

## ASSESSING THE EFFECTIVENESS OF TURMERIC IN THE MANAGEMENT OF DRY SOCKET

MAAZ ANWER MEMON<sup>1</sup>, BILAL HAIDER SHIRAZI<sup>2</sup>, JAMAL ASAD<sup>3</sup>, BASIL KHALID<sup>4</sup>,  
MUHAMMAD ARSALAN RAFFAT<sup>5</sup>, MAHAM MUBEEN<sup>6</sup>, KA YIU LEE<sup>7</sup>

<sup>1-4</sup>Multan Medical and Dental College, Pakistan, <sup>2</sup>Shahida Islam Medical Complex, Pakistan, <sup>3</sup>Islamabad Medical and Dental College, Pakistan, <sup>4</sup>Department of Health Sciences, Swedish Winter Sports Research Centre, Mid Sweden University, 83125 Östersund, Sweden

### ABSTRACT

**Background:** The utilisation of plants and their extracts for wound management and treatment has great potential. Some herbs stimulate tissue healing and regeneration through various mechanisms. Turmeric, also known as Haldi in Urdu, is its active ingredient, contains curcumin, and has been demonstrated to exhibit antibacterial, antifungal, and anti-inflammatory properties. A dry socket represents the most frequent complication that may arise following a tooth extraction, and it causes discomfort.

**Objective:** To assess the efficacy of turmeric in managing dry sockets by comparing its effectiveness with a conventional treatment option.

**Methods:** This randomized clinical study was carried out at Multan Medical and Dental College, Pakistan, at the Department of Oral and Maxillofacial Surgery from December 2022 to May 2023, focusing on 50 individuals who were diagnosed with dry sockets in the Oral and Maxillofacial Surgery Department. In Group A, patients were treated with turmeric and mustard oil dressing, whereas Group B received an Alvogyl dressing.

**Results:** Both groups experienced noteworthy decrease in pain and inflammation. However, Group A demonstrated accelerated wound healing, evident from positive changes in tissue color, palpation response, granulation tissue presence, and enhanced incision margins by the second day after the initial dressing change. In contrast, the majority of Group B patients exhibited positive healing progress from the third day of dressing application.

**Conclusion:** Both turmeric and Alvogyl alleviate dry socket pain. However, further investigations are required to validate the dosing regimen of turmeric and evaluate its long-term safety and effectiveness.

**Keywords:** Curcumin, Dry socket, Turmeric

**How to cite this article:** Memon MA, Shirazi BH, Asad J, Khalid B, Raffat MA, Mubeen M, Lee KY. Assessing the Effectiveness of Turmeric in the Management of Dry Socket. Pak Postgrad Med J 2023;34(4): 203-208

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

DOI: <https://doi.org/10.51642/ppmj.v34i04.624>

Correspondence to: *Maaz Anwer Memon, Department of Oral Pathology, Multan Medical & Dental College, Southern Bypass Jahangirabad, Multan, Pakistan.*

Email: [memon.maaz@hotmail.com](mailto:memon.maaz@hotmail.com)

### INTRODUCTION

A dry socket is a frequently encountered complication that may occur following tooth extraction.<sup>1</sup> Crawford

was the first to describe it in 1896.<sup>2</sup> Numerous terms have been used to describe dry sockets, including alveolar osteitis, postoperative alveolitis, and localised osteitis. Among various terms used, "dry socket" remains the widely accepted terminology, despite the existence of other alternative terms.<sup>3</sup> A dry socket, as proposed by Blum in 2002, is characterised by pain at the extraction site that worsens between the first and third day after the procedure, a blood clot that has either partially or completely disintegrated within the socket,

