

# Evaluation of healing in mandibular molar extraction sockets with and without turmeric gel

## ABSTRACT

**Context:** In the present era of allopathic medication usage, there is always a risk of toxicity. Turmeric is a wonderful natural herb with excellent healing properties and a plethora of many clinical trials in dentistry. Hence, this study aims to evaluate the efficacy of healing in mandibular molar extraction sockets with and without turmeric gel.

**Aim:** This study aimed to evaluate the efficacy of turmeric gel with the objective of analyzing the soft tissue healing in mandibular molar extraction sockets with and without turmeric gel.

**Settings and Design:** The split-mouth study design with randomization of the sites was done using the sequentially numbered opaque sealed envelope (SNOSE) in the same patient indicated for bilateral lower molar extraction. A total of 50 patients were included in the study, who were divided into group A, 25 patients in the experimental site using turmeric gel, and group B, 25 patients in the control site without turmeric gel.

**Materials and Methods:** Turmeric in the form of gel was used in the experimental site to evaluate its efficacy in soft tissue healing of the mandibular molar extraction socket. The extraction sites of the same patient were evaluated for soft tissue healing on postoperative day 1, day 7, and day 21 using Landry, Turn Bell, and Howley scale.

**Statistical Analysis:** A comparison of soft tissue healing between group A and group B, which showed a consequential difference in group A on day 7 with  $P = 0.001$  and day 21 with  $P = 0.001$ , was significant.

**Results:** Results revealed postoperative day 1 showed a significant beginning of healthy granulation tissue formation in both the groups. There was a consequential difference in soft tissue healing in group A on postoperative day 7 and day 21 as compared to group B. The turmeric in the form of gel proved to enhance the soft tissue healing in the mandibular molar extraction socket.

**Conclusions:** The present study revealed that enhanced soft tissue healing of the extraction socket of the mandibular molar was present in the turmeric gel group on postoperative day 7 and day 21 than in without the turmeric gel group.

**Keywords:** Ayurvedic, tooth socket, turmeric extract, wound healing

## INTRODUCTION

Turmeric has been broadly utilized in India since antiquated times. Indian turmeric is considered to be the best in the world due to its inherent medicinal properties.<sup>[1]</sup> The earliest evidence of the use of turmeric also known as Haridra is found in the Atharvaveda and further in Charaka Samhita, Sushruta Samhita, and many others. The plants and their extracts have a lot of potential for wound healing. Turmeric has powerful anti-oxidant and anti-inflammatory mitigating properties to treat various diseases and health problems, digestive difficulties, treatment of infections, and wounds.<sup>[2-6]</sup> The

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generation of reactive oxygen species is the key to the process of wound healing. Long-term exposure to reactive oxygen species, however, invokes oxidative stress, which postpones wound healing. Antioxidants, such as turmeric can help to stimulate tissue regeneration by reducing inflammation, protecting the injury from bacterial contamination, and increasing cellular proliferation, which is necessary for the regeneration of the damaged tissue.<sup>[7,8]</sup> Besides, it has anti-oxidative and anti-inflammatory properties, anticarcinogenic, and hypocholesterolemia properties.<sup>[4]</sup> In dentistry, the use of turmeric in the form of an irrigant has been used as an adjuvant treatment for gingivitis.<sup>[2]</sup> Turmeric mouthwash has also shown to have antiplaque and antigingival properties comparable to chlorohexidine mouthwash.<sup>[9,10]</sup> As a result, the application of turmeric gel can reduce soft tissue inflammation, thus improving wound healing.<sup>[11,12]</sup> This study aims to evaluate the efficacy of turmeric gel with the objective of analyzing the soft tissue healing in mandibular molar extraction sockets with and without turmeric gel.

