



Propolis- A New Wonder to the World of Dentistry!

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ABSTRACT

Propolis which is also known as bee glue, is a natural nontoxic resinous sticky substance produced by honeybees through their hypopharyngeal glands. Propolis is a complex of different naturally occurring constituents. In ancient Europe and Egypt, Propolis has been used for anti-inflammatory purpose in medicine since early times. It has traditionally been used in curing infections, common cold, and healing wounds, burns etc. Propolis-based preparations have a wide range of applications in various specialties of dentistry like restorative dentistry, prosthodontic dentistry, orthodontic treatments, oral surgical procedures periodontal care.

KEYWORDS

Propolis, bee glue, anti-inflammatory, cariostatic, endodontic disinfectant, restorative dentistry

INTRODUCTION –

Propolis, which is also known as bee glue, is a natural nontoxic resinous sticky substance produced by honeybees through the secretions of their hypopharyngeal glands with the resins collected from plants, which is used as a sealant in honeybee nests. Bees use it to protect and reinforce their hives, repair, and cover honeycombs.¹ It is dark green, brown colored, and its chemical content depends on the geographic zone from which it is. The term propolis is derived from the Greek word “pro” means- in front, and “polis” means- town. Chemical composition of propolis depends upon the diversity of plants in the vicinity of the hive.

In ancient Europe and Egypt, Propolis has been used for anti-inflammatory purpose in folk medicine since early times. It has traditionally been used in curing infections, common cold, and healing wounds and burns etc. The anti-inflammatory properties of propolis act mainly against infections, rheumatism, torsions, and muscular and articular diseases as well as other types of inflammation. It also promotes tissue reorganization and has antioxidant properties.

Propolis is a complex of different naturally occurring constituents with more than 300 constituents which includes phenolic acid, terpenes, cinnamic acid, caffeic acid, aromatic aldehydes, alcohols, amino acids, fatty acids, vitamins (A, B1, B2, B3, and B7), several esters, minerals, essential oils, and flavonoids (flavones, flavonols, and flavanones)².

Propolis-based preparations have a wide range of applications in various specialties of dentistry. Dental use of propolis has been emphasized by several studies; some of these usage are^{1, 2, 4}

1. To decrease dentinal hypersensitivity and permeability of dentin and occlude dentinal tubules.
2. Beneficial in many aspects of prevention of dental caries.

3. As an effective transport medium for increasing periodontal ligament cell viability of avulsed teeth.
4. Direct pulp capping.
5. As an intracanal medicament in root canal treatment.
6. The regenerative effect on the tooth pulp.
7. Quicker bone remodeling in orthodontic treatments.
8. Reduction of oral mucositis resulted from chemotherapy
9. Oral cancer
10. Gingival and periodontal diseases, plaque inhibition
11. As a constituent of dentifrice to control oral microbiota
12. As an analgesic,
13. An antiviral, it delays growth and progression of skin changes in an early stage of infection with Herpes simplex and does not cause cytotoxic effect.

Effect of propolis gel on the reduction of dentin permeability-

A variety of treatments have been tried to stop or minimize pain caused by dentinal hypersensitivity. The most widespread treatments involve application of desensitizing agents and other materials such as toothpaste containing strontium salts or potassium salts, high- concentration fluoride varnishes, cyanoacrylate adhesives, etc. Some in vitro studies have successfully shown that, Propolis has clinically significant effect on reduction of dentin permeability. The authors explained the effect due to blockade of dentinal tubules in SEM observation.

According to study done by *Purra, et al*, Propolis was the most effective desensitizer providing immediate relief which gradually increased by the end of 3 months and provides better results than 5% potassium nitrate.

According to Rana Al-Haj Hussain et al, Pain related to DH that occurred due to chair-side teeth bleaching procedure could be successfully reduced by using a Propolis home-grown extract (Apipol, 625mg/ml, Beepharm Company, Syria) as a local application treatment⁵.

Effect of Propolis on prevention of dental caries-

Basic role in development of dental caries is by *Streptococcus mutans* and *Lactobacillus* species. *Ikeno et al.* proved that propolis considerably reduces teeth caries in rats as the result of its multidirectional influence on bacterial flora: it limits the number of microorganisms, slows down synthesis of insoluble glucans, and slows down activity of glucosyl transferase.⁴

Duarte et al. explained cariostatic effects of propolis by high quantity of fatty acids which slow down the production of acids by *Streptococcus mutans* and decreases the tolerance of microorganisms to acid pH.

