results of the current study can also be attributed to the antibacterial properties of green tea mouthwash along with its anti-inflammatory activity.

In our study, we used mouthwash composed of extracted green tea polyphenols, which are the most effective component of this plant in a safe and stable composition. Statistical analysis showed that green tea mouthwash significantly reduced inflammation in patients in the postoperative period.

Several previous studies have reported that green tea can help treat gum disease and maintain oral health. According to various reports, the number of injuries during surgery directly affects the level of pain after surgery [16], [17].

In this study, the timing of surgery was not relevant. Significant difference between green tea and chlorhexidine groups. In addition, the experience of the surgeon could also influence the number of injuries and postoperative complications [18]. Given that all operations are performed by one surgeon according to the same protocol, this factor is also eliminated.

In this study, the total time of hemostasis was 32.4 hours in patients who received saline-impregnated gauze, while the total time of hemostasis was 20.6 hours in patients who used green tea extract-impregnated gauze. Rasool *et al.* [15] also found that patients who took green tea extract in their study had less post-operative discharge than those who took placebo. In addition, the effect of green tea on the significant reduction of post-extraction bleeding and oozing observed in this study is likely due to tannins, which cause constriction of damaged tissues and capillaries with an astringent effect. Tannins have also been reported to promote blood clotting [19]. This effect may be another possible mechanism of hemostasis. According to the results of this study, the dose of painkillers was lower in the green tea group than in the chlorhexidine group. This may be due to the effectiveness of green tea in combating postoperative pain. However, most pain medication was administered within 3 days of surgery.

The results of the current study are based on Eshghpour *et al.* [14]. Our study found that green tea was effective in reducing pain after tooth extraction and also in quickly stopping bleeding after tooth extraction. Therefore, because it is readily available and cheap, green tea extract can be a good choice to stop bleeding from the socket caused by this type of surgery. On the other hand, the effectiveness of green tea mouthwash can reduce the microbial load in the mouth and promote better healing.

## VI. CONCLUSION

The results of this study show that green tea extract has a significant effect on reducing the time from tooth extraction to completion of hemostasis. The study found that the pain experienced among the patient was significantly less with green tea compared to chlorhexidine. Therefore, it can be said that green tea is therapeutically useful in the treatment of postoperative bleeding and pain.

## CONFLICT OF INTEREST

Authors declare that they have no conflict of interest.

## REFERENCES

- [1] Comfort MB, Tse AS, Tsang AC, McGrath C. A study of the comparative efficacy of three common analgesics in the control of pain after third molar surgery under local anaesthesia. *Australian Dental Journal*, 2002; 47:327–330.
- [2] De Craen AJ, Di Giulio G, Lampe-Schoenmaeckers JE, Kessels AG, Kleijnen J. Analgesic efficacy and safety of paracetamol-codeine combinations versus paracetamol alone: a systematic review. *BMJ*, 1996; 313:321–325.
- [3] Sridhar V, Wali GG, Shyla HN: Evaluation of the perioperative use of 0.2% chlorhexidine gluconate for the prevention of alveolar osteitis after the extraction of impacted mandibular third molars: a clinical study. *Journal of Maxillofacial Oral Surgery*. 2011; 10:101–111.
- [4] Jung YS, Kim MK, Um YJ, Park HS, Lee EW, Kang JW. The effects on postoperative oral surgery pain by varying NSAID administration times: comparison on effect of preemptive analgesia. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology*. 2005; 100: 559–563.
- [5] Tiigimae-Saar J, Leibur E, Tamme T: The effect of prednisolone on reduction of complaints after impacted third molar removal. *Stomatologija*. 2010; 12:17–22.
- [6] Sajjan, Parappa&Laxminarayan, Nagesh&Kar, Prem&Sajjanar, Mangala. Chlorhexidine as an Antimicrobial Agent in Dentistry – A Review. *Oral Health and Dental Management*. 2019; 15:93-100.
- [7] Cabrera C, Artacho R, Gimenez R: Beneficial effects of green tea—a review. *Journal of American College of Nutrition*. 2006; 25:79–99.
- [8] Jenabian N, Moghadamnia AA, Karami E, Mir AP: The effect of *Camellia Sinensis* (green tea) mouthwash on plaque-induced gingivitis: a single blinded randomized controlled clinical trial. *DARU Journal of Pharmaceutical Science*. 2012; 20:39.
- [9] Hirasawa M, Takada K, Makimura M, Otake S: Improvement of periodontal status by green tea catechin using a local delivery system: a clinical pilot study. *Journal of Periodontal Research*. 2002; 37:433–438.
- [10] Otake S, Makimura M, Kuroki T, Nishihara Y, Hirasawa M: Anticaries effects of polyphenolic compounds from Japanese green tea. *Caries Research*. 1991; 25:438–443.
- [11] Chacko SM, Thambi PT, Kuttan R, Nishigaki I: Beneficial effects of green tea: a literature review. *China Medicine*. 2010; 5:13.
- [12] Romozi E, Bekhradi R, Talebi MR, Barouti, P. and Kamali, E. Effect of green tea mouthwash on reducing plaque and gingivitis. *Journal of Dent Health Oral Disorder Therapy*. 2018; 9(2): 207–210.
- [13] Forouzanfar A. Review of the therapeutic effects of *Camellia sinensis* (green tea) on oral and periodontal health. *Journal of Medicinal Plants Research*. 2011; 5(23): 5465-5469.
- [14] Eshghpour M, Mortazavi H, Mohammadzadeh Rezaei N, Nejat A. Effectiveness of green tea mouthwash in postoperative pain control following surgical removal of impacted third molars: double blind randomized clinical trial. *DARU Journal of Pharmaceutical Sciences*. 2013; 21: 1-6.
- [15] Soltani R, Haghighat A, Fanaei M, Asghari G. Evaluation of the effect of green tea extract on the prevention of gingival bleeding after posterior mandibular teeth extraction: a randomized controlled trial. *Evidence-Based Complementary and Alternative Medicine*. 2014.
- [16] Krekmanov L, Nordenram A: Postoperative complications after surgical removal of mandibular third molars. Effects of penicillin V and chlorhexidine. *International Journal of Oral Maxillofacial Surgery*. 1986; 15:25–29.
- [17] Van Gool AV, Ten Bosch JJ, Boering G. Clinical consequences of complaints and complications after removal of the mandibular 3rd molar. *International Journal of Oral Surgery*. 1977; 6: 29-37.
- [18] Sisk AL, Hammer WB, Shelton DW, Joy ED Jr: Complications following removal of impacted third molars: the role of the experience of the surgeon. *Journal of Oral Maxillofacial Surgery*. 1986; 44: 855–859.
- [19] Chung KT, Wong TY, Wei CI, Huang YW, Lin Y. Tannins and human health: a review. *Critical reviews in food science and nutrition*. 1998; 38(6): 421-64.