



Review Article

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Holistic Endodontics

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ABSTRACT

Herbal extracts have gained attention in dental field for various therapeutic measures such as tooth cleanser or antimicrobial plaque agent. Use of the herbal medicines continues to expand rapidly across the world and slowly people started using herbal products or herbal medicines for their health care settings. These herbal extracts have prompted the dentists too to use for reducing inflammation, as antiseptics, antioxidants, antimicrobials, as microbial plaque agents in gingivitis and periodontitis, thereby improving immunity, for preventing release of histamine, antifungals, antibacterials, antivirals and analgesics. This articles highlights the various herbs that are used in the field on dentistry.

Keywords: Herbal extracts, Dentistry, Antiseptics, Herbs, Irrigant.

INTRODUCTION

Herbs are natural plants that lack woody characteristics of trees and shrubs. With the advent of technology, these plants have gained its importance recently due to its medicinal properties, flavour and scent. Many allopathic medicines also have medicinal plants as their origin. Patients with serious chronic or degenerative illness and patients who combat with side effects of allopathic medicines, use of Ayurveda and Homeopathy therapies serve as an alternate option ^[1]. Moreover, constant increase in antibiotic resistant strains and the side effects induced by the use of synthetic drugs have prompted the researchers to look for herbal alternatives. Herbal medicines are commonly prepared from their root, leaves, seeds, and flowers. These preparations often contain combination of chemical substances such as minerals, vitamins, and its specific active ingredient ^[2]. Herbal or natural products have been used in dental and medical practice for more than thousands of years due to their antimicrobial activity, biocompatibility, anti-inflammatory and anti-oxidant properties ^[1, 2].

Endodontic or root canal treatment involves removal of infected pulp tissue and micro-organisms from the root canal space to prevent further infection of the peri-radicular tissues and allow healing process ^[3]. This process involves the use of chemical substances for disinfection of the root canal space. Several studies have shown that contemporary chemical agents [both proteolytic and acidic] do not achieve complete disinfection and have other disadvantages like weakening of the tooth structure, predisposing tooth fracture ^[4]. This has triggered the researchers to seek for natural remedies and it is termed as ethnopharmacology or phytotherapy.

AYURVEDA AND ENDODONTICS

Ayurveda is one of the oldest form of medicine in India. Ayurvedic herbs have nature's own power of remedies. Thus the right herb with the right combination keeps the body system in perfect harmony ^[4, 5]. Many herbal extracts have been found to be of potential use in endodontics and also with minimal incidences of complication. Various natural agents that currently have gained importance in the field of dentistry are: (table 1)

1) *Morinda citrifolia*

Morindacitrifolia also known as noni, Indian Mulberry, Batitian, Nono or Nonu, cheese fruit and Nhan. It is indigenous to tropical countries and is considered as an important herbal medicine in various cultures throughout the world. Its juice extract has a broad range of therapeutic effects such as antibacterial, antiinflammatory, analgesic, antiviral, antihemithic, antitumour, immune enhancing effect. Its

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antibacterial activity is effective against acubin, L-asperuloside and alizarin- P.aeruginosa, S.aureus, E.coli, salmonella, shigella [6].

Dental applications: The use of MorindaCitrifolia extract are

- As an endodontic irrigant have been a boon for endodontic professionals as part of the growing trend to seek natural remedies for dental treatment and is advantageous because it is a biocompatible antioxidant and unlikely to cause injuries to patients that might occur through NaOCl accident [6].
- An in vitro study compared the effectiveness of MCJ, NaOCl and CHX against smear layer removal from the root canal walls of prepared teeth [7]. It was concluded that the efficacy of MorindaCitrifolia was similar to that of NaOCl in combination with EDTA as an intra-canal irrigant.
- MCJ appears to be the one of the next alternate identified as a possible replacement for NaOCl as an intra canal irrigant [8, 9]. Murray *et al.*, concluded that 6% MCJ could be used as an endodontic irrigant in combination with EDTA followed by a final flush with 6% MCJ. MCJ contains the antibacterial compounds like L.asperuloside and alizarin [6].
- Kandaswamy *et al.*, investigated the antimicrobial activity of 2% chlorhexidine gel, propolis, morindacitrifolia extract, 2% povidone iodine and calcium hydroxide on E. faecalis- infected root canal dentin at two different depths (200 and 400 µm) and three time intervals (1,3,5days) and concluded that propolis and MCJ were effective against E. faecalis [10].

