REVIEW ARTICLE

HERBAL ROOT CANAL IRRIGANTS: A REVIEW

Authors:

John Paul[1]
Meera Gopalakrishnan[2]
Dinesh Kamath[3]
Romel Joseph[4]

[1]Senior Lecturer,
Dept. of Conservative Dentistry & Endodontics
Indira Gandhi Institute of
Dental Sciences,
Kothamangalam, Ernakulam Dt., Kerala

[2]Reader,
Dept. of Conservative Dentistry & Endodontics
Indira Gandhi Institute of
Dental Sciences,
Kothamangalam, Ernakulam Dt., Kerala

[3]Professor,
Dept. of Conservative Dentistry & Endodontics
Indira Gandhi Institute of
Dental Sciences,
Kothamangalam, Ernakulam Dt., Kerala

[4]Principal
Professor& Head
Dept. of Conservative Dentistry & Endodontics
Indira Gandhi Institute of
Dental Sciences,
Kothamangalam, Ernakulam Dt., Kerala

Address for correspondence

[1]Senior Lecturer,
Dept. of Conservative Dentistry & Endodontics
Indira Gandhi Institute of
Dental Sciences,
Kothamangalam, Ernakulam Dt., Kerala
Email : john_paul_0077@yahoo.com

ABSTRACT

One of the major objectives of a root canal treatment is to disinfect the root canal system. Irrigation is carried out to reduce the number of bacteria in the root canals. For this purpose, a wide variety of synthetic drugs are available today but due to the ineffectiveness, safety concerns and side effects of these synthetic drugs, the herbal alternatives for endodontic irrigants might be advantageous .Over the past decade, interest in drugs derived from medicinal plants has markedly increased. In dentistry phytomedicine has been used as anti-inflammatory, antibiotic, analgesic, sedative and also as endodontic irrigant.This update focuses on various herbal drugs and products as well as their therapeutic application, side effects and possible drug interactions when used as phytomedicine in endodontics.

Key Words : Root canal irrigants, Phytomedicine, Bio films, Smear layer.

J Odontol Res 2015;3(1):9-14.

INTRODUCTION

Primary etiologic factors in the development of pulp and periapical lesions have long been recognized as the bacteria.[1,2,3] The main aim of an endodontic treatment is to remove the diseased tissue, eliminate bacteria from the root canal system and prevent its recontamination.[4] Irrigation is carried out to reduce the number of bacteria in the root canal system and to control the periapical disease[5]. Herbal products have been used since ancient times in folk medicine, involving both eastern and western medicinal traditions. Many plants with biological and anti micrbiological properties have been studied since there has been a relevant increase in the incidence of antibiotic overuse and misuse. In dentistry Phytomedicines has been used as anti-inflammatory, antibiotic, analgesic and sedative agents. Herbal or natural products have also become more popular today due to their high antimicrobial activity, biocompatibility, anti-inflammatory and anti-oxidant properties[6]. A wide variety herbal products have been used in the past in medicine. Thus the aim of this review is to enlist and describe the various herbal alternatives available today for use as effective endodontic irrigants.

IDEAL REQUIREMENTS OF ROOT CANAL IRRIGANTS[7]

1. Broad antimicrobial spectrum.
2. High efficacy against anaerobic and facultative microorganisms organized in biofilms.
3. Ability to dissolve necrotic pulp tissue remnants.
4. Ability to inactivate endotoxin.
5. Ability to prevent the formation of a smear layer duringinstrumentation or to dissolve the latter once it has formed.

Herbal Endodontic Irrigants

Curcuma longa (Turmeric):

Curcumin, a member of a ginger family possesses anti inflammatory[8], anti oxidant[9], anti microbial[10] and anti cancer activity[11]. In an in vitro study conducted by Prasanna Neelakantan, it has been shown that curcumin has significant anti bacterial activity against E.faecalis and can be used as an alternative to sodium hypochlorite for root canal irrigation. Thus this herb can be used especially in endodontics for root canal failure cases. [12]

Triphala

Triphala consists of dried and powdered fruits of three medicinal plants Terminalia bellerica, Terminalia chebula, and Emblica officinalis[13]. Triphala achieved 100% killing of E faecalis at 6 min. This may be attributed to its formulation, which contains three different medicinal plants in equal proportions; in such formulations, different compounds may help enhance the potency of the active compounds, producing an additive or synergistic effect[14] .Triphala contains fruits that are rich in citric acid, which may aid in removal of the smear layer.

Morinda citrifolia:

Morinda citrifolia (MCJ) has a broad range of therapeutic effects, including antibacterial, antiviral, antifungal, antitumor, antihelmintic, analgesic, hypotensive, antiinflammatory, and immune-enhancing effects.[15,16.17,18] MCJ contains the antibacterial compounds L-asperuloside and alizarin[18]. Murray et al.[18] proved that, as an intracanal irrigant to remove the smearlayer, the efficacy of 6% MJC was similar to that of 6% NaOCl in conjunction with EDTA.

The use of MCJ as an irrigant might be advantageous because it is a biocompatible antioxidant[18]and not likely to cause severe injuries to patients as might occur through NaOCl accidents.