Propolis as a transport medium for avulsed teeth-

Tooth avulsion is a complex traumatic injury characterized by the rupture of the neurovascular bundle and periodontal ligament. The type of transport media used and the storage period play a significant influential role on the successful clinical outcome of replanted avulsed teeth. A variety of media like saliva, milk, Hank's Balanced Salt Solution (HBSS) and ViaSpan have been advocated as an interim storage media for avulsed teeth⁵.

A study by *Mori et al.* showed that propolis is an appropriate medium for the avulsed tooth and can maintain the viability of PDL for an extended duration of about six hours.

Propolis as direct pulp capping agent-

The direct pulp capping after mechanical or chemical uncovering is made in order to stimulate reparative dentin formation. Since long time, the regenerative effect of propolis on dental pulp is well documented.

Bretz et al. studied that there are same results in direct capping with propolis and with calcium hydroxide. Propolis offers its effect by healing pulp inflammation, reducing quantity of microbes and stimulating creation of dentin bridge. Ethanol extract of propolis presents good properties for promoting bone regeneration and inducing hard tissue bridge formation in pulpotomies or pulp capping⁶.

Parolia et al. and *Ozório et al.* studied that propolis, calcium hydroxide, and MTA have similar effectiveness in induction to create reparative dentin.

Propolis as an intracanal medicament in root canal treatment-

Infected root canals have predominance of facultative and anaerobic microorganisms, particularly *Enterococcus faecalis* which is a dominant enterococcus species. The cells of *E-faecalis* remain viable and are more resistant to endodontic treatment. Most important constituents in propolis are flavonoids, phenolics and aromatics. It is believed that flavonoids account for much of the biologic activity in propolis.

Many studies show that propolis effectively limits the quantity of *E. faecalis* in root canals. A comparative evaluation on microbial efficacy of propolis, NaOCl and saline when used as intracanal irrigants indicated that the propolis has antimicrobial activity equal to that of NaOCl. Some researches indicate that propolis is more effective in fighting microbes than calcium hydroxide-based products. Since propolis has good diffusion abilities and adds to the antimicrobial action of calcium hydroxide, it can be used as a vehicle for calcium hydroxide⁷.

Propolis in restorative dentistry-

Glass-ionomer cement along with propolis will provide antibacterial activity against *Streptococcus mutans*. A study stated the distinct antibacterial and antibiofilm efficacy of propolis containing GIC. Therefore GIC containing propolis would be a promising material for restoration.

Propolis in orthodontic treatments-

The research carried out by *Altan et al.* on showed an increased quantity of osteoblasts in preparations from rats, which received propolis during the treatment. In such cases,

the bone remodeling observed within the palatine suture was quicker.

Role of propolis in oral cancer-

Oral cancer is the most common type of cancer and has poor prognosis and survival rate. Various studies have been carried out to research the effect of propolis on cancer. Propolis has anticarcinogenic action because of its constituents⁷. The presence of flavonoids and derivatives of p-coumaric acid provide substantial antioxidant activity to propolis.

A study evaluated effective use of a mixture of honey, beeswax, and olive oil-propolis extract in the treatment of chemotherapy-induced oral mucositis for acute lymphoblastic leukemia.

Role of propolis in gingival and periodontal diseases, plaque inhibition, etc.-

Studies done by authors show that extracts from bee glue limit the quantity of bacterial plaque. Study done by *Özan et al.* shows that propolis has lower cytotoxic effect on fibroblasts than chlorhexidine, which predisposes them to be used as ingredient of mouthwashes. Propolis can be also used in a form of a solution to decontaminate fibers of toothbrushes. Study done by *Koo et al.* indicated high effectiveness of a propolis extract on reducing growth of bacteria that belong to red complex.

A study done by Sterer and Rubinstein and Barak and Katz with the help of Halimeter indicate that propolis reduces halitosis¹⁰.

Role of propolis in healing of wounds-

Propolis is used in replantation of avulsed permanent teeth and supports the healing process after a surgery in the oral cavity. Local application of propolis helps to reduce inflammation, speeds up creation of granulation tissue and epithelialization, and has an analgesic effect. It can be used in the treatment of dry socket in deep parodontopathies⁸.

Allergy to propolis-

In spite of many advantages and possibilities of application of propolis in dentistry, there is a risk of allergy to it. Symptoms of a contact allergy have been observed and documented in beekeepers¹¹. Itching and rashes are the main symptoms of propolis allergy. Also these allergic reactions may manifest as contact cheilitis, contact stomatitis, labial edema, oral pain, peeling of lips, and dyspnea, etc.

Conclusion-

Propolis-based preparations have a wide range of applications in various specialties of dentistry. The natural components in bee glue give us antibacterial, antiviral, antifungal anti-inflammatory, analgesic, and many other applications.

All of these applications of propolis after proper further studies would be a promising treatment option for future aspects.

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