and in some cases, a foul odour.<sup>3</sup> A dry socket is a common complication that occurs as a result of increased fibrinolytic activity, which can be caused by factors such as traumatic extraction, pre-extraction infection, tobacco use, and contraceptives.<sup>4</sup> Fibrinolysis, which involves the activation of plasminogen into plasmin, can occur either directly or indirectly. However, the causes of dry sockets are unknown<sup>4</sup>. Pain is the primary symptom and can be severe enough to interfere with daily activities. Typically, the discomfort begins one to three days after permanent tooth extraction and worsens over time.<sup>5</sup> Based on the type of surgery performed, which could be either impacted or routine extraction, the incidence of dry sockets ranges from 1% to 30%, making its management difficult for healthcare professionals.<sup>6</sup> There are a variety of treatment options for managing dry sockets, including the use of obtundent and pain-relieving dressings, such as zinc oxide and eugenol. Locally or systemically, anti-infective agents and anti-fibrinolytic agents may be administered.<sup>6</sup> In some cases, surgery is necessary to remove the necrotic clot and encourage the formation of an entirely fresh blood clot.<sup>7</sup> In addition to conventional wound management methods, the application of antibiotics and antiseptics, chemical-based debridement agents such as hydrogen peroxide and collagenase ointment, as well as wound healing promoters such as aloe vera extract and tretinoin, have been reported as potential treatment options. Several natural substances, including tissue extracts, vitamins, minerals, and plant products, have been identified to have wound-healing properties.<sup>8</sup> These substances aid in blood clotting, prevent infections, and accelerate healing. Researchers are currently identifying and formulating herbal products for the management of wounds. A number of these products, including aloe vera, neem, Cedrus, turmeric, and jasmine auriculatum, have been used over the years.

Curcuma Longa is typically referred to as turmeric and Haldi in Urdu. The healing properties of turmeric, which have been employed in herbal medicine for hundreds of years, make it a significant product. It possesses potent anti-inflammatory and antioxidant properties.<sup>9</sup> Curcumin is the primary active yellow pigment found in turmeric and has been associated with a variety of therapeutic benefits, including anti-cancer, anti-diabetic, anti-viral, and anti-rheumatic effects. Curcumin induces the expression of pro-angiogenic factors, including vascular endothelial growth factor (VEGF), transforming growth factor (TGF-), and fibroblast growth factor-2 (FGF-2), which play a crucial role in the process of angiogenesis.<sup>10</sup> Since curcumin is only soluble in fat, it should be combined with lipids such as coconut milk, ghee, butter, or oils to maximise its

medicinal properties.<sup>11</sup> This study employed the dressing of turmeric and mustard oil. The objective of this study is to assess the efficacy of turmeric in managing dry sockets by comparing its effectiveness with a conventional treatment option.

## METHODS

This randomized clinical study took place at Multan Medical and Dental College in Pakistan, specifically at the Department of Oral and Maxillofacial Surgery from December 2022 to May 2023. Before initiating the procedure, the Research and Ethics Committee approved the study. Patients were fully informed about the study and its details, and their informed consent was obtained in written format. A detailed patient history was documented using a pre-designed Performa, which included personal information such as name, age, gender, and hospital registration number. Additionally, the patient's presenting complaints and clinical features, including signs and symptoms, were also recorded. The calculation of the sample size was performed using G power (statistical software to determine sample size). A total of 50 patients, comprising 20 females and 30 males aged between 26 to 52 years, were diagnosed with dry sockets following extraction. **Error! Reference source not found.** The majority of cases (40) were located in the mandibular molar region, while 6 cases were observed in the maxilla molar region, and 4 cases were located in the anterior maxilla region. None of the patients had received any prior treatment. The study incorporated individuals who did not exhibit any indications of active infection in the sockets of their extracted teeth. Women who were pregnant or breastfeeding, those who took oral contraceptives, patients who had previously received an antibiotic and anti-inflammatory medicine for dry socket treatment, smokers, and those who were unable or unwilling to attend follow-up sessions were excluded from this study.

Patients were randomly assigned to two groups. Group A (Study Group) comprised of 25 individuals (14 males and 11 females). A dressing comprising turmeric and mustard oil was administered to the afflicted socket. Group B (Control Group) consisted of 25 patients (16 males and 9 females). A commercially available Alvogyl dressing was applied to the infected dry socket.