II) Propolis

It is also called as Russian Penicillin. Propolis is a commonly used herbal medicine for centuries. Flavonoids and cinnamic acid derivatives have been identified as the primary biologically active components. It is a resinous hive product built by honey bees from various plant sources consisting of complex mixture of constituents [10]. Propolis exhibits several pharmacological properties such as antimicrobial, anti-inflammatory, healing, anaesthetic, cytostatic and cariostatic properties. The ethanolic extract of propolis inhibits the activity of hyaluronidase enzyme, which is responsible for several inflammatory processes. Substance involved in the inhibition of this enzyme is considered as a potential anti-inflammatory agent [11, 12].

Flavonoids, diterpenic compounds, aromatic acids and phenolic compounds appear to be the principle component responsible for the biological activity of propolis. It prevents bacterial cell division and also breaks down bacterial cell wall and cytoplasm. The anti-microbial properties are mainly against gram-positive bacteria - Enterococcus spp, Mycobacteria sp, staphylococcus aureus, Streptococcus than gram negative species.

Dental applications:-

- The anti-inflammatory action of propolis is due to the presence of caffeic acid phenethyl ester (CAPE). Ethanol extract of propolis presents good properties for endodontic use, such as promoting bone regeneration and inducing hard tissue bridge formation in pulpotomy or pulp capping. Its antimicrobial and anti-inflammatory property serve as good intra-canal irrigant and intra-canal medicament [10].
- Mechanical exposure of human pulp tissue to Propolis has led to the stimulation of various enzyme systems, cell metabolism and collagen formation, thus contributing to the hard tissue bridge formation [13].

- Studies have found it to be effective against E.faecalis in dentin.
- Propolis is also used to treat dentinal hypersensitivity by occluding the dentinal tubules

III) Azadirachta indica

Azadirachta indica A. Jussis a commonly seen medicinal tree popularly known as "Indian neem/ Margosa tree" or "Indian lilac", it is well known in India and its neighboring countries for more than 2000 years as one of the most versatile medicinal plants having a wide spectrum of biological activity [10].

It possesses anti-bacterial, anti-cariogenic, anti-viral, cytotoxic, anti-inflammatory activity, anti-helminthic, anti-diabetic, anti-oxidant, and as astringent. Nimbidin, Azadirachtin and nimbinin are the active compounds present, which are responsible for antibacterial activity [14]. Biological activities and pharmacological properties of neem is from the crude extracts and their different fractions from its leaf, bark, flowers, roots, seed and oil.

Neem leaf extract have a significant antimicrobial effect against E. faecalis and C.albicans. Microbial inhibition potential of neem leaf extract observed opens perspectives for its use as an intra-canal medication. However, preclinical and clinical trials are needed to evaluate biocompatibility & safety before neem can conclusively be recommended as an intracanal irrigating solution, but in vitro observation of effectiveness of neem as an intra-canal irrigant appears to be promising. Its bark is used as an active ingredient in a number of toothpastes and toothpowders due to its anti-bacterial property for curing gingival problems and maintaining oral health in a natural way. Neem twigs are used as oral deodorant, toothache reliever and for cleaning of teeth [15, 16].

Prashanth *et al.*, evaluate the antimicrobial effects neem chewing sticks and mango against Streptococcus mutans, Streptococcus salivarius, Streptococcus mitis, Streptococcusanguis, which are commonly responsible for dental caries. It was concluded that neem extract produced the maximum inhibition zone on Streptococcus mutans at 50% concentration [17]. Hence it could serve as an additional inexpensive, simple, and effective method in caries prevention.

IV) Green tea polyphenols

Green tea polyphenols, the traditional drink of Japan and China is prepared from the young shoots of the tea plant Camellia sinensis. The tea plant leaves contain polyphenolic component, which are active against a wide spectrum of microbes [18]. The anti-oxidative properties of unfermented tea can be attributed to the ability of polyphenols contained especially the galocatechin, to inactive free radicals.

Dental applications:

- Green tea polyphenols shows significant antibacterial activity against E faecalis biofilm formed on tooth substrate. It takes 6 min to achieve 100% bactericidal action against E faecalis. It is also used as laxative, detoxifying agent and rejuvenator. The polyphenols found in Green tea are more commonly known as flavanoids or catechins [19].
- It posses significant antioxidant, anticariogenic, antiinflammatory, thermogenic, probiotic and antimicrobial properties.
- Green and black teas both contain flavonoids that inhibit the growth and activity of the bacteria associated with tooth decay which is attributed to the presence of natural fluoride, which helps in preventing dental caries.

