



TANTIA UNIVERSITY JOURNAL OF HOMOEOPATHY AND MEDICAL SCIENCE

www.tjhms.com

REVIEW ARTICLE

PROPOLIS (A NATURAL PRODUCT): A REVOLUTION IN DENTISTRY

Rajni Aggarwal¹, Abdul Mannan², Manoj Garg³

²Post graduate student, ¹Surendera Dental College and Research Institute, Sri Ganganagar, ³Dr. S S Tantia Medical College, Sriganganagar, Rajasthan

Abstract

Received- 10/02/2022

Revised- 15/3/2022

Accepted- 20/03/2022

Key Word- Propolis,
Natural Product,
Dentistry, Oncology.

Corresponding Author:-

Rajni Aggarwal , HOD,
Surendera Dental College
and Research Institute, Sri
Ganganagar, Rajasthan.

Background: Propolis (also called bee glue) is a resinous substance derived from bees. It has long been used in medicine for its beneficial properties, including antimicrobial, anti-inflammatory, antidiabetic and local anaesthetic effects. In dentistry, propolis has been used for the prevention of dental caries and periodontal diseases, as an interim transport medium for avulsed teeth, and in endodontics, orthodontics and periodontics.

Objective: To highlight the role of propolis in dentistry.

Methods: A PubMed search was made using the keywords propolis, bee glue, antimicrobial, dental and herbs without any limits on the date of publication. No specific inclusion or exclusion criteria were applied as the purpose of the review was to make it as comprehensive as possible.

Discussion: The role of propolis is discussed in various branches of dentistry, including: preventive dentistry, dental traumatology, endodontics, periodontology, orthodontics and oral oncology.

Conclusion: Although most research published in the dental literature on propolis is based on in-vitro studies or animal studies, extrapolating the results of these present studies to clinical practice may be too early as these results may not be necessarily replicated in human trials. In future, propolis may find a definitive role in one or more applications in dentistry; however, clinical trials are necessary to isolate the individual components responsible for its beneficial effects and to study them.

INTRODUCTION

Propolis is a resinous substance derived from honey bees, and has been used in medicine for decades for its beneficial belongings. The Greeks, Romans, Arabs, and Egyptians have well known about the medical properties of propolis since history, however the use of propolis in dentistry is something new. Propolis can be considered as effective on infection, inflammation and carcinogenesis, as well as it may have more potential uses in the treatment and prevention of oral disease.

Bees' saliva act as a protective barrier against light, moisture and external factors, its saliva along with wax and exudates used to seal the gaps in the hive and protect it. Moreover, it regulates the internal temperature of the hive¹. It contains resin and balsams (50-70%), wax (30- 50%), pollens (5-10%), amino acids, minerals, vitamins A, B and E, phenols and aromatic compounds. Propolis has antioxidant activity too, which is even more powerful than the vitamin C antioxidant activity. Resinous portion contains flavonoids which are an active component of propolis and are responsible for the majority of anti-oxidative, antibacterial, antiviral, antifungal, anti-cariogenic and anti-inflammatory. Its antibacterial activity is effective against Gram-positive bacteria, such as

Staphylococcus aureus (*S. aureus*) and Gram-negative bacteria like *Salmonella*. Researchers evaluated the antibacterial activity of propolis against some anaerobic oral pathogens and confirmed that its effectiveness against *Lactobacillus acidophilus*, *Actinomyces naeslundii*, *Prevotella oralis*, *Porphyromonas gingivalis*, *Fusobacterium nucleatum* and *Veillonella parvula*²

METHODS:

Although propolis has been used in dentistry for various indications, evidence from RCTs and controlled clinical trials are lacking. Hence, no specific criteria were applied a priori as to what articles would be selected for this review. The purpose was to make this review as comprehensive as possible, although only articles indexed in PubMed were considered for inclusion.

