

## HerboDontics A Descriptive Review

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**Abstract:** Background: Herbal ingredients have been a part of human life since ancient times when they relied upon only the plants and their products for curing ailments. There is vast research on the efficacy of Ayurveda in curing diseases. However need is felt regarding extensive studies on the usage of such historic natural products in oral health care and especially in endodontics. One of the important factors for successful root canal treatment is complete eradication of microbes, which require efficient bio-mechanical preparation of root canal system. There are variety of chemical based solutions available for the purpose of endodontic irrigation. Due to various safety concerns including oral and peri-radicular toxicity, there is the need for such solutions which can be used as their alternative. In recent years, there has been a profound increase in the literature and research regarding the use of herbal solutions as endodontic irrigants. This article aims at providing a comprehensive overview about various herbal solutions that can be used in endodontic treatment. [Oak A Natl J Integr Res Med, 2022; 13(3):43-48, Published on Dated:10/05/2022]

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**Introduction:** Attaining completely sterile surroundings and hermetic seal are the pre-standards for predictable endodontic success. The main reason for formation of biofilm inside the dentinal tubules as well as the peri-radicular place are the microbes which result in the colonization of the entire root canal space, collectively with the dentinal tubules. The basic canal area acquires the potential to harbour various irritants consisting of numerous species of micro-organisms, alongside their pollutants and products, which results into the pathological modifications<sup>1,2</sup>. The root canal anatomy could be very complex which poses great challenge with the effective disinfection of the basic canal area. This places emphasis on the whole debridement of the root canal which is not possible without complete irrigation along with the mechanical preparation of root canal space.

Numerous irrigating solution which are broadly used together with sodium hypochlorite (NaOCl), ethylenediaminetetraacetic acid (EDTA) are totally chemical based and have been documented to have diverse varieties of side-consequences which include hypersensitive reactions. Often used Intracanal medicaments including calcium hydroxide, Triple antibiotic paste can lead to collagen breakdown and

consequently weakening of radicular dentin and tooth discoloration as well as demineralization of dentin respectively<sup>3,4</sup>. The literature is suggestive of need to explore viable herbal alternatives to present day chemical sellers as they're rich in antioxidant, anti-inflammatory and antimicrobial properties, thereby making them perfect for root canal disinfection<sup>5,6</sup>. The current article goals to check natural alternatives which may be used as root canal irrigants.

Endodontic-Herbal Solutions: Azadiracta Indica: Attributable to the capacity medicinal values, Azadiracta indica is considered an evergreen tree. It possesses anti-bacterial, anti-cariogenic, and anti-helminthic, anti diabetic, anti oxidant, astringent, anti viral, cytotoxic, anti-inflammatory potential. The active compounds present in neem, which are liable for its anti-bacterial efficacy are Nimbidin, Azadirachtin and nimbinin.

Nimbidin, an vital factor, is being isolated from the plant's seed kernels. From nimbidin, different active materials like nimbin, nimbinin, nimbidinin, nimbolide and nimbidic acid may be isolated, which might be responsible for its organic activities<sup>7</sup>. The Antibacterial activity has been proved in various studies<sup>8</sup>. The antimicrobial consequences of Neem were pronounced

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towards *S. mutans* and *S. faecalis*<sup>9</sup>. A clinical study tested the results of the leaf aqueous extract from *Azadirachta indica* (Neem) on adhesion, cell floor hydrophobicity and biofilm formation, which can also have an effect on the colonization via *Candida albicans*. The results propose that Neem leaves have a potential anti adhesive impact at the pattern studied in vitro<sup>10</sup>.

Antimicrobial potency of Himalaya natural dental cream, which is available commercially, containing neem and fluoride containing cheerio gel toothpaste has been assessed. They suggested both the toothpastes showed an awesome antimicrobial effect on caries generating salivary streptococcus mutans<sup>11</sup>.

Aqueous extract of Neem stick and the gallotannin enriched extract from *Melaphis chinensis* inhibited insoluble glucan synthesis and outcomes in bacterial aggregation. It reduces the capacity of streptococci to colonize enamel surfaces<sup>12</sup>.

Aqueous and ethanolic extract of Neem leaf inhibits *S. mutans* and *E. faecalis* due to which root canal failure in endodontic method is seen.

Its antioxidant and antimicrobial attributes makes it an agent for root canal irrigation. Literature states that the Neem (*Azadirachta indica*) leaf extract has enormous antimicrobial effect towards *E. faecalis* derived from inflamed root canal samples. The extract became observed to be efficacious in comparison with 2% sodium hypochlorite<sup>13</sup>.

Oscimum Tenuiflorum: Tulsi is considered to be the most sacred plant and is frequently referred as the "HolyBasil" in Indian subcontinent. There is recorded evidence concerning use of *Ocimum sanctum* (Tulsi) as a fragrant plant in Ayurveda. "Tulsi" in Sanskrit way "the incomparable one" and therefore called the queen of herbs<sup>14</sup>.