The dental product utilized in the procedure was Alveopaste Pengha Iodoform Paste, manufactured by Produits Dentaires. The composition of each container, weighing 15 grams, includes various components such as 4% Penghawar-Djambi, which acts as a hemostatic agent, 16% Iodoform, which serves as an antiseptic,

26% Ethyl Aminobenzoate, a local anaesthetic, 14% Eugenol, 8% Oil of Mint, and 100% excipient.

The Curcuma Longa (Haldi) rhizome, which had been dried, was crushed into a fine powder utilizing a mechanical blender. A 150 mm sieve was used to sift the material, yielding a fine powder. This product was stored, and a fresh dressing was prepared using a sterile gauze with mustard oil. The dressing was applied every other day until the symptoms subsided. After the irrigation with saline solution, a dressing was applied to the socket (**Error! Reference source not found.**).

Table 1 Summary Statistics of Age (in years)

Age	Group A	Group B
Mean	26.04	26.04
SD	8.56	8.68
Minimum	18	18
Maximum	52	49



Figure 1: Turmeric and mustard oil paste dressing in a dry socket wound

### TREATMENT PROTOCOL

After gathering information about the patient's detailed medical history. The socket was irrigated with a warm

Table 2 Healing Index

Healing Index	Tissue Colour	Response to Palpation	Granulation Tissue	Incision Margin
<b>Very poor 1</b>	≥ 50% of gingiva is red	Bleeding	Present	Not epithelialised with loss of epithelium beyond incision margin
<b>Poor 2</b>	< 50% of gingiva is red	Bleeding	Present	Not epithelialised with connective tissue exposed
<b>Good 3</b>	≥ 25% of gingiva is red	No Bleeding	None	No connective tissue exposed
<b>Very good 4</b>	< 25% of gingiva is red	No Bleeding	None	No connective tissue exposed
<b>Excellent 5</b>	All tissue is pink	No Bleeding	None	No connective tissue exposed

### STATISTICAL ANALYSIS

The statistical data collected for the study were entered into the software program SPSS (Statistical Package for

saline solution, and a cotton swab was utilized to eliminate any residual food particles and remnants of the disintegrated clot. It was ensured that the socket walls were not curetted during the process. The socket was subjected to multiple irrigation cycles, followed by the application of Alvogyl dressing and sterile gauze.

Turmeric and mustard oil paste were utilized as a dressing within the setting of the study group. Sterile gauze was placed on the paste containing turmeric and mustard oil. Pain levels of patients in two distinct groups were assessed at three specific time intervals (1st, 2nd, and 3rd days) subsequent to the initiation of treatment, utilizing a visual analogue scale (VAS). The VAS is a patient-centric assessment tool comprising a 10 cm ruler, where the leftmost end signifies the absence of pain, and the rightmost end represents the most severe level of pain experienced. Patients were instructed to indicate the severity of their pain by marking the appropriate location on the ruler, as depicted in Figure 2. The clinical examination and evaluation of healing were assessed by using a healing index, as depicted in Table 2.

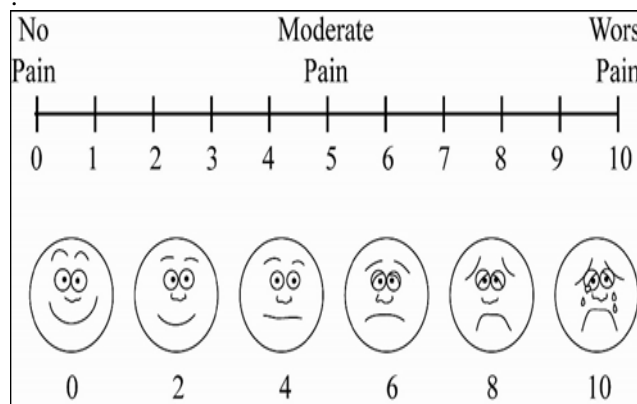


Figure 2: Visual Analog Scale (VAS)

Social Sciences) version 25, where it was stored and subsequently subjected to comprehensive analysis. For continuous variables, such as the pain scale

encompassing pre- and post-operative pain assessments, along with the healing index, descriptive statistics, including mean and standard deviation (SD), were calculated. To assess the significance of the observed differences, an independent t-test was conducted with a p-value <0.001.