DISCUSSION:

Propolis has been widely used in dentistry; the earliest reference to its use was a medical book named 'The Carbadini' published in the 13th century, in which its beneficial role had been discussed in tooth decay. After that, due to its wide antimicrobial activity (including antibacterial, antifungal and antiviral activity), propolis has been used for the treatment and prevention of dental caries and periodontal diseases, endodontic treatment, and for dental hypersensitivity

and aphthous stomatitis.³ Application of propolis in the world of dentistry has been discussed below.

Preventive Dentistry-

As an anti-caries agent: Apart from the previous approaches available for the prevention of dental caries (like, fluorides, dietary counselling, povidone-iodine, probiotics, caries vaccine), which hampers one or more steps in the caries process, propolis is a divinely addition to this list as it works as a water-insoluble glucan synthesis that affects acid production and the acid tolerance of micro-organisms leads to destruction.⁴ The cariostatic effect of propolis depends on its composition and, thus, the region of collection of the propolis sample.^{5,6} Propolis has already been tested as an adjuvant to vaccines and hence, may have a future role in caries vaccination or as adjuvant therapy to other anti-caries agents [e.g., fluorides, povidone-iodine, casein phosphopeptide – amorphous calcium phosphate (CPP-ACP)].⁷

Periodontology-

Propolis has been added in a large number of mouth rinses for their ability to interrupt the formation of plaque. In a double-blind cross-over study, propolis was proved to be significantly more effective than placebo in reducing the plaque (plaque index) and the concentration of insoluble polysaccharide.⁸

Reduction of insoluble polysaccharide by propolis may not only reduce the amount of plaque but also affect the cariogenic potential as well.⁹ Sub-gingival irrigation with propolis extract as an adjuvant to periodontal treatment was found to be more effective than conventional treatment.^{10,11} That is why propolis can be recommended in cases of gingivitis and periodontitis. However, according to past literature it can be conclude that propolis may have a limited role when compared to chlorhexidine (CHX) as an anti-plaque agent.¹²

Endodontics-

Calcium hydroxide [Ca(OH)₂] has remained a standard material of choice for intra-canal medicament among other intra-canal medicaments (ICMs) available in market.^{13,14} However, it has some disadvantages, like limited spectrum of activity against micro-organisms and takes longer time for action.¹⁵ Studies mentioned that propolis has a greater inhibitory effect on *Enterococcus faecalis* compared to Ca(OH)₂, tri-antibiotic mixture, ethanol and saline.¹⁶ Although propolis had better inhibitory activity against *E. faecalis*, CHX and povidone iodine were found to be better than propolis and Ca(OH)₂.¹⁷

Orthodontics-

Propolis solution was shown to have a positive effect during expansion of the palatine suture on bone formation

during treatment with a device. In a study it was mentioned that an increase in quantity of osteoblasts formation and faster bone remodelling in preparations from rats that received propolis during the treatment.¹⁸

Pulp-capping agent/Pulpotomy-

Propolis has been used as a pulp-capping agent in permanent teeth¹⁹ and as a pulpotomy agent in primary teeth.^{20,21} It was seen that teeth capped with propolis form a hard tissue barrier. The probable components of propolis responsible for the formation of the hard tissue barrier are the flavonoids, which have been shown to cause less inflammation and harder tissue formation than non-flavonoid components.²²

Intra-canal Irrigant-

Propolis may be used as an intra-canal irrigant and has been found to be effective in dropping endotoxins and inhibiting *E. faecalis*, *Streptococcus aureus*, *Candida albicans* and *E. coli*.²³

Oral Oncology-

The radio-sensitising capacity of propolis was evaluated in human head and neck squamous cell carcinoma (HNSCC) cells and propolis was found to enhance radio-sensitivity in one of the three HNSCC lines and also reduced cell growth and clonogenic survival.²⁴

Dental Materials-

Arslan et al.,²⁵ evaluated the effect of five cavity disinfection agents: chlorhexidine, sodium hypochlorite, propolis, ozone, and erbium chromium: yttriumscandium-gallium garnet (Er,Cr:YSGG) laser on bond strengths of silorane-based resin composite. However, no significant difference in mean bond strength was observed between the groups.