## SUBJECTS AND METHODS

A double-blinded split-mouth study with randomization of the experimental and control sites with an allocation ratio of 1:1 was carried out on 50 patients scheduled for bilateral mandibular molar extraction at the Department of Oral and Maxillofacial Surgery [Figure 1]. The inclusion criteria were healthy patients between the age group of 18 and 50 years, indicated for bilateral mandibular molars extractions without associated pathology, and willing to participate in this clinical study. This clinical study with a split-mouth study design was approved by the Institutional Ethical Committee with Ref. No DYPDCH/IEC/123/134/19, dated 25/10/2019. This study was carried out in accordance with the ethical standards of the committee and with the Helsinki Declaration of 1975, as revised in 2000. According to the split-mouth design, every patient was divided into two groups, one side was the experimental side (25) using turmeric gel and the contralateral side was the control side (25) without turmeric gel. A detailed case history was taken of all the enlisted participants and written informed consent was obtained for the same. The written informed consent for the procedure and the study was obtained. Turmeric was used in the gel form 20% and water base gel at 20% concentration. The gel was prepared with standardized quality and certification from Dr. D. Y. Patil College of Ayurveda and Research Centre, Pimpri, Pune [Figure 2 and Supplement 1]. All tooth extractions were performed by a single oral and maxillofacial surgeon. Standard scrubbing, painting, and draping for all patients undergoing the procedure were done. Local anesthesia was given by bilateral pterygomandibular nerve block. The attached gingiva was reflected, the tooth was

elevated, and extraction was carried out atraumatically as possible. Hemostasis was achieved. In one of the extraction sockets, which was the experimental site, turmeric gel was placed using the insulin syringe, and suturing was done with a 3–0 silk suture, whereas at the control site of the extraction socket, only suturing was done with 3–0 silk suture in the same patient [Figures 3–5]. The experimental site and control site of the same patient were evaluated for soft tissue healing on postoperative day 1, day 7, and day 21 using Landry, Turn Bell, and Howley scale, and the suture removal was done after 7 days [Figure 6a–c]. The healing quality (Healing Score) was assessed on postoperative day 1, day 7, and day 21 by using the Landry, Turn bull, and Howley soft tissue healing index. A total of 50 patients were included in the study, who were divided into group A, 25 patients in the experimental site using turmeric gel, and group B, 25 patients in the control site without turmeric gel. The selection of the experimental and control sites was done randomly using the sequentially numbered opaque sealed envelope (SNOSE) technique in the same patient indicated for bilateral lower molar extraction.

The 50 opaqued sealed envelopes with tooth numbers as experimental site or control site were placed in the transparent bowl, which was dispensed by the third person who coded it. This was a double-blinded study in which patients and the principal investigator were blinded.

All readings were recorded and subsequently tabulated as a master chart and then sent for statistical analysis. Data were compiled in a Microsoft Excel Sheet and were analyzed using IBM SPSS version 21.

The statistical analysis between group A and group B was done using the Friedman test, Wilcoxon signed rank test, and Mann–Whitney *U* test.

## RESULTS

In our study, 50 patients were evaluated with a varied age range of 32 to 46 years and a mean age of 39 years. Before starting the procedure, a detailed case history was taken with the extraoral and intraoral examination. The experimental site and control site of the patient were evaluated for soft tissue healing on postoperative day 1, day 7, and day 21 using Landry, Turn Bell, and Howley scale. The comparison of soft tissue healing in mandibular molar extraction socket with turmeric gel on postoperative day 1, day 7, and day 21 using the Friedman test and Wilcoxon signed-rank test. The Friedman test revealed the significant effect of turmeric gel on postoperative healing on day 1, day 7, and day 21,  $\chi^2 (2, n = 25) = 48, P = 0.001$ . The median indicated that postoperative healing was the highest on postoperative day