Propolis:

Propolis, a natural antibiotic is a resinous substance that honey bees collect from trees of poplars and conifers. It possesses anti bacterial activities against streptococcus sobrinus and streptococcus mutans[19]. It also possesses good anti oxidant[20] and anti inflammatory activities [21]. It has been used as a pulp capping agent[22], cariostatic agent [23], as a mouth rinse [24] and in the treatment of periodontitis [25]. Ethanolic extract of propolis can promote bone regeneration and induce formation of hard tissue bridge in pulpotomies or pulp capping. In a study conducted

by Al-Qathami and Al-Madi,the anti microbial efficacy of propolis, sodium hypochlorite and saline as endodontic irrigants was compared and it was found that propolis showed anti microbial activity equal to that of sodium hypochlorite. [26]

Azadirachta indica (Neem):

Neem's anti viral [27], anti fungal [28], anti bacterial [29] and anti carcinogenic activity [30] makes it a potential agent for root canal irrigation. Neem leaf extract is also used to treat dental plaque and gingivitis. Being a bio-compatible anti oxidant, use of neem is advantageous as it is not likely to cause the severe harms to patients that might occur through sodium hypochlorite accidents. Naiyak Arathi et al observed that ethanolic extract of neem had significant anti microbial activity against E.faecalis.[31] In another study by Hannah Rosaline et al, the effects of herbal extracts such as Morinda Citrifolia, Aadirachta indica and green tea were studied. The most to least effective irrigants were: Azadirchta indica, sodium hypochlorite, green tea, Morinda citrifolia and saline. Thus, it is an effective herbal alternative to the more commonly used irrigant sodium hypochlorite. [32]

Aloe Vera (Aloe barbadensis miller):

Aloe vera possesses good anti bacterial and anti fungal activity. In a study conducted by Suresh Chandra, anti microbial effect of water, alcohol, chloroform extracts of aloe vera gel were investigated and it was found that chloroform extract of aloe vera had significant anti microbial effect against E.faecalis[33]. It also has been found to be effective against the resistant micro organisms commonly found in the pulp.

Green Tea

Green tea polyphenols, the traditional drink of Japan and China is prepared from the young shoots of the tea plant Camellia sinensis[34]. Green tea polyphenols showed statistically significant antibacterial activity against E faecalis biofilm formed on tooth substrate. It takes 6 min to achieve 100% killing of E faecalis[14].The antimicrobial activity is due to inhibition of bacterial enzyme gyrase by binding to ATP B sub unit[35]. Green tea exhibits antibacterial activity on E-faecalis plaknotic cells. It is also found to be a good chelating agent.

German chamomile and Tea tree oil:

German chamomile has anti inflammatory, analgesic and anti microbial properties. Tea tree oil also has many properties such as being an antiseptic, anti fungal agent, anti bacterial and a mild solvent. The active component in tea tree oil is terpinen-4-ol which is responsible for the above properties. [36] In a SEM study conducted to overcome the undesirable effects of sodium hypochlorite, it was observed that chamomile when used as an irrigant was more effective in removing smear layer when compared to sodium hypochlorite used alone but less effective than sodium hypochlorite combined with EDTA[37]. In another study by Uday Kamath et al, anti bacterial efficacy of tea tree oil was compared with 3% sodium hypochlorite and 2% Chlorhexidine against E.faecalis. It was found that maximum anti microbial activity was shown by Chlorhexidine followed by tea tree oil and then sodium hypochlorite. [38]

Allium Sativum (Garlic):

Its main active component is allicin which destroys the cell wall and cell membrane of root canal bacteria and thus can be used as an irrigant alternative to sodium hypochlorite. [39]

Jeeryin Solution:

This is a Chinese herbal compound with anti bacterial, anti inflammatory and detoxifying effects. When used at 30% concentration for irrigation of root canal, it had a similar effect to that of sodium hypochlorite.[39]

Salvadora Persica Solution (Miswak-siwak):

In a study conducted by Nawal A.K.Al-Sabawi et al, alcoholic extract of Salvadora Persica was compared with 5.25% sodium hypochlorite,0.2% Chlorhexidine and normal saline. It was shown that Salvadora Persica extract had a significant anti microbial effect against both aerobic and anaerobic bacteria with its efficacy being maximum at 15%. [40]

Aroeira-da-praia and Quixabeira:

In an invitro study conducted by Edja Maria Melo de Brito Costa et al, anti microbial activity and root canal cleaning potential of Aroeira-da-praia and Quixabeira against E.faecalis was evaluated. It was concluded that Aroeira-da-praia showed anti microbial activity at all concentrations tested whereas Quixabeira was effective only at 100% and 50% concentrations.[41]

Spilanthes Calva DC:

Spilanthes Calva DC is an important herb for oral health care. It is non toxic to human beings and has anti bacterial and anti fungal activities. Moulshree Dube et al compared the anti bacterial efficacy of methanolic extract of Spilathes Calva DC roots with 2% Chlorhexidine 3% sodium hypochlorite and doxicycline at different concentrations against E.faecalis. From the study, it was concluded that Spilanthes Calva DC root extract had comparable anti bacterial activity to sodium hypochlorite. Thus it may have potential as a root canal irrigant. [42]

Conclusion

Literature has addressed many plants with potential source for new therapies in endodontics. The studies listed have shown important medicinal activities of plants, with great demand to inhibit or suppress bacteria and their biofilm. The major advantages of herbal irrigants are safety, easy availability, increased shelf life, cost effectiveness and lack of microbial resistance so far. The in vitro studies conducted so far have shown that herbs can have a promising role as root canal irrigants. However, further clinical trials and investigations are also required for the herbal irrigants to be considered as effective alternatives to the synthetic root canal irrigants.

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