Troca et al.²⁶ evaluated the effect of adding green propolis on the mechanical properties of glass ionomer cements (GICs). Water sorption values of the experimental GICs were increased compared to pure GIC; other mechanical properties like diametral tensile strength and solubility were also affected, although the change in properties were dependent on the GIC material (i.e., manufacturer).

Dentin Hypersensitivity-

Dentin hypersensitivity has been defined as a short, sharp pain arising from exposed dentin in response to stimuli, typically thermal, evaporative, tactile, osmotic or chemical, which cannot be ascribed to any other form of dental pathology. Numerous materials have been used to reduce dentin hypersensitivity; propolis is one of them. When compared with CPP-ACP F and sodium fluoride, topical application of propolis was found to be most effective in reducing hypersensitivity over a period of 90 days.²⁷

Stomatitis-

Systemic intake of propolis (500 mg/day) was found to be effective in reducing the number of disease outbreaks and improving the QoL of patients suffering from recurrent aphthous stomatitis.²⁸

CONCLUSION:

Although most of the dental literature published on propolis is based on in-vitro studies or animal studies, extrapolating the results of these present studies to clinical practice may be too early as these results may not be necessarily replicated in human trials. In future, propolis may find a definitive role in one or more applications in dentistry; however, clinical trials are necessary to isolate the individual components responsible for its beneficial effects and to study them. Further research is also needed to determine its optimal concentration, time of application, method of preparation and effects on the oral cavity. Lastly, allergy to propolis and its constituents should be considered before prescribing the product to patients.

REFERENCES:

1. Wander P. Taking the sting out of dentistry. *Dental Practice*. 1995; 25(1995):3-4.
2. Krol W, Czuba Z, Scheller S, Gabrys J, Grabiec S, Shani J. Anti-oxidant property of ethanolic extract of propolis (EEP) as evaluated by inhibiting the chemiluminescence oxidation of luminol. *Biochemistry International*. 1990;21(4):593-7.
3. Kujungiev A, Tsvetkova I, Serkedjieva Y, Bankova V, Christov R, Popov S. Antibacterial, antifungal and antiviral activity of propolis of different geographic origin. *Journal of ethnopharmacology*. 1999; 64(3):235-40.
4. Sardana D, InduShekar KR, Manchanda S, Saraf BG, Sheoran N. Role of propolis in dentistry: review of the literature. *Focus on Alternative and Complementary Therapies*. 2013 18(3):118-25.
5. Duarte S, Rosalen PL, Hayacibara MF et al. The influence of a novel propolis on mutans streptococci biofilms and caries development in rats. *Arch Oral Biol* 2006; 51: 15–22.
6. Elbaz GA, Elsayad II. Comparison of the antimicrobial effect of Egyptian propolis vs New Zealand propolis on *Streptococcus mutans* and *lactobacilli* in saliva. *Oral Health Prev Dent* 2012; 10: 155–60.
7. Koo H, Rosalen PL, Cury JA et al. Effect of *Apis mellifera* propolis from two Brazilian regions on caries development in desalivated rats. *Caries Res* 1999; 33: 393– 400.