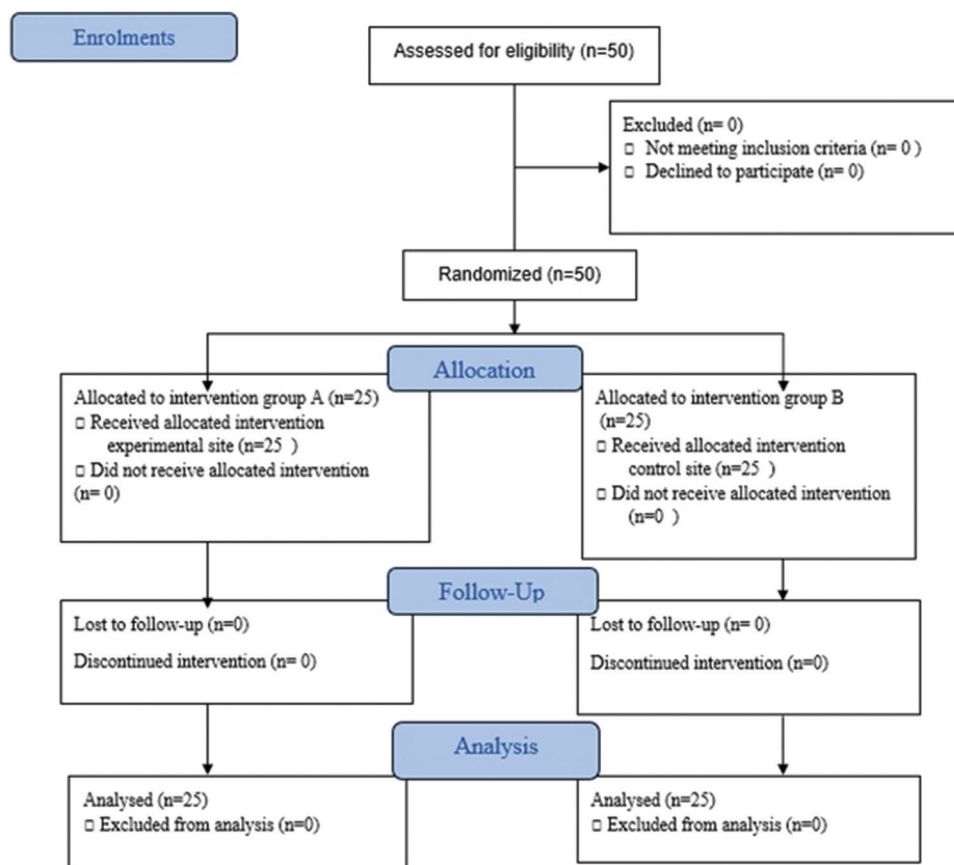


Figure 1: Flow diagram of the progress through the phases of a split mouth randomised trial of two groups (enrolment, intervention allocation, follow-up, and data analysis)

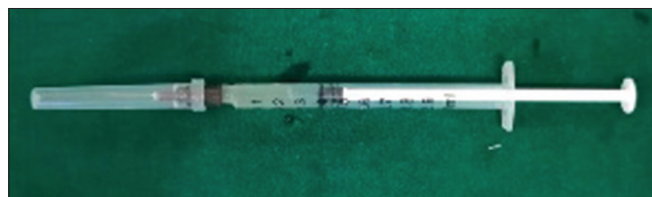


Figure 2: Syringe loaded with turmeric gel for the delivery into the extraction socket

7 (Mdn = 2.50) and day 21 (Mdn = 2.50), followed by day 1 (Mdn = 1). The mean of day 1 was 3, whereas for day 7 and day 21 it was 5 with a standard deviation of 0.00. A Wilcoxon signed-rank test revealed that healing was enhanced between postoperative when compared day 1 with day 7 and day 21 as compared to day 7 with day 21, day 7–day 1  $z = -4.899^b$ , day 21–day 1  $z = -4.899^b$ , day 7–day 21  $z = 0.00^c$ ,  $P = 0.001$  with large effect size,  $r = 0.97$  [Graph 1]. The comparison of soft tissue healing in the mandibular molar extraction socket between group A and group B on postoperative day 1, day 7, and day 21 was done according to the Mann–Whitney  $U$  test. The Mann–Whitney  $U$  test revealed that postoperative healing scores were significantly higher in group A ( $n = 25$ ) compared to group B ( $n = 25$ ), day 1  $U = 288$ , day 2  $U = 0.00$ , day 3  $U = 0.00$ , day 1  $z = 0.00$ , day 2  $z = -6.856$ ,  $z = -6.856$ ,

$P = 0.001$  between day 1 and day 7 with a large size effect on day 7 and day 21,  $r = 1.37$  [Table 1] [Graph 2]. In our study, no adverse effects of the turmeric gel were observed in any patient. The healing was very good on day 7 and excellent on day 21 (according to Landry Turn bull and Howley soft tissue healing index) in the experimental group as compared to the control group in the age range of 32 to 46 years without any disparity in soft tissue healing pattern.

## DISCUSSION

The use of Ayurveda for the health of humans has been practiced since ancient ages. Ayurveda has its roots in India. It is a medicinal system with a rational framework and has not departed its distinct existence from remote ancientness to the new era of advanced medicine. In today's era of cosmetics, many ayurvedic plants such as rose, turmeric, neem, aloe vera, and hibiscus have been a boon for the natural treatment of skin-related problems such as acne and reducing the tan of the skin.<sup>[13-17]</sup> It has been a common practice in Indian households to use neem leaves while bathing during infected with chickenpox. Ayurvedic medicine has been used as adjunctive treatment along with modern allopathic