**RESULTS**

To assess the differences in average pre- and post-operative Visual Analog Scale (VAS) scores as well as healing index scores across multiple days (day 1, day 2, and day 3), an independent t-test was conducted. The t-test involved two distinct groups denoted as Group A and Group B, and aimed to compare the means of these groups for the above mentioned variables. The obtained results, presented in Table 3 and Table 4, respectively,

illustrated a significant difference in the mean scores of post-operative VAS and healing index on day 2 and day 3, indicating a significant impact of the study group on pain levels and healing progress (p<0.001). However, there was no significant difference observed in the mean values of pre-operative VAS scores between the two study groups.

In Group A, favourable healing outcomes were noted from the initial dressing change on the second day, as evidenced by positive changes in tissue colour, response to palpation, presence of granulation tissue, and improvement in incision margin. In contrast, it was observed that the majority of patients in Group B exhibited positive healing progress starting from the third day of dressing, as presented in Table 4..

Table 3: Comparison of Mean Pre-Operative and Postoperative Pain between Group A and Group B

Study Variables	Group A			Group B		
	Mean	Standard Deviation	p-value (0.001)	Mean	Standard Deviation	p-value (0.001)
<b>Pre-operative Pain Scale</b>	8.20	1.04	0.58	8.36	8.99	0.58
<b>Post-operative Pain Scale</b>						
Day 1	5.64	0.73	<0.001	7.20	0.76	<0.001
Day 2	4.28	0.45	<0.001	5.92	0.49	<0.001
Day 3	1.8	0.8	<0.001	3.6	1.0	<0.001

Table 4: Comparison of Mean Pre-Operative and Postoperative Pain between Group A and Group B

Post-operative Healing Index	Group A			Group B		
	Mean	Standard Deviation	p-value (0.001)	Mean	Standard Deviation	p-value (0.001)
Day 1	3.32	0.69	<0.001	4.20	0.56	<0.001
Day 2	1.30	0.57	<0.001	3.20	0.64	<0.001
Day 3	1.20	0.48	0.009	1.80	0.65	0.009

**DISCUSSION**

The first signs and symptoms of dry sockets appear one to three days after a tooth is extracted.<sup>11</sup> The symptoms encompass excruciating and acute discomfort that predominantly extends to the ear and cervical region. Halitosis, or a putrid odour, is present, along with erythema of the surrounding mucosa and a coating of yellow-grey necrotic tissue in the alveolar socket. The condition has a limited duration. Despite its highly incapacitating and distressing nature.<sup>12</sup> Dentists frequently underestimate the level of pain experienced by their patients, resulting in inadequate treatment.<sup>13</sup> The majority of research indicates that dry socket occurs in 1-4% of regular dental extractions and is estimated around 7% to 30% of impacted third molar extractions.<sup>3</sup> The current study revealed that dry socket was observed in 9% of extractions and 6% following impactions.

In the present study, the turmeric and mustard oil dressing and Alvogyl dressing significantly reduced pain and inflammation. The study group experienced more rapid wound healing than the control group. There were no adverse effects associated with turmeric and mustard oil paste. Recent randomized clinical research conducted by Lone et al. in 2018 assessing the efficacy of turmeric in the management of alveolar osteitis (dry socket) is consistent with our findings.<sup>11</sup> Our findings also imply that turmeric has significant wound healing and alleviation of pain benefits for dry socket patients. These consistent results provide additional support for turmeric's potential as an alternative treatment for dry sockets.