8. Ashry el SH, Ahmad TA. The use of propolis as vaccine's adjuvant. *Vaccine* 2012; 31: 319.
9. Koo H, Cury JA, Rosalen PL et al. Effect of a mouthrinse containing selected propolis on 3-day dental plaque accumulation and polysaccharide formation. *Caries Res* 2002; 36: 445–8.
10. Cury JA, Rebelo MAB, Del Bel Cury AA et al. Biochemical composition and cariogenicity of dental plaque formed in the presence of sucrose or glucose and fructose in situ. *Caries Res* 2000; 34: 491–7.
11. Coutinho A. Honeybee propolis extract in periodontal treatment: a clinical and microbiological study of propolis in periodontal treatment. *Indian J Dent Res* 2012; 23: 294.
12. Gebaraa EC, Pustiglioni AN, de Lima LA, Mayer MP. Propolis extract as an adjuvant to periodontal treatment. *Oral Health Prev Dent* 2003; 1: 29–35.
13. Murray MC, Worthington HV, Blinkhorn AS. A study to investigate the effect of a propolis-containing mouthrinse on the inhibition of de novo plaque formation. *J Clin Periodontol* 1997; 24: 796–8.
14. Podbielski A, Spahr A, Haller B. Additive antimicrobial activity of calcium hydroxide and chlorhexidine on common endodontic bacterial pathogens. *J Endod* 2003; 29: 340–5.
15. Lynne RE, Liewehr FR, West LA et al. In vitro antimicrobial activity of various medication preparations on *E. faecalis* in root canal dentin. *J Endod* 2003; 29: 187–90.
16. de Souza CA, Teles RP, Souto R et al. Endodontic therapy associated with calcium hydroxide as an intracanal dressing: microbiologic evaluation by the checkerboard DNA-DNA hybridization technique. *J Endod* 2005; 31: 79–83.
17. Kayaoglu G, Ömürlü H, Akca G et al. Antibacterial activity of propolis versus conventional endodontic disinfectants against *Enterococcus faecalis* in infected dentinal tubules. *J Endod* 2011; 37: 376–81.
18. Kandaswamy D, Venkateshbabu N, Gogulnath D, Kindo AJ. Dentinal tubule disinfection with 2% chlorhexidine gel, propolis, *Morinda citrifolia* juice, 2% povidone iodine and calcium hydroxide. *Int Endod J* 2010; 43: 419–23.
19. Altan BA, Kara IM, Nalcaci R et al. Systemic propolis stimulates new bone formation at the expanded suture. *Angle Orthod* 2013; 83: 286–91.
20. Parolia A, Kundabala M, Rao NN et al. A comparative histological analysis of human pulp following direct pulp

- capping with propolis, mineral trioxide aggregate and Dycal. *Aust Dent J* 2010; 55: 59–64.
21. Ozório JE, Carvalho LF, de Oliveira DA et al. Standardized propolis extract and calcium hydroxide as pulpotomy agents in primary pig teeth. *J Dent Child (Chic)* 2012; 79: 53–8.
22. Lima RV, Esmeraldo MR, de Carvalho MG et al. Pulp repair after pulpotomy using different pulp capping agents: a comparative histologic analysis. *Pediatr Dent* 2011; 33: 14–18.
23. Sabir A, Tabbu CR, Agustiono P, Sosroseno W. Histological analysis of rat dental pulp tissue capped with propolis. *J Oral Sci* 2005; 47: 135–8.
24. Hehlgers S, Lange I, Eke I et al. Human head and neck squamous cell carcinoma cell lines are differentially radiosensitized by the honeybee product propolis. *Int J Radiat Biol* 2011; 87: 243–53.
25. Arslan S, Yazici AR, Gorucu J et al. Effects of different cavity disinfectants on shear bond strength of a silorane-based resin composite. *J Contemp Dent Pract* 2011; 12: 279–86.
26. Troca VB, Fernandes KB, Terrile AE et al. Effect of green propolis addition to physical mechanical properties of glass ionomer cements. *J Appl Oral Sci* 2011; 19: 100–5.
27. Addy M. Tooth brushing, tooth wear and dentine hypersensitivity – are they related? *Int Dent J* 2005; 55: 261–7.
28. Mahmoud AS, Almas K, Dahlan AA. The effect of propolis on dentinal hypersensitivity and level of satisfaction among patients from a university hospital, Riyadh, Saudi Arabia. *Indian J Dental Res* 1999; 10: 130–7.

How to Cite this Article- Aggarwal R., Mannan A., Garg M., Propolis (A Natural Product): A Revolution In Dentistry. *TUJ. Homo & Medi. Sci.* 2022;5(1):48-54.

Conflict of Interest: None

Source of Support: Nil



This work is licensed under a
Creative Commons Attribution
4.0 International License