This plant has been tested pharmacologically for antimicrobial, immunomodulatory, anti-inflammatory, hypoglycemic, chemoprotective and analgesic characteristics<sup>15</sup>. Tulsi consists of good sized quantity of Eugenol (1-hydroxy-2-methoxy-4 allylbenzene), for this reason it acts as COX-2 inhibitors similar to analgesics. *Ocimum sanctum* leaves comprise 0.7% volatile oil consisting about 71% eugenol and 20% methyl eugenol<sup>16</sup>. Tulsi leaves are quite powerful in

treating common oral infections. whilst chewed, tulsi leaves assist in maintaining oral hygiene.

Antibacterial components namely carvacrol and terpene are present in this plant. Sesquiterpene b-caryophyllene also serves the equal cause which is FDA approved food additive.

*Streptococcus mutans* is a causative microorganism drastically contributing to tooth decay. In an in-vitro experiment various concentrations of the Tulsi extracts have been evaluated in opposition to streptococcus mutans and for this reason concluding that the composition of Tulsi extract 4% has a maximum antimicrobial capacity<sup>17</sup>.

The antifungal attribute of the important oil of *Ocimum sanctum* and its elements i.e. Eugenol and linalool were studied against species of *Candida* (i.e. *C. albicans* and *C. tropicalis*) which can be regarded to be the main reason for oral candidiasis and concluded that linalool is more promising and powerful in opposition to candida<sup>18</sup>. Nutrient Tulsi contains vitamin A and C, calcium, zinc and iron. It additionally has chlorophyll and lots of other phytonutrients. Deficiency of these vitamins has been related to variety of oral illnesses<sup>19</sup>.

Triphala: Literature has proven 0.6% Triphala mouthwash to have huge anticaries interest, along with no staining of enamel not like chlorhexidine which produces extrinsic stains and changed flavour<sup>20</sup>. Triphala mouth rinse in conjunction with scaling and root planing showed huge reduction within the plaque, gingival, and oral hygiene indices of enamel at 7, 30, and 45 days while in comparison to chlorhexidine mouth wash<sup>21</sup>.

Experiments were conducted to compare the efficacy of Triphala with Chlorhexidine as mouthwash. It showed that, Triphala (0.6%) when used twice a day confirmed 17% and 44% reductions in oral streptococci on second and seventh day respectively in comparison to chlorhexidine (0.2%) that confirmed sixteen percent and forty five percent reductions within the organism over the same duration. Authors concluded antistreptococcal efficacy of Triphala is comparable to Chlorhexidine<sup>22</sup>.

Oxidative strain has been accounted as a predisposing aspect in diverse oral illnesses.

Disruption of stability between the manufacturing of oxygen loose radical species and inactivation of the equal, consequences in illnesses. Phenolic compounds present in Triphala extracts attributed to its antioxidant property.

Concentration of phenolic compounds in Triphala is around 33-44%. Consequently, Emblica officinalis well-known agent shows terrific lipid peroxidation properties while Terminalia chebula has tremendous radical scavenging characters. This synergistic result makes Triphala a better antioxidant<sup>23</sup>.

Triphala has excellent antimicrobial action towards gram positive and gram negative micro organism particularly Staphylococcus aureus, Staphylococcus epidermidis, Bacillus subtilis, Escherichia coli and Pseudomonas aeruginosa.

This is due to presence of various chemical parts like flavonoids, terpenes and alkaloids. It possesses extraordinary bacteriostatic and bactericidal activities at a completely low concentration of 50µg/ml. About five percent solution of Triphala inhibits roughly about eighty three percent Streptococcus mutans<sup>24</sup>.

It might be because of the tannic acid in Triphala which gets adsorbed onto the surface of the bacterial cell leading to protein denaturation and in the long run to dying of the cell. Triphala additionally enables in controlling dental plaque, microbial boom and gingival irritation as a result of the Lactobacillus and Streptococcus mutans.

Triphala inhibits boom of Enterococci which causes nosocomial bacteraemia and the infection of surgical wounds.<sup>25</sup> Further, one of the constituent of Triphala, Terminalia chebula has shown vast inhibitory impact on Candida and might be because of the gallic acid additives<sup>23</sup>.

Various species of streptococci particularly Streptococcus mutans, Streptococcus salivarius and Streptococcus mitis are acknowledged to be the reason for occurrence of dental caries.

Complex interaction between the streptococcal species and the dental biofilm, outcomes in dental plaque formation. Streptococcus mutans metabolizes sucrose into dextran. This insoluble sticky glucan promotes the adherence of the microbial species over the surface of the teeth, hence forming dental plaque. Prolonged

accumulation of dental plaque on the teeth surface outcomes in decalcification of teeth thereby beginning dental caries<sup>26</sup>.