The current study employed turmeric, which is abundant in curcuminoids, to benefit from its anti-inflammatory, antioxidant, and anti-microbial characteristics.<sup>14</sup> Curcumin's mechanism of action can be characterised as multi-centric due to its ability to function as a stabilising

agent of the liposomal membrane and a prostaglandin inhibitor. Additionally, it depletes substance P in nerve terminals, acts as an analgesic, and inhibits the activity of prostaglandins and leukotrienes while not affecting the synthesis of prostacyclins.<sup>15</sup> Furthermore, curcuma longa comprises proteins and fats, as well as vitamins A, B, and C, which play a significant role in wound healing and regeneration.<sup>16</sup>

Turmeric possesses therapeutic properties that aid in the management of chronic ulcers. These properties include enhancing microcirculation, inducing angiogenesis, facilitating granulation tissue formation, and accelerating re-epithelialization.<sup>17</sup> In 2006, Choukroun et al. conducted a study aiming to explore the underlying factors crucial to the healing process. Their findings highlighted key elements such as angiogenesis, immune response, the mobilization of circulating stem cells, and the provision of wound protection via epithelial coverage as crucial contributors to successful wound healing<sup>18</sup>. In the process of socket healing, the fibrin matrix present within the blood clot serves as a temporary scaffold that facilitates the movement of developing endothelial cells.<sup>19</sup> The process of angiogenesis holds significant importance in the healing of the socket. The aforementioned components, namely inflammatory cells, growth factors, and progenitor cells, play a crucial role in the various stages of socket healing that involve inflammation and proliferation.<sup>20</sup>

The application of turmeric topically produced a noteworthy decrease in wound size during the proliferative phase, as compared to the wound size treated with Alvogyl dressing.<sup>17</sup> The results indicate that the application of turmeric topically may exert a beneficial impact on the process of wound healing and wound contraction in comparison to the daily use of saline cleansing and Alvogyl dressing. The efficacy of turmeric powder in promoting the healing of acute wounds resulting from surgical incisions was evaluated before its clinical trial initiation.<sup>11, 21</sup>

Considering the significant findings from various studies<sup>22, 23</sup> and the outcomes of our study, as well as the distinctive role of angiogenesis in the context of wound healing and repair, the properties of anti-inflammation, anti-oxidation, and anti-microbial activity of turmeric with mustard oil, it may be deemed an alternative wound dressing for dry sockets.

## CONCLUSION

The study highlights the efficacy of both turmeric and Alvogyl in alleviating the severe pain associated with dry sockets. Additionally, distinct healing patterns emerged between Group A (Study group) and Group B (Control group). Group A displayed early positive

healing indicators, such as improved tissue characteristics and incision margins after the second day of dressing change, while Group B showed similar progress starting from the third day. These findings indicate the potential superiority of turmeric in initiating early and favorable healing responses, suggesting its promising role in managing dry sockets.

