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EFFECTIVE ROLE OF HONEY BEE PRODUCT PROPOLIS IN ORAL CAVITY WITH EMPHASIS ON RECURRENT APTHOUS STOMATITIS

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ABSTRACT

The health industry has always used natural products as an alternative, to the conventional allopathic formulations. Over the last few decades, worldwide increase in the use of natural products for pharmacological purposes has been observed. Propolis is a resinous yellow brown to dark brown substance that honey bees collect from tree buds, sap flows, shrubs or other botanical sources to seal up their hives. The main pharmacologically active constituents present in propolis are flavonoids, phenolics and other various aromatic compounds which are well known plant compounds that have antibactetial, antifungal, antiviral, antioxidant and anti-inflammatory properties. Currently beneficial role of propolis in dentistry has also been elucidated specifically in cariology, periodontics and many more. This review highlights the potential benefits of bee propolis in oral cavity with main emphasis in management of recurrent apthous stomatitis as an adjuvant therapy.

KEYWORDS: Honey bees, Oral cavity, Propolis, Recurrent apthous stomatitis.

INTRODUCTION

Nowadays, there is a great trend to use natural materials as a cure for a variety of diseases. The health field has also always aimed to use natural products as an alternative to the

conventional allopathic formulations. Propolis is one such natural substance, which has gone unnoticed inspite of its potential uses in curing a large array of diseases.[1,2] As the most important chemical weapon of bees against pathogenic microorganisms, propolis has been used as a remedy by humans since ancient times.[3]

History

The word propolis is derived from the Greek word "pro" before, "polis" city or defender of the city. The Egyptian and Greek civilizations recognized the healing qualities of propolis. It was also used for healing sores and ulcers by Hippocrates, both internally and externally.[1,2] Incas employed propolis as an anti-pyretic agent. Greek and Roman physicians used it as mouth disinfectant and as an antiseptic. These therapeutic applications were perpetuated in the middle age and among Arab physicians. In the end of 19th century, propolis was widely used due to its healing properties and in the Second Global War, it was used in several Soviet clinics for tuberculosis treatment. In the Balkan states it was one of the most frequently used remedies, applied to treat wounds and burns, sore throat and stomach ulcer. It is also named as bee glue. Due to its waxy nature and mechanical properties, bees use propolis in the construction and repair of their hives, for sealing openings and cracks and smooth out internal walls and as a protective barrier against external invaders or against weathering's threats like winds.[2,4,5] During the last 10 years, considerable research has been conducted on propolis in America, Australia, United Kingdom and Europe and especially in Eastern Europe.[1] Propolis is a non-toxic resinous substance and was classified in to 12 types according to physicochemical properties and is related to geographic locations, however the botanical origin of only three types were identified. A new type of propolis, named Brazilian red propolis because of its color has attracted the attention of international business.[6] Propolis is available in the world markets in different forms as capsules, lozenges, tincture, and cream and recently added to the list are mouthrinses and toothpastes.[1]

Sources and composition of propolis

Propolis is a resinous material that honeybees (Apis mellifera L.) collect from various plant species and mix with wax and other substances. Propolis is used as a sealant for unwanted open spaces in the hive. Propolis is composed of resin and balsams (50-60%), pollen (5-10%) and other constituents which are amino acids, minerals, Vitamins A, B complex and the highly active biochemical substance known as bioflavenoid (Vitamin P), phenols and aromatic compounds. It is commonly brown in colour, but it varies depending on the

botanical source. Flavenoids are well known plant compounds which have antibacterial, antifungal, antiviral, antioxidant, and anti-inflammatory properties. Flavonoids are the most common group of polyphenolic compounds in the human diet and are found ubiquitously in plants. They are divided into four subgroups: Flavones, Flavonol, Flavonones, Flavononol. Cinnamic acid (CHCHCHOOH) is a white crystalline acid, which is slightly soluble in water and is obtained from oil of cinnamon, or from balsams.[1-3,5,7,8]

Functions and general uses of propolis

The biological activities of propolis are associated mainly with flavonoids and derivatives of hydrocinnamic acids. Thus propolis also has antimicrobial, antioxidant, antibacterial, antifungal, antiviral and anti inflammatory properties. Propolis is shown to inhibit synthesis of prostaglandins, activate thymus gland, aid the immune system by promoting phagocytic activity, stimulate cellular immunity and augment healing effects on epithelial tissues thus resulting in its anti-inflammatory action. Propolis is antibacterial because it can inhibit bacterial RNA polymerase, it is immunomodulatory, antioxidative, and a healing agent because of the ability to sequester or inhibit free radical formation. Flavonoids (quercetin, galangin, and pinocembrin), caffeic acid, benzoic acid, and cinnamic acid may probably act on the microbial membrane or cell wall, causing functional and structural damages. Additionally, propolis contains elements, such as iron and zinc that are important for the synthesis of collagen. Aromatic compounds, such as caffeic acid, in propolis are known to be antimicrobial and antibacterial, anti-inflammatory, immunomodulatory and hepatoprotective properties.[1,2]