Figure 3: Preoperative photograph before the start of the procedure



Figure 5: Suturing of both the sides was done using 3-0 silk sutures

medicine.<sup>[16]</sup> In this era of allopathic medicine, the rich Indian traditional medicine has its benefits to reduce inflammation. The challenges of drug resistance to antibiotics can be taken care of with the replacement of drugs with turmeric, which forms the benchmark of traditional medicine. Turmeric has always been used as the primary medication for wounds in many households. There was a proficient enhancement of wound healing of extraction of the mandibular molar socket with turmeric gel.<sup>[11]</sup>

Nimma *et al.*<sup>[17]</sup> used aloe vera gel in the extraction socket for the evaluation of postoperative healing. Similarly, we used turmeric gel in our study when comparing the postoperative day 1, day 7, and day 21 in the test group that showed a significant difference in postoperative day 1 compared to day 7 and day 21 as shown in Figure 6(a-c).<sup>[18]</sup> In our study, a total of 50 patients were evaluated with an age range of 32 to 46 years and a mean age of 37 years. The postoperative day 1 showed the beginning of satisfactory healthy granulation tissue formation as shown in Figure 6a. Behal *et al.*<sup>[18]</sup> evaluated local drug delivery using 2% turmeric gel in chronic periodontitis patients as an adjuvant to scaling and root



Figure 4: Turmeric gel was placed into the experimental site A in the extraction socket

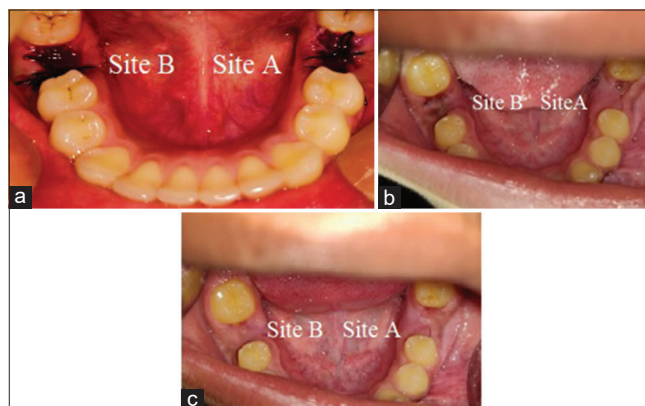


Figure 6: (a) Evaluation of soft tissue healing on postoperative day 1, experimental site A and on control site B. Figure 6: (b) Evaluation of soft tissue healing on postoperative day 7 experimental site A and on control site B after suture removal. Figure 6: (c) Evaluation of soft tissue healing on postoperative day 21 experimental site A and on control site B.

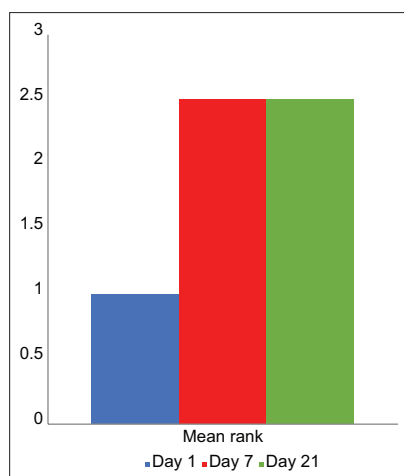
Table 1: Mann-Whitney *U* test

	Group	<i>n</i>	Mean rank	Mann-Whitney <i>U</i>	<i>P</i>
Day 1	1	25	24.50	288.000	1.000
	2	25	24.50		
	Total	50			
Day 7	1	25	36.50	0.000	0.001
	2	25	12.50		
	Total	50			
Day 21	1	25	36.50	0.000	0.001
	2	25	12.50		
	Total	50			

planning. Besides being effective as adjuvant therapy, the taste of the gel was acceptable. The staining of the teeth, burning sensation, or dry mouth were absent, proving the overall biocompatibility of the gel. Similarly, there was no complaint from the patients about ulcer formation, burning sensation, or pus discharge in the socket region from the experimental site in our study.