**Ethical Approval:** Submitted

**Conflict of Interest:** Authors declare no conflict of interest.

**Funding Source:** None

## REFERENCES

1. Mamoun J. Dry Socket Etiology, Diagnosis, and Clinical Treatment Techniques. *J Korean Assoc Oral Maxillofac Surg.* 2018;44(2):52-8.
2. Gottlieb B, Crawford H. Therapy and prophylaxis of dry socket. *Am J Orthod Dentofacial Orthop.* 1943;29(6):B328-B31.
3. Blum IR. Contemporary views on dry socket (alveolar osteitis): a clinical appraisal of standardization, aetiopathogenesis and management: a critical review. *Int J Oral Maxillofac Surg.* 2002;31(3):309-17.
4. Sharma S. Assessment of risk factors associated with dry socket-A clinical study. *J Med Dent Sci Res.* 2021;9(3):85-8.
5. Mamoun J. Dry Socket Etiology, Diagnosis, and Clinical Treatment Techniques. *J Korean Assoc Oral Maxillofac Surg.* 2018;44(2):52-8.
6. Xiang X, Shi P, Zhang P, Shen J, Kang J. Impact of platelet-rich fibrin on mandibular third molar surgery recovery: a systematic review and meta-analysis. *BMC oral health.* 2019;19(1):163.
7. Kolokythas A, Olech E, Miloro M. Alveolar osteitis: a comprehensive review of concepts and controversies. *Int J Dent.* 2010;2010:249073-.
8. Chybicki D, Janas-Naze A. Pain Relief and Antimicrobial Activity in Alveolar Osteitis after Platelet-Rich Fibrin Application—A Non-Randomized Controlled Study. *Appl Sci.* 2022;12(3):1324.
9. Menon VP, Sudheer AR. Antioxidant and anti-inflammatory properties of curcumin. *Adv Exp Med Biol.* 2007;595:105-25.
10. Wang TY, Chen JX. Effects of Curcumin on Vessel Formation Insight into the Pro- and Antiangiogenesis of Curcumin. *Evid Based Complement Alternat Med.* 2019;2019:1390795.
11. Lone PA, wakeel Ahmed S, Prasad V, Ahmed B. Role of turmeric in management of alveolar osteitis (dry socket): A randomised clinical study. *J Oral Biol Craniofac Res.* 2018;8(1):44-7.

12. Nishanth M, Vishwas L, Tantry D. Is alveolar osteitis more prevalent since COVID-19? A cross-sectional study. *J Dent Educ.* 2023;9(1):5-12.
13. Kamal A, Salman B, Razak NHA, Samsudin AR. A comparative clinical study between concentrated growth factor and low-level laser therapy in the management of dry socket. *Eur J Dent.* 2020;14(04):613-20.
14. Hewlings SJ, Kalman DS. Curcumin: A Review of Its Effects on Human Health. *Foods.* 2017;6(10):92.
15. Sharifi-Rad J, Rayess YE, Rizk AA, Sadaka C, Zgheib R, Zam W, et al. Turmeric and Its Major Compound Curcumin on Health: Bioactive Effects and Safety Profiles for Food, Pharmaceutical, Biotechnological and Medicinal Applications. *Front pharmacol.* 2020;11:01021-.
16. Raina R, Parwez S, Verma P, Pankaj N. Medicinal plants and their role in wound healing. *Vet J.* 2008;3(1):21.
17. Kumari A, Raina N, Wahi A, Goh KW, Sharma P, Nagpal R, et al. Wound-Healing Effects of Curcumin and Its Nanoformulations: A Comprehensive Review. *Pharm.* 2022;14(11):2288.
18. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, et al. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part IV: clinical effects on tissue healing. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2006;101(3):e56-60.
19. Saghiri MA, Asatourian A, Sheibani N. Angiogenesis and the prevention of alveolar osteitis: a review study. *J Korean Assoc Oral Maxillofac Surg.* 2018;44(3):93-102.
20. de Sousa Gomes P, Daugela P, Poskevicius L, Mariano L, Fernandes MH. Molecular and Cellular Aspects of Socket Healing in the Absence and Presence of Graft Materials and Autologous Platelet Concentrates: a Focused Review. *J Oral Maxillofac Surg.* 2019;10(3):e2-e.
21. Shedoeva A, Leavesley D, Upton Z, Fan C. Wound Healing and the Use of Medicinal Plants. *Evid Based Complement Alternat Med.* 2019;2019:2684108.
22. Faiga NN, Rachmadi P, Meizarini A. Neovascular Pattern in Wound Healing after Zinc Oxide and Curcuma longa Rhizome Extract Dressing Application. *Contemp Clin Dent.* 2018;9(Suppl 2):S337-s41.
23. Hosea ZY, Kator L, Rhoda EH. Phytochemical properties and antimicrobial activities of aqueous extract of Curcuma longa (Turmeric) rhizome extract. *Asian J Crop Sci.* 2018;2(1):1-8.