V) *Salvadora persica* (miswak-siwak)

Various literatures have demonstrated that the extracts of *Salvadora Persica* possess antiplaque, anticariogenic, antiinflammatory and antimycotic activities. Miswak (chewing stick) was used by Babylonians and later by Greek and Roman empires and has also been used by ancient Egyptians and Muslims. It is used in different parts of Africa, Asia, especially the Middle East countries and South America. It is a medicinal plant whose roots, twigs or stems have been used for centuries as oral hygiene tools in many parts of the world, particularly in Saudi Arabia.

The root of *Salvadora persica* contains steam-distillable oil composed of 10% benzyl nitrate and 90% Benzyl-isothiocyanate (BIT). BIT is a chemopreventive agent, which has anti-carcinogenic property, possesses plaque inhibiting enzymes, and virucidal activity against herpes simplex virus 1 (HSV-1) at a concentration of 133.3 mg/ml. In addition, it is reported to have a broad-spectrum of bacteriocidal activity. The extract of these sticks have a drastic effect on the growth of *Staphylococcus aureus*, *Streptococcus mutans*, and variable effects on other bacterial species [20].

It also possesses analgesic effect, anti-inflammatory, hypoglycaemic activities beside the astringent and detergent effect. Although the antimicrobial activity of Miswak has been reported, its toxicity must be accounted, therefore it cannot be used as an endodontic irrigant [21].

Homeopathic Applications in Endodontics

Homeopathy is used by dentists as a natural alternative to traditional therapy approach since it is safe, non-addictive, and effective for both adults and children. Homeopathic remedies are used to improve the psychological or emotional condition of patients without the drugging effects of conventional tranquilizers. The homeopathic products are made from minerals, botanical substances, and several other natural resources. The basic law of homeopathy is "the Law of Similars." This

law states that any drug capable of producing morbid symptoms in the healthy will remove similar symptoms occurring as an expression of disease [22, 23].

- i) *Arnica* - *Arnica* helps with pain, swelling and bleeding due to blunt trauma, soft tissue injuries or any bruising types of injuries.
- ii) *Hypericum-Hypericum* is specifically used for trauma to nerves; such as a deep filling that is close to the pulp, after root-canal therapy, for fractured incisors where you have a near exposure or exposure of the nerve.
- iii) *Magnesia Phosphorica*- It is used for muscle pains and muscle spasms. The key notes with Mag phos are better from warmth, worse from cold, and better from pressure.
- iv) *Rutagraveolans*- Used for any kind of periosteal injuries or bone surgery, contusions, and apicectomies. *Ruta* is a good remedy following endodontic therapy if the file is overextended beyond apex.
- v) *Silica*- *Silica* is useful in the management of draining periapical abscess typically when there is a sinus draining into the buccal sulcus and also effective against root infections of tooth.
- vi) *Hydrofluoricum acid*- It is highly useful for decaying and sensitive tooth.
- vii) *Belladonna*- *Belladonna* is a remedy for acute endodontic abscess.
- viii) *HeparSulph*- Useful in treating chronic periapical abscess, where there may still be a little cold sensitivity in the tooth (or the patient may be chilly in general). With *HeparSulph*, potency selection for endodontic lesions may be particularly critical. Low potencies (6C or below) tend to promote the abscess to point and drain, higher potencies (30C or above) tend to suppress and shrink the abscess.
- ix) *Aconitum napellus*- Indicated for unbearable pain such as severe pulpitis or inflammation of the nerve of the tooth accompanied by anxiety. The information about the traditional uses of the medicinal plants has been compiled in Table 1. The various dental applications of herbs is summarized in Table 2.

Table 1: The traditional uses of the medicinal plants

S. NO.	Name	Parts and their Roles
1	<i>Acorus calamus</i>	Paste of the Rhizome is applied to painful teeth and gums
2	<i>Allium sativum</i>	The paste of the bulb is applied to the gums and cavities of infected teeth.
3	<i>Bonbaxceiba</i>	Gum is used to treat tooth care
4	<i>Cinamomum</i>	Stem bark juice is applied to the teeth to treat tooth decay and toothache.
5	<i>Citrus medica</i>	Due to high content of Vitamin-C, used to treat bleeding gums in scurvy.
6	<i>Datura stramonium</i>	Seeds mixed with butter are burnt and smoke is inhaled into the mouth.
7	<i>Juglens regia</i>	Oil & fruits are used in making traditional tooth powder to cure toothache and Pyorrhoea.
8	<i>Justicia adhatoda</i>	The twigs of the plant are used as tooth picks / brushes to treat Pyorrhoea.
9	<i>Myrica esculenta</i>	The bark is chewed to relieve toothache.
10	<i>Ocimum sanctum</i>	Powder of dry leaves along with salt is applied to painful teeth.
11	<i>Punica granatum</i>	It is very useful in bleeding gums caused due to scurvy.
12	<i>Ricinus communis</i>	Tender shoots are used as tooth brushes in dental caries. Leaf juice is used to gargle in Pyorrhoea
13	<i>Urtica dioica</i>	2-3 drops of root extract are applied to hollow tooth cavities to treat toothache.
14	<i>Vitex negundo</i>	Leaf is used as a mouthwash to relieve toothache.
15	<i>Zanthoxylum</i>	Powder of the fruits is used as a remedy for toothache. Small twigs of the branches are used to treat toothache
16	<i>Zingiber officinale</i>	Paste of rhizomes is applied to the teeth to treat toothache and tooth decay.

