

EFFECTIVENESS OF PROPOLIS GEL IN REDUCING THE OCCURRENCE OF DRY SOCKET AFTER EXTRACTION OF MANDIBULAR MOLARS: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Objectives: This study aimed to assess the effectiveness of propolis gel in reducing the occurrence of dry sockets after mandibular molars extraction.

Materials and Methods: This Quasi-experimental study was conducted in Lahore General Hospital. A total of 96 patients requiring a mandibular molar extraction were recruited. The patients were randomly allocated to one of the two trial arms: experimental propolis group and control group. After the extraction, 1.5% propolis gel was placed in the socket of the experimental group, while no intervention was done in the control group. The presence of exposed bone and disintegrated blood clot was assessed at day 5.

Results: A greater number of sockets were found to have disintegrated blood clots in the control group ($n = 17, 35.4\%$) as compared to the propolis group ($n=4, 8.3\%$) group ($p = 0.001$). The number of sockets with exposed bone were also greater for the control group ($n = 17, 35.4\%$), as compared to the propolis group ($n = 4, 8.4\%$), at day 5 ($p = 0.001$).

Conclusion: Propolis gel was found to be effective in reducing the occurrence of dry socket.

Key words: Propolis gel; tooth extraction; dry socket.

INTRODUCTION

Dry socket or alveolar osteitis is the most common post-extraction complication in dentistry. Dry socket is an extraction socket with exposed bone, devoid of a blood clot and it may be filled with food debris, edema of the surrounding gingiva, and regional lymphadenitis.¹ There are many predisposing factors for the formation of a dry socket such as complexity and pain during surgery, fragments of root or bone remaining in the wound, vasoconstrictors in local anesthetic solutions, oral contraceptives use, smoking, the surgeons' expertise, and poor oral hygiene.² The management of alveolar osteitis involves

controlling the pain until normal healing begins. Generally, local measures are enough to control pain and discomfort, however, in a few cases, the pain or infection is severe enough to necessitate the use of systemic analgesics and antibiotics. Although the placement of intra-alveolar dressing material may interfere with the timely healing of the extraction socket, its use is widely advocated in the literature. One of the most common intra-alveolar dressings is Alvogyl, which is composed of anesthetic, analgesic, and antimicrobial components.³

During the last century, many efforts have been made to find a proper way for preventing dry sockets. A number of materials and techniques which have been and still are being investigated for their success have been reported in the literature. These pharmacological prophylactic agents include antimicrobials, antiseptics and lavage, antifibrinolytic, steroid anti-inflammatory, clot support agents, and

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obtundent dressing.⁴ The most effective method for reducing dry sockets is reported to be the use of antifibrinolytic agents that topically reduce the microorganisms within the wound.⁵ Although antiseptics and antibiotics have been demonstrated to be the most effective, they are more expensive, have significant side effects, and have the potential to develop resistance.⁶

Propolis (bee glue) has been used as a healing agent for centuries. The healing properties of propolis were extensively utilized in medicine by the Greek, Roman, and Egyptian civilizations. However, research on the actual composition of propolis began in the 20th century and continued after the second world war.⁷ It is composed of flavonoids/ caffeic acid, resins/ balsams (50 -70%), essential oil/wax (30- 50%), pollen (5-10%), minerals, vitamin E, and vitamin B complex. It is known to have antibacterial, antifungal, antiviral, antioxidant, and anti-inflammatory properties.⁸

Propolis has extensive use in dentistry including the treatment of painful denture ulceration, inflammation of the mucosa, bad breath, and periodontal abscess or pockets. Moreover, it is also used as a mouth freshener; mouthwash for cervical, dentinal, and root caries sensitivity; socket 'covering' after extraction, and for treating dry sockets.^{9,10} Although the role of propolis as an antimicrobial, caries prevention, and dentine hypersensitivity has been explored in dentistry, there is inadequate evidence to suggest its efficacy in the prevention of dry socket after tooth extractions.¹¹ In order to establish the biologically plausible role of propolis gel in the prevention of dry sockets, further empirical evidence is required. Therefore, this study aimed to evaluate the effectiveness of propolis gel in reducing the occurrence of dry sockets after the extraction of mandibular molar teeth.

MATERIALS AND METHODS

This quasi-experimental trial was conducted in the dental department of Lahore General Hospital from March 2016 till February 2017. Ethical approval was taken from the hospital review committee. The WHO sample size calculator was used for sample size estimation. Considering a 5% level of significance, 80% power, anticipated sample and population proportions of 6% and 27%, a sample size of 96 was estimated to be adequate.¹²

All 20-40 years aged patients that reported to the dental department with a painful mandibular molar; were indicated to have an extraction; had a history of good oral hygiene and no systemic disease were invited to participate in the study. The whole procedure was explained in detail for all patients who agreed to participate. Informed, written consent was taken from the patients. Pregnant women and individuals with other co-morbid conditions including immunocompromised conditions, diabetes mellitus and nephrotic disorders were excluded from the study.