The role of turmeric in treating alveolar osteitis was done by Lone *et al.*<sup>[14]</sup> The powdered form of turmeric was used in the study mixed with mustard oil, and the dressing was placed with help of sterile gauze. The effect of the local

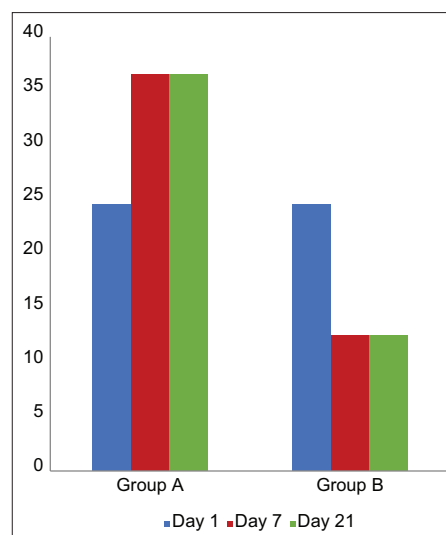




Graph 1: Comparison of soft tissue healing in mandibular molar extraction socket with turmeric gel on postoperative day 1, day 7, and day 21

application of turmeric dressing in the treatment of alveolar osteitis was effective from day 2 of dressing with reduced symptoms.<sup>[19]</sup> In the present study, we used the gel form of the turmeric [Figure 2] in the mandibular extraction socket with a noticeable result on postoperative day 1 as compared to day 7 and day 21. When comparing the experimental group with the non-turmeric gel group, it showed a significant difference in postoperative day 7 and day 21.

Maulina *et al.*<sup>[4]</sup> used the curcumin tablets, which are one of the bioactive compounds of turmeric in patients for managing post-surgical acute inflammation pain on the removal of impacted third molars. In the current study, we evaluated the soft tissue healing using turmeric in the gel form in mandibular molar extraction sockets with the beginning of satisfactory granulation tissue formation on immediate postoperative day 1. As Ayurveda has been the surfeit for many studies in dentistry, Rath *et al.*<sup>[15]</sup> assessed the effectuality of turmeric and neem in wound healing in orthodontic extraction sockets. A turmeric gel was prepared using 100 g of turmeric block and using mortar and pestle. The paste was prepared using distilled water, which was acquainted with the gel foam. In the present study, the preparation was using turmeric in a gel form of 20% and water base gel at 20% concentration and was used to evaluate the soft tissue healing in the mandibular extraction socket [Figure 2]. Patients were then recalled after 24 h of the procedure, 3 days, and 7 days, whereas in the present study, the patients were evaluated on day 1, day 7 as the inflammatory phase lasted until 4 days post-injury, and day 21 as the proliferation or granulation phase lasted up to 3 weeks post-injury. In the study by Rath *et al.*,<sup>[15]</sup> the inflammation was least in the turmeric group, which was evaluated on postoperative day 3, whereas the present study statistically showed a beginning of satisfactory granulation tissue formation on postoperative day 1 [Graphs 1 and 2].



Graph 2: Comparison of the effect of soft tissue healing in mandibular molar extraction socket in the experimental site showed a significant healing on day 7 and day 21 as compared to the control site

The current study statistically showed a tectonic effect of using turmeric gel on soft tissue healing of mandibular molar extraction socket on day 7 and day 21 as compared to the non-turmeric gel group [Graphs 1 and 2]. In congruence with the result of this clinical study, it can be concluded that turmeric gel can be used as a local delivery system to meliorate the soft tissue healing of the extraction of sockets.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for images and other clinical information to be reported in the journal. The patient understands that names and initials will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

#### Financial support and sponsorship

Nil.

#### Conflicts of interest

There are no conflicts of interest.

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SUPPLEMENT 1: TURMERIC GEL STANDARDIZATION CERTIFICATE

**DPU**

**Dr. D. Y. Patil College of Ayurved & Research Centre, Pimpri, Pune-18.**

**Research Laboratory and QC Department**

**Certificate of Analysis**


**Name of Sample - Turmeric Gel**  
**Date of sampling - 11.02.2021**

**Sample Quantity - 50 gm**  
**Report Date - 14.02.2021**

**TESTS FOR- TURMERIC GEL**

Sr. No.	Parameter	Test Observation
1.	Description a) Colour b) Odour c) State	Yellowish Pleasant Semisolid
2.	Visual Appearance	Translucent and Transparent
3.	Homogeneity	Consistent
4.	pH	5.86
5.	Viscosity(cps) At 30.0 RPM At 60 RPM	536 416
6.	Type of Smear	Mild greasy
7.	Irritancy Test	No redness No edema No inflammation & irritation during irritancy study

Opinion -In the undersigned the sample referred above is of a standard quality ~~is not standard~~  
quality.As per Classical Text.

  
Analyzed by

  
QC Head  
Quality Control Department  
Head Quality Control (Testing)  
Sudhatatva Pharmacy  
Dr. D. Y. Patil College of Ayurved  
Hospital & Research Center,  
Pimpri, Pune - 411 018.