

Phytodentistry: Potential Application of Traditional Medicinal Plant Extracts in the Prevention and Treatment of Oral Diseases.

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Abstract

The sole purpose of any branch of medicine is to strive to make human life happier and healthier with the available resources. Oral diseases are among the major public health problems and the commonest of chronic diseases that affect mankind. An herb is a plant part other than woody tissues, which serve as an effective source of treatment for various diseases. India is the largest producer of medicinal herbs and is appropriately called the botanical garden of the world. The use of this readily available, natural and safe resource as a part of dental practice has great potential for a more "Natural and Green Dental Practice". Herbal extracts have been used in dentistry as antimicrobial, antiseptics, antibacterial and also plays an important role in controlling plaque in cases of gingivitis, periodontitis. More than 750 species of bacteria that inhabit the oral cavity, a number are implicated in oral diseases. The development of dental caries involves acidogenic and aciduric Gram-positive bacteria (mutans streptococci, lactobacilli and actinomycetes). Periodontal diseases have been linked to anaerobic Gram-negative bacteria (*Porphyromonas gingivalis*, *Actinobacillus*, *Prevotella* and *Fusobacterium*). Several agents are commercially available, these chemicals can alter oral microbiota and have undesirable side-effects such as vomiting, diarrhea and tooth staining. This review is aimed at exploring the perspectives of this holistic treatment approach in dentistry and its benefits as an adjunctive therapy.

Key words:- Herbal extract, oral diseases, phytotherapy, dentistry, medicinal value.

1. Introduction

Oral diseases continue to be a major health problem worldwide¹. Dental caries and periodontal diseases are among the most important global oral health problems, although conditions such as oral and pharyngeal cancers and oral tissue lesions are also significant health concerns². Anti-inflammatory, antibacterial and antioxidant properties of plants as well as their biocompatibility explain the people's growing interest in use of herbal medications³. Evidence shows that 65% to 80% of people in developing countries use medicinal plants for their treatment. In 2007, a study conducted in the United States showed that 12% of children in the US used alternative medicine, and 5% used plant-based treatments. Metal nanoparticles synthesized from medicinal plant extracts, such as those containing silver (AgNp) and gold (AuNp) hold enormous application in dentistry due to their unique optical, electrical, and photothermal properties. Many people also prefer herbal remedies, and ask for guidance and advice in this regard from their physicians. Since different plants have different compositions and effects, we aimed to review a number of medicinal plants used in dentistry, especially pediatric dentistry, and discuss their benefits and side-effects to promote proper use of medicinal herbs in treatment of oral conditions in children^{4,5,6,7}.

In most developing countries, expenditure on oral health care is low; access to dental healthcare is limited and is generally restricted to emergency dental care or pain relief. While there has been a marked improvement in oral health in most developed countries worldwide, populations of dentally disadvantaged individuals exist in these countries, often indigenous child populations and

those people of low socio-economic status, where oral health is deteriorating. Hence, the search for alternative products continues and natural phytochemicals isolated from plants used in traditional medicine are considered as good alternatives to synthetic chemicals^{8,9}.

2. Phytotherapy: Since many people believe that medicinal plants are safer than invasive methods and chemical drugs and have fewer side effects, the tendency to use medicinal plants for children has increased. Some of the properties of plants used are given below:

Table - Biological activities of medicinal plants

Herbs	Biological activity
Allium sativum ^{10,11}	antibiotic, antibacterial, anticaries, antifungal,
Aloe vera ^{12,13}	antibacterial, antioxidant, antifungal
Azadirachta indica ¹⁴	antimicrobial, antioxidant, antibacterial, antifungal
Coriandrum sativum ¹⁵	antifungal
Arctium lappa	antibacterial, antifungal, antioxidant
Carum carvi	Antihistaminic, antiseptic, antimicrobial,

3. Prevention: High rates of decay besides the high costs of treatment highlight the need for caries prevention. For this reason, the use of antibacterial materials and fluoride-containing substances is important. Studies have shown that some plants can increase the sensitivity of microorganisms by using secondary metabolites. Moreover, some of them can inhibit bacterial growth and their acid production, inhibit the adhesion of bacteria to the teeth and inhibit the synthesis of exopolysaccharide for prevention of dental decay. Some of these plants are mentioned below:

I. Allium sativum (garlic): Garlic reinforces the immune system, reduces blood pressure and decreases cholesterol synthesis in the liver. This plant can be used for treatment of asthma, arthritis, atherosclerosis and circulatory and digestive problems. Its fresh oil, raw cloves and odorless extract are used (20, 30). Research shows that alliin is responsible for its antibacterial properties.

The plant inhibits the growth of Streptococcus mutans and reduces its acid production. It also increases the secretion of saliva and can be effective for prevention and treatment of dental caries.

II. Azadirachta indica: Neem reduces the frequency of early caries and reverses its process to the same extent as chlorhexidine by decreasing the count of Streptococcus mutans. It has antibacterial properties and is a biocompatible antioxidant. It is effective against Enterococcus faecalis and Candida albicans. It has been shown that this plant can inhibit the growth of Streptococcus mutans, Streptococcus mitis, Streptococcus sanguinis and Streptococcus salivarius. In another study, it was shown that the gel containing neem significantly decreased the plaque index and bacterial count.

III. Curcuma Longa: Turmeric is antioxidant, anti-inflammatory and antimutagenic. Its mouthwash causes a rapid reduction of pain. When rubbed on the aching tooth, it relieves pain. The paste contains turmeric, mustard and salt and is useful for reducing gingivitis and periodontitis. Turmeric has strong antibacterial properties against S. mutans biofilm and is as effective as CHX. So it can be effective in preventing dental caries.

IV. Mentha piperita: In the past, peppermint used to treat stomach, intestinal and muscle conditions and improve blood circulation. Today, it is also used to treat conditions such as colic, fever, nausea and diarrhea. Menthol and methyl acetate are among its other constituents. In dentistry, it can be applied topically to relieve dental pain, and as mouthwash for reducing inflammation of the gums. In one study, the antimicrobial activity of M. piperita and Rosmarinus officinalis essential oils and CHX against S. mutans and Streptococcus pyogenes was investigated; the results showed that the antimicrobial activity of peppermint was good.

V. Pistacia atlantica: This plant is from Pistacia species. Different parts of the plant including resin, leaves, fruit, and aerial part can be used for therapeutic purposes. For example, its resin, which is also known in Iran as Saqqez, can be used as mouth freshener, antiseptic and gum tissue strengthener and is available in the form of chewing gum for gastrointestinal disorders, and motion sickness treatment.

4. Conclusion:

There is considerable evidence that plant extracts, essential oils and purified phytochemicals have the potential to be developed into agents that can be used as preventative or treatment therapies for oral diseases. Due to the side effects and disadvantages of synthetic drugs, the use of medicinal plants is increasing considering their low cost, availability and biocompatibility. Further studies on types of suitable medicinal plants, their use and dosage are required especially in children to know more about their toxicity and possible side effects.

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