Many antiplaque solutions are available but due to their unwanted detrimental outcomes have led researchers to discover ayurvedic ones with very minimal side outcomes. Research has proven that Terminalia chebula prevents plaque formation on the surface of the enamel by way of inhibiting sucrose precipitated adherence and glucan caused aggregation. It inhibits the increase and accumulation of Streptococcus mutans on the tooth enamel. This prevents the construct-up of acids on the teeth and thus prevents similarly demineralization<sup>27</sup>.

Root canal infections are polymicrobial in nature specially gram negative anaerobic rods. But, Enterococcus faecalis is normally determined in excessive percentage of root canal failures and performs a prime function in etiology of chronic periradicular lesions. Sodium hypochlorite (NaOCl) has been successfully used as a root canal irrigant because of its high-quality antimicrobial assets, but ineffective elimination of smear layer, unpleasant flavor, high toxicity and deleterious effects on dentine like reduction of its elastic modulus and flexural strength limits its use.

Triphala has a robust antimicrobial character in opposition to enteric pathogens and has shown big inhibitory action against biofilm. This could be attributed to the presence of tannic acid that is its major constituent. Triphala also have a positive aspect of being an antioxidant, anti-inflammatory agent over traditional root canal irrigant, thereby proving to be an splendid herbal opportunity without undesirable aspect effects of NaOCl<sup>28-30</sup>.

Citrus Limon: Various in vitro and in vivo research had been performed to assess the effectiveness of components of citrus lemon in lowering anti-inflammatory objectives and the markers of persistent irritation<sup>31</sup>.

The anti-inflammatory effect of C. limon essential oil is probably due to the excessive of D-limonene<sup>32</sup>. The mechanism of hepatoprotective outcomes in numerous studies turned into likely associated with the antioxidant, anti-microbial capability of limonin mediated with the aid of the down regulation of the TLR-signaling pathway<sup>33</sup>.

Extracts from *C. limon* have proven inhibitory criteria towards *Enterococcus faecalis* and *Bacillus subtilis*, the Gram-negative *Salmonella typhimurium* and *Shigella sonnei*<sup>34</sup>.

*C. limon* oil showed antibacterial characteristics towards Gram-positive, Gram-negative microorganism and *E. Coli*<sup>35</sup>. Another study showed that *C. limon* promoted a 100% reduction in the growth of *Candida albicans*<sup>36</sup>.

**Aloe Vera:** Aloe Vera has remarkable medicinal attributes. This vegetation is one of the richest resources of health for human beings coming from nature. Various products of the plant are used for the treatment of numerous ailments.

*A. Vera* is gaining popularity in dentistry as it is completely herbal and there are no side consequences being pronounced with its use.

*A. Vera* has been utilized in dentistry for its wound-restoration effects, gingivitis, plaque management, and curing oral mucosal lesions.

*A. Vera* may additionally reduce the ache and duration of oral ulcers even as speeding recovery. The dentists ought to use *A. vera* at a level excessive enough to maximise its healing gain<sup>37</sup>.

The anti-bacterial activity of *A. vera* inner gel, with regards to both Gram-positive and Gram-negative microorganism has been tested by numerous different strategies. *Streptococcus pyogenes* and *Streptococcus faecalis* are microorganisms which have been inhibited through *A. vera* gel. Bactericidal effect is documented with respect to *Pseudomonas aeruginosa*. A processed *A. vera* gel reportedly inhibited the growth of *Candida albicans*<sup>38</sup>.

*A. vera* includes 75 doubtlessly energetic materials: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids. It acts in many approaches. *A. vera* is a robust anti-inflammatory agent; it inhibits the COX pathway and decreases prostaglandin E2 production from arachidonic acid. It is mainly acknowledged for its penetrating capability to attain deeper layers of the epidermis whilst applied topically. It has strong antiseptic characters being bactericidal, fungicidal, and virucidal<sup>39</sup>.

*A. vera* has been proven to have protection mechanisms, and it has a spread of additives to

assist combat periodontal ailment and different oral conditions. It promotes growth of the cells.

It's far neurologically calming and also acts as a detoxifying agent. *A. vera* consists of antiseptic agents: Lupeol, salicylic acid, urea nitrogen, cinnamic acid, phenols, and sulfur. They all have inhibitory action on fungi, microorganism, and virus<sup>40</sup>.

**Conclusion:** Ayurveda had and has immense scope in country like India. Many countries have vast documentation of used of natural products for healing process, especially where majority of population is not able to afford expensive treatment. Herbal medicines can be said to be the future in dentistry due to its biocompatibility, easy availability and negligible or no side effects.

The herbal products need vast pre-clinical, invitro studies and clinical trial data to establish its effectiveness either alone or in combination with synthetic agents.

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