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**ABSTRACT**
Propolis (bee glue) is a sticky dark-coloured material that honey bees collect from living plants, mix it with wax and use it in the construction and adaptation of their nests, mainly to fill out cracks in the bee hive. It has been used in folk medicine since ancient times, and is now known to be natural medicine with antibacterial, antifungal, antitumoral, antioxidative, immunomodulatory properties. These therapeutic properties of propolis have been motivating isolation researches, identification of chemical compounds, and the possible relationship of these with its biological activity. It has been used in dentistry for surgical wound healing, root canal treatment, pulp capping and tooth hypersensitivity. Propolis has a promising role in future medicine. This article reviews the clinical application of propolis as a natural medicine in dentistry.

**Composition**
Propolis is a natural extract that honeybees collect from tree buds. The main chemical class present are Flavonoids, phenolics and...
various aromatic compounds.[6] It is composed of resin (55%), essential oils & wax (30%) mixed with bee glue (the salivary secretions of bees) and pollen (5%) and other constituents (10%) which are amino acids, minerals, ethanol (alcohol), vitamins A, B complex, E and the highly active bio-chemical substance known as bioflavonoid. It also has a prime source of histamine and serotonin being substances needed to help the body cope with allergies.[1]

**Clinical Applications in Dentistry**

1) Antibacterial effect - Steingerg et al demonstrated an in vitro antibacterial effect of propolis on both isolated oral streptococci and salivary bacterial counts in the clinical study.[7] Ikono et al studied the effect of propolis on growth and glycosyltransferase activity of Streptococcus mutans and Streptococcus sanguis in vitro and suggested that propolis could control dental caries in rats.[8] Koo et al in Brazil found antibacterial effect of propolis on S. mutans, S. sanguis and A. Neaslund in addition to inhibition of glycosyltransferase.[9]

2) Repair of surgical wounds - Magro-Filho and de-Carvalho analyzed and found that mouth rinse containing propolis in aqueous alcohol solution aided repair of intrabuccal surgical wounds and exerted mild analgesic and anti-inflammatory effects.[10]

3) Treatment of Root Canal and Periodontitis - Kosenko and Kosrish used 4% alcohol solution of bee glue as root canal filling material clinical & radiographic examinations to concluded that it accelerated oral epithelial repair after root extraction but had no effect on socket wound healing.[10]

4) Treatment of dental sockets and skin wounds - Magro-Filho and de-Carvalho examined cutaneous wound healing and socket wound after tooth extraction in rats with topical application of either 10% hydro alcohol solution of propolis and concluded that it accelerated oral epithelial repair after root extraction but had no effect on socket wound healing.[10]

5) Direct and Indirect dental pulp capping - Ardo Sabir compared zinc oxide base filler and propolis flavonoids as direct pulp capping agents in rats. They concluded that Propolis flavonoids may delay dental pulp inflammation and stimulate repair dentin.[11] Lontia et al compared alcoholic solution of propolis and zinc oxide for both direct and indirect pulp capping. The morphologic study of indirect capping showed that secondary dentin developed followed by sclerotic transformation of the pulp. In teeth with direct pulp capping a protective film develops at the opening of pulp chamber followed by cicatrisation by fibrosis with a trend to remineralisation. No areas of pulpal degeneration were found.[14]

6) Effect on dentinal hypersensitivity - Mahmoud AS et al conducted an in vivo study on effect of propolis on dentinal hypersensitivity using visual analogue scale and concluded that propolis had a positive effect in the control of dentinal hypersensitivity. In vitro studies found that propolis occluded dentinal tubules in sound, periodontally involved and recession teeth specimens in both etched and unetched dentin.[1]

7) Storage medium for avulsed teeth - Martin & Pileggi, and Ozan et al found propolis to be a superior transport medium to HBSS or milk in terms of maintaining PDL viability after avulsion and storage. Gopikrishna V et al conducted a comparative study to evaluate potential as storage medium in maintaining PDL viability between coconut water, Propolis, HBSS and milk and found coconut water to be superior most followed by Propolis.[6]

**Discussion**

There is a great trend nowadays to use natural materials as cure for many diseases. Alternative medicine has made a lot of contributions to modern medical practice.[1]

Flavonoids are known to be antibacterial and anti-inflammatory while the other phenolic compounds and caffeic acid esters have powerful antioxidant properties, other derivatives in propolis are known to stimulate the immune system. They surround & seal viruses stimulating WBCs & lymphocytes into producing interferon hence stimulating immune system. A very active ingredient is CAPE: caffeic acid phenethyl ester, with antiinflammatory, antimutagenic, antioxidant cystostatic and anti-cancer activities. The flavanoids in propolis contain very potent inhibitors of eicosanoid production, which strongly affect the immune and inflammatory response. However it is believed that no single ingredient is predominantly active rather all work together as a holistic product.

Propolis could also be an alternative to traditional antifungal & antiviral treatments. It can be tried at home as well as in the surgery, for sore throats (use propolis and Echinacea throat spray), burns and cuts (tincture and cream), cracked and chapped lips (propolis lip balm), athletes foot and other fungal infections, wicklows (tincture and cream). Propolis is particularly effective in treating mouth ulcerations both aphthous and traumatic. Propolis toothpaste is useful for periodontal patients and hypersensitivity. Propolis tincture is excellent in treatment for oral ulcerations of the aphthous type, denture trauma, and herpetic and non-specific painful oral ulcerations.

Propolis has a slightly anaesthetic effect. Propolis tincture is most useful as it can be applied to areas where other preparation are not so effective in staying in place. Allergy and sensitivity to propolis is uncommon but patients should be asked about adverse reactions to bee stings, allergies to bee products, honey and sensitivity to pollen, particularly if they are taking propolis systemically.[5]
Conclusion

A good deal of research data on the effect of Propolis has come from Eastern Europe where Propolis has been used as a natural medicine and where it is still being used routinely in medicine practice. These literature data are being published mostly in Russian, Polish, Roman, Slovak, German, Bulgarian and Chinese Languages. There is a need for further human and animal trial of this natural remedy in oral diseases. In conclusion, Propolis is a natural medication with a promising future but further studies should be conducted to investigate its merit and demerits in clinical dentistry.

References


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