A total of 96 patients were conveniently allocated to either the Experimental group (Propolis n = 48) or the Control group (n = 48). After taking periapical radiographs of all patients, inferior nerve and lingual nerve regional block local anesthesia was administered using lignocaine. After ensuring that the anesthesia is effective, the tooth was luxated using a straight elevator. The extraction was performed using molar forceps. A single, experienced oral surgeon performed all the extractions (Dr. S). The surgeon was blinded to the group allocation. After the extraction, 1.5% Propolis gel was placed in the sockets of all Propolis group patients. No intervention was done in the control group patients. Post-operative instructions were given to all patients along with a prescription of Ibuprofen 400 mg.

The patients were recalled for a follow-up check-up on days 3 and 5. The occurrence of a disintegrated blood clot and exposed bone were assessed on the follow-up visits. Both these variables were used as indicators of dry socket.

All data were entered and analyzed using SPSS v 18.0. Frequencies and percentages were described for the occurrence of disintegrated dry sockets and exposed bone. Mean and standard deviation was described for age. Chi-squared test was applied to compare the frequency of dry sockets between the two groups.

RESULT

There were a total of 96 patients in the study with 48 in each group. The mean age of the patients was 29.53 ± 4.95 years. The occurrence of blood clot disintegration was compared between the two groups on day 5. A significantly greater proportion of disintegrated blood clots were found in the control group (n = 17, 35.4%) as compared to the propolis

(n = 4, 8.3%) group (p = 0.001; Table 1).

The occurrence of exposed bone was compared between the two groups on days 1 and 5. On day 1, a greater number of patients from the propolis group had exposed bone (n = 42, 87.5%), as compared to the control group (n = 34, 70.8%; p=0.044; Table 2).

However, the trend was reversed on the next follow-up. On day 5, a greater number of patients from the control group had exposed bone (n = 17, 35.4%), as compared to the Propolis group (n = 4, 8.3%; p = 0.001; Table 2).

DISCUSSION

Alveolar osteitis is a widely studied post-op complication in dentistry. Numerous studies have been conducted to find the safest and most effective method of preventing and treating the condition. One of the major challenges faced in identifying dry sockets is an inconsistent definition and lack of standardized diagnostic criteria. Since dry socket is one of the most common post-extraction complications, it is imperative to understand the pathology, prevention, and treatment.¹³ Literature highlights the need to establish a uniform definition of dry sockets and to critically review the etiology and pathogenesis of the condition. Moreover, there is a dire need of identifying and eliminating potential risk factors and improving preventive strategies against alveolar osteitis.¹⁴

A study conducted by Serrano et al. to determine the effects of propolis in preventing dry socket after extraction of third molars reported that out of the 26 extractions performed, three patients (23%) in the control group reported dry socket whereas no case

of dry socket was reported in the propolis group.¹⁵ In a study conducted by Garzon et al. to determine the effects of propolis and alveogyl in treating wet and dry extraction sockets, they reported that 83% of the cases of dry socket improved between 2 to 9 days in both groups but a slightly better healing response was observed with alveogyl (45%) in the treatment of wet socket compared to tincture of propolis (42%).¹⁶ Abbasi et al. reported propolis enhances the healing of the surgical wound after extraction and a superior efficacy in the synthesis of type I and III collagen.¹¹

In our study, the mean age of patients was 29.53 ± 4.95 years with minimum and maximum ages of 20.0 and 40.0 years respectively. Furthermore, 69.79% were females and only 30.21% were males with a female to male ratio of 2.33:1, and 18.75% of patients were smokers. Another Nigerian retrospective review comprised of over 3300 dental extractions performed in over 3000 patients, showed a 4.1% incidence of dry socket. The mean age of the patients was 33.4 years and a peak age incidence was 21 to 30 years. A slight female preponderance (1.4:1) was observed.¹⁷ The results of age and gender in this study were very much similar to our results.

Gonzalez et al. conducted a study on patients with periodontal disease to see the healing effect of propolis paste and mouthwash after tooth extraction. The patients were prescribed either a control mouthwash, 0.2% chlorhexidine mouthwash, or propolis mouthwash. Propolis demonstrated antibacterial properties by itself and in combination with chlorhexidine mouthwash. Moreover, 90% of the sockets treated with propolis paste showed healing compared to only 13.4% healing with control paste. They

Table 1 Frequency of Blood Clot Disintegration at Day 5

		Groups		Total	p Value
		Propolis	Control		
Blood Clot Disintegration Day 5	Present	4 (8.3%)	17 (35.4%)	21 (21.9%)	0.001
	Absent	44 (91.7%)	31 (64.6%)	75 (78.1%)	

Table 2 Frequency of Exposed Bone in both Groups at Days 1 and 5

		Groups		Total	p Value
		Propolis	Control		
Exposed Bone Day 1	Present	42 (87.5%)	34 (70.8%)	76 (79.2%)	0.001
	Absent	6 (12.5%)	14 (29.2%)	20 (20.8%)	
Exposed Bone Day 5	Present	4 (8.3%)	17 (35.4%)	21 (21.9%)	0.001
	Absent	44 (91.7%)	31 (64.6%)	75 (78.1%)	

also observed a reduction in the microorganisms; streptococci mutants and lactobacilli, especially when propolis was used in combination with chlorhexidine.¹⁸ Yet another clinical study conducted by Babar. et al. found a reduction in the incidence of dry sockets after mandibular third molar surgery using 0.2% chlorhexidine gel foam.¹² All these results were similar to our findings.