Table 2: Herbs and their applications in dentistry

S. NO.	HERBS NAME	APPLICATION
1.	Myrrh (<i>Commiphoramyrha</i>)	It helps and promote healing of pyorrhoea and also eliminate bad breath.
2.	Tree tea oil (<i>Melaleuca alternifolia</i>)	Rubbing the tree tea oil directly on sore or inflamed gums provide temporary relief. It reduces oral inflammation when used as mouthwash. It has mild solvent action and hence could be in root canal treatment for dissolving necrotic pulp tissue.
3.	Prickly Ash (<i>Zanthoxylum</i>)	Increase salivary flow and relieve pain in case of toothache.
4.	Thyme (<i>Thymus vulgaris</i>)	The extract is effective against Streptococcus Mutans. Combination of thyme, myrrh and goldenseal helps to treat oral herpes,
5.	Aloe Vera (<i>Aloe barbadensis</i>)	Useful in preventing caries and periodontal disease when added in tooth paste and in mouth washes at optimum concentration
6.	Peppermint (<i>Mentha piperita</i>)	It helps in toothache and peppermint mouthwash relieve gum inflammation.
7.	Violets (<i>Clematis virginca</i>)	Mouthwash helps to relieve pain and tenderness from sores caused by oral cancer. It is also helpful in soothing canker sores and cold sores.
8.	Clove	Crude clove extracts is effective against Streptococcus mutans by inhibiting cell-surface hydrophobicity, cell adhesion, and glycosyltransferase activities.
9.	Rosemary (<i>Rosmarinus officinalis</i>)	Rosemary mouthwash for the treatment of gum disease and bad breath.
10.	Red clover (<i>Trifolium pretense</i>)	Mouthwash enables healing of irritated and diseased gums and also used as ointment due to its antimicrobial property.
11.	Green tea (<i>Camellia sinensis</i>)	Its antimicrobial property prevents the adhesion of Streptococcus mutans, Porphyromonasgingivalis, and Streptococcus sorbis
12.	Violets (<i>Clematis virginca</i>)	Mouthwash made from violets helps relieve the pain and tenderness from sores caused by oral cancer. It is also helpful in soothing canker sores and cold sores.
13.	Sanicle (<i>Sanicula europaea</i>)	It act as a powerful antioxidant and heal septic wounds.
14.	Honey (propolis)	It is used in the treatment of ANUG, apthous ulcer, gingivitis, pulpitis, periodontitis, and candidiasis
15.	Wintergreen (<i>Gaultheria procumbens</i>)	Mouthwash act as an excellent astringent and antiseptic and also provide temporary relief of inflamed gums.
16.	Yarrow (<i>Achillea millefolium</i>)	Used to treat hemorrhages, ulcers and to improve blood clotting. Mouthwash promote healing of cuts in mouth due to surgery, teeth cleaning and braces.
17.	Miswak (<i>Salvadora persica</i>)	It posses plaque inhibiting, antibacterial properties against numerous oral bacteria.
18.	Neem (<i>Azadirachta indica</i>)	Mouth wash effectively reduce plaque, gingivitis and also used to periodontal disease.
19.	Mango (<i>Mangifera indica</i>)	Plays an efficient role in the management of periodontitis

CONCLUSION

This article presents a brief overview of the role of Herbs in dentistry. The major advantages of using herbal alternatives are ease of availability, cost effectiveness, increased shelf life, low toxicity and lack of microbial resistance. The *in-vitro* observations of natural products appear promising but preclinical and clinical trials are needed to evaluate the biocompatibility and safety factor before they can conclusively be recommended as intra-canal irrigating solutions or as medicaments [24-28]. Herbs are generally safe if used with proper knowledge, but they can be harmful if misused. Hence herbs should only be used for treatment procedures that have been established to be effective along with minimal risk involvement.

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