The antibacterial property of honey was first recognized in 1892 by van Ketel and all examined types of propolis revealed a strong antibacterial activity. Important factors which influence the antibacterial effectiveness are its hygroscopic property due to high osmotic properties so it can extract water from bacterial cells and cause them to die, its acidic ph and presence of hydrogen peroxide.[7] Many authors have demonstrated that propolis has significant antimicrobial activities against Gram-positive bacteria and yeasts. It had shown to be effective against Enterococcus sp, Escherichia coli and especially Staphylococcus aureus. Reports have pointed its activity against Gram-positive bacteria and limited against Gram-negative bacteria.[3]

Propolis is a powerful antioxidant. This effect is due to the high concentration of phenolics and other antioxidant compounds. Propolis can prevent tissue damage from oxidative stress

by decreasing the overproduction of superoxide anion and by restoring respiratory control ration in mitochondrial tissue.

The anti-inflammatory activity can be explained by the presence of active flavonoids and cinnamic acid derivatives. The former includes acacetin, quercetin, and naringenin the latter includes caffeic acid phenyl ester (CAPE) and caffeic acid (CA). Ethanolic extract of propolis inhibits hyaluronidase activity. As this enzyme is responsible for several inflammatory processes, propolis holds a great potential as an anti-inflammatory agent.

Propolis's pharmacological properties make it safe and effective as an adjunct for patients receiving cancer treatment. Its biological therapy works hand in hand with the immune system. Its biological activities, such as antitumoral activity, DNA protection, free-radicals scavenging, and immune stimulation act in synergy with each other and with conventional chemotherapy medication. Propolis may boost the effects of anticarcinogenic drugs, thus enabling a decrease in the administered dose and in turn leading to a reduction in side effects. They may also influence the response to chemotherapy. Propolis also has immunomodulating, anti-diabetic, anti-hypertensive effects, protective action on cartilage and as vaccines as well.[3,7] The presence of arginine, vitamin C, pro-vitamin A, vitamin B-complex and trace minerals such as copper, iron, zinc causes stimulation of various enzyme systems, cell metabolism, circulation and collagen formation that contribute to hard tissue bridge formation.[8]

Recently, propolis has been used for cold syndrome (upper respiratory tract infections, common cold, flu-like infections), as dermatological preparations in wound healing, treatment of burns, acne, herpes simplex and genitalis, neurodermatitis,[4] pediatric diseases, radiculitis, polyradiculoneuritis, gastric ulcers and baldness.[9] In cosmetics and in health foods and beverages not only to improve health and prevent diseases, but also an an ingredient in many dietary supplements and neutraceuticals.[4]

Uses of propolis in oral cavity

Dental caries

Two groups of bacteria are responsible for initiating caries: Streptococcus mutans and Lactobacillus. If left untreated, the disease can lead to pain, tooth loss and infection. Propolis is associated with two mechanisms of action, i.e., anti-caries/anti-plaque properties: It shows anti-microbial activity against cariogenic bacteria and it inhibites glucosyl transferase

enzymes (GTFs) activity. Propolis limits the number of cariogenic microorganisms, slows down synthesis of insoluble glucans, and inhibits glucosyl transferase enzyme, which is essential for Streptococcus mutans to catalyze the formation of soluble and insoluble glycans and provide adherence. Cariostatic effect of propolis is through a high quantity of fatty acids, which slow down the production of acids by Streptococcus mutans and decrease the tolerance of microorganisms to acid pH.[2]

Periodontal diseases

Propolis has potential as anticalculus agent in toothpastes and mouthwashes. The antimicrobial properties of propolis against oral pathogens is attributed to the flavonone pinocembrin, the flavonol galangin and the caffeic acid phenethyl ester (CAPE), the mechanism of action is probably due to inhibition of bacterial RNA-polymerase.[2]

Role in wound healing, tissue regeneration and bone remodeling

The mouth rinse containing propolis in aqueous alcohol solution aided repair of intra-buccal surgical wounds and exerted a small pain killing and anti-inflammatory effect. Topical application of propolis hydroalcoholic solution accelerates epithelial repair after tooth extraction. Propolis accelerates the tissue regeneration process. Ethanol extract of propolis promotes the healing processes in damaged cartilage and enhances ossification in the artificially induced bone defects. In malocclusions accompanied by a considerable narrowing of the maxilla, it is necessary to use a device to expand the palatine suture. The regenerative effect of propolis on the tooth pulp has been known for a long time. It not only prevents the inflammatory reaction, infection with microbes and pulp necrosis but also induces the formation of high quality tubular dentin through stimulation of stem cells.[2]