The present study suggests that propolis gel was found to be an effective agent for the prevention of dry sockets, in terms of both exposed bone as well as blood clot disintegration. These findings substantiate the finding of several other studies previously done. The antimicrobial properties of propolis identified in the literature have a possible significant role to play in preventing the occurrence of dry sockets.

A strength of this study was its significant sample size. However, due to resource limitations, a quasi-experimental study was done, which is a major limitation of this study.

CONCLUSION

On the basis of the findings of the present study, propolis gel may be recommended as an adjunct preventive therapy for the prevention of dry sockets during tooth extractions. Randomized controlled trials should be conducted to explore the role of propolis gel in the prevention of dry sockets.

REFERENCES

1. Mamoun J. Dry Socket Etiology, Diagnosis, and Clinical Treatment Techniques. *J Korean Assoc Oral Maxillofac Surg.* Apr 2018;44(2):52-58.
2. Rakhshan V. Common risk factors of dry socket (alveolitis osteitis) following dental extraction: A brief narrative review. *J Stomatol Oral Maxillofac Surg.* Nov 2018;119(5):407-411.
3. Keshini MP, Shetty SK, Sundar S, Chandan SN, Manjula S. Assessment of Healing Using Alvogyl and Platelet Rich Fibrin in Patients with Dry Socket - An Evaluative Study. *Ann Maxillofac Surg.* Jul-Dec 2020;10(2):320-324.
4. Almutairi BM. Dry sockets—a systemic review. *Adv Life Sciences.* 2019;7(1):48-57.
5. Ezhil I, Kumar M. Recent advances in the management of dry socket-A review. *Dru Inv Today.* 2018;10(4)
6. Khooharo TS, Hassan SU, Shaikh AH. Prevention of dry socket in mandibular 3rd molars with single pre-operative oral dose of metronidazole and amoxicillin compared to conventional therapy. *J Pak Med Assoc.* Feb 2021;71(2(b)):585-589.
7. Kuropatnicki AK, Szliszka E, Krol W. Historical aspects of propolis research in modern times. *Evid Based Complement Alternat Med.* 2013;2013:964149.
8. Ali ZH, Dahmouh HM. Propolis versus Daktarin (R) in mucosal wound healing. *Life Sci J-Act Zhen Uni Over Edition.* 2012;9(2):624-636.
9. Carvalho C, Fernandes WHC, Moutinho TBF, Souza DM, Marcucci MC, D'Alpino PHP. Evidence-Based Studies and Perspectives of the Use of Brazilian Green and Red Propolis in Dentistry. *Eur J Dent.* Jul 2019;13(3):459-465.
10. Zulhendri F, Felitti R, Fearnley J, Ravalía M. The use of propolis in dentistry, oral health, and medicine: A review. *J Oral Biosci.* Mar 2021;63(1):23-34.
11. Abbasi AJ, Mohammadi F, Bayat M, Gema SM, Ghadirian H, Seifi H, et al. Applications of Propolis in Dentistry: A Review. *Ethiop J Health Sci.* Jul 2018;28(4):505-512.
12. Babar A, Ibrahim MW, Baig NJ, Shah I, Amin E. Efficacy of intra-alveolar chlorhexidine gel in reducing frequency of alveolar osteitis in mandibular third molar surgery. *J Coll Physicians Surg Pak.* Feb 2012;22(2):91-4.
13. Hwu YJ, Lin FY. Effectiveness of propolis on oral health: a meta-analysis. *J Nurs Res.* Dec 2014;22(4):221-9.
14. Gupta S. True pain of false healing-various treatment modalities (a research perspective). *J Ayu Hol Medicine (JAHM).* 2018;6(1)
15. González-Serrano J, López-Pintor RM, Cecilia-Murga R, Torres J, Hernández G, López-Quiles J. Application of propolis extract, nanovitamin C and nanovitamin E to prevent alveolar osteitis after impacted lower third molar surgery. A randomized, double-blind, split-mouth, pilot study. *Med Oral Patol Oral Cir Bucal.* Mar 1 2021;26(2):e118-e125.
16. Garzón AEC, Ramírez CMV, Reyes NG, Martínez YP. Tintura de propóleos al 12% y Alveogyl® en el tratamiento de la alveolitis dental. *MediCiego.* 2019;26(1):1404.
17. Oginni FO, Fatusi OA, Alagbe AO. A clinical evaluation of dry socket in a Nigerian teaching hospital. *J Oral Maxillofac Surg.* Aug 2003;61(8):871-6.
18. Lisbona-González MJ, Muñoz-Soto E, Lisbona-González C, Vallecillo-Rivas M, Diaz-Castro J, Moreno-Fernandez J. Effect of Propolis Paste and Mouthwash Formulation on Healing after Teeth Extraction in Periodontal Disease. *Plants (Basel).* Aug 4 2021;10(8)