As an intra-canal medicament

Propolis has good in vitro antibacterial activity against E.faecalis in the root canals as it has good diffusion abilities and adds to the antimicrobial action of calcium hydroxide and can be used a vehicle for calcium hydroxide.[2]

In treatment of candidiasis and denture stomatitis

Due to the increasing resistance to fluconazole and toxicity of some antifungal drugs, new alternatives in the treatment of denture stomatitis are a novel idea. Propylene glycol Brazilian green propolis has been shown to have an antifungal activity, which is similar to miconazole

in the C. albicans colonies decrease and in the erythema reduction of patients with Candida-associated denture stomatitis.[2]

Propolis has also found to be effective as a promising new storage media for avulsed teeth, in dentinal hypersensitivity, as a pulp capping agent, as an intracanal irrigant, prevention of microleakage, halitosis and recurrent apthous stomatitis.[2,5,6]

Beneficial effects of propolis in recurrent apthous stomatitis

Recurrent aphthous ulceration or recurrent aphthous stomatitis (RAS) is the most common oral mucosal disease of human beings and considerable researches have ever done because of its multiple etiologies and various treatment modalities with no much of cure. Repeated episodes of ulcers and severe pain cause the patient to seek for medical treatment. Perhaps sometimes the pain of these lesions interacts with eating, speaking, swallowing, and the patient's quality of life. Since the cause remains unknown there is no specific treatment for RAS Despite the unknown etiology, involved factors include: genetic predisposition, deficient blood elements, Drugs, allergies to certain foods, Infection with the virus HIV 6 -7 and local factors such as trauma and smoking. In most researches an immunological response after antigenic stimulation and immune-mediated tissue destruction, has determined as demonstrated pathogenesis of RAS. Considering all these factors in combination, we can divide the pathogenesis of RAS into three general categories-immune deregulation, reduction in thickness of mucosa and increased antigenic exposure. Many different treatments have been proposed that are mostly supportive The most important goals are decrease in severity, frequency and duration of ulcer episodes. Treatment includes use of corticosteroids, colchicines, vitamin C, B12 and propolis. Today, patients are interested in herbal and natural medication with low side effects such as Propolis.[10,11]

Delavarian Z et al conducted a triple blind placebo controlled study on 22 patients (12 cases and 10 controls) with minor apthous stomatitis and prescribed them 500 mg propolis to cases and placebo to controls daily and examined them every 2 weeks for 6 months and concluded that propolis was effective in reducing the frequency of occurrence of ulcers and significantly reduced the size, pain and healing time of ulcers when compared to controls.[10]

Samet N et al performed a randomized double-blind placebo controlled study on 19 subjects suffering from recurrent apthous stomatitis minor at a minimum frequency of four outbreaks per year and gave 10 cases 500 mg/day propolis and placebo capsule of calcium based food

supplement to 9 controls daily. This study concluded that propolis is effective in decreasing number of recurrences and improve the quality of life in RAS patients.[11]

Stojanovska AA et al did a randomized double blind placebo controlled study on 20 patients with RAS and 10 cases were treated with proaftol spray and other 10 with placebo and reported that profatol positively influences the rate of epithelization and reduction of subjective feeling of pain in RAS patients.[12]

Lotufo MA et al conducted a study on 40 RAS minor patients and advised them a propolis solution which were to be applied with swabs adequately soaked in solution to ulcers for 1 minute three times per day for a year during recurrence episodes and concluded that propolis reduced the number of lesions, period of duration and frequency of recurrence with no allergic reaction or other side effects.[13]

Ali HS et al conducted a study on 120 patients equally divided in to 3 groups. Group 1 was prescribed seasame oil paste, Group 2 was prescribed olive oil with propolis containing buccal paste and Group 3 was prescribed placebo and all patients were asked to apply the paste directly on lesion twice daily and concluded propolis buccal paste resulted in increased reduction in pain, duration of healing and frequency of recurrences.[14]

Safety associated with propolis

In general, propolis is safe. It is a non toxic substance and for most people, will not cause irritation when used as supplements or applied to skin. But some people may be allergic to bee propolis. Allergic reaction due to this substance was first reported in beekeepers as an occupational effect but is now seen mainly in individuals using propolis in cosmetics and supplement to treat various health conditios. It is caused by a substance called caffeic acid in propolis. Allergy to propolis may cause skin reddining, rashes, swelling, itching, skin cracking, eczema or mouth sores. People allergic to pollens, bee stings, balsam of Peru, asthamatic patients and preganant females should avoid propolis containing products.[5-7,9]

CONCLUSION

Bee propolis is very interesting and can be further developed in to medicinal products and can offer new and better treatment alternatives or form basis for identification of new drugs which can be used according to the principles of pharmacology and pharmacy. Though propolis has shown promising results in fields of dentistry as well particularly with RAS but

clinician should be cautious while using it due to its allergic reactions in some patients. Thus much efforts and further studies are necessary to establish their position in modern medicine.

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