

Role of Herbs in Endodontics

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Abstract: Medical plants have a long history of use and their use is widespread in over world countries. According to the report of the World Health Organization 80% of the words population rely mainly on traditional therapies which involve the use of plant extracts or their active substances. Green Tea is one of the most ancient and popular therapeutic beverages consumed around the world. This product is made from the leaf of the plant called “*Camellia sinensis*”. The antioxidant, antimicrobial, anticollagenase, antimutagenic, and chemopreventive properties of these catechins proved to be helpful in the treatment of chronic disease. *Zingiber officinale* extract has potential antimicrobial action against bacterial isolates.

Keywords: Green Tea, *Zingiber officinale*, Endodontics

INTRODUCTION

Cleaning of the root canal system, as well as proper filling of the canal, are essential procedures for the success of root canal treatment. Even when treatment is adequate, failure may occur within the canal. Therefore, disinfection and shaping of the canal with a combination of chemical agents and endodontic instruments play an important role in the success of endodontic therapy [1,2]. Herbal products have been used in dental practice for thousands of years and now become more popular due to their antimicrobial activity, biocompatibility, anti-inflammatory and anti-oxidant properties [3].

Tea is the second most commonly drank liquid on earth after water. It is known to possess anticariogenic and antibacterial properties. Green tea has antimicrobial activity which is due to inhibition of bacterial enzyme gyrase by binding to ATP B sub unit. Green tea exhibits antibacterial activity on *Enterococcus faecalis*. It is also found to be a good chelating agent [4]. These components have been shown to have significant antibacterial.

GREEN TEA

Green tea is extracted from the leaves of *Camellia sinensis*. *Camellia sinensis* is shrub-like and is grown in a semi tropical environment on plantations in Southeast Asia. Heavy rainfall of 3000–7000 ft elevation is required [5]. It is cloned or grown from seed from cuttings obtained from the mother bush and rooted and grown in a nursery for 1 or 2 years. Green tea is one of the most popular beverages in the world, and it has received considerable attention because of its many scientifically proven beneficial effects on human health [4].

Constituents

Green tea also contains Gallic acid (GA) and other Phenolic acids such as chlorogenic acid, caffeic acid, and flavanoids such as kaempferol, myricetin, and quercetin [1].

Contents	% Dry weight
Proteins	15–20
Amino acids	1–4
Fiber	26
Carbohydrates	7
Lipids	7
Pigments	2
Minerals	5
Phenolic compounds	30
Oxidized phenolic compounds	0

Mechanism of Action

The endoplasmic reticulum and mitochondria release oxygen. This oxygen gets converted into hydrogen peroxide, which inturn releases reactive

oxygen species molecules. These reactive oxygen species molecules can lead to damage of DNA, RNA, oxidize proteins (enzymes, histones), oxidize lipids and can also activate cell suicide. Intake of green tea can stop all these degenerative changes by inhibiting the action of the reactive oxygen species molecule [6].

Biological Activity of Tea Components (Catechins)

Anti oxidative

Green tea polyphenols are responsible for its antioxidant activity either directly by scavenging of reactive oxygen and nitrogen species and chelating redox-active transition of metal ions like iron and copper or indirectly by inhibition of pro oxidant enzymes, redox sensitive transcription factors, and induction of antioxidant enzymes [7].

Capacity to modulate the physical structure of cell membranes

This mechanism may be influenced by the influence of catechins with the cellular phospholipid palisade. EGCG has shown to induce apoptotic cell death and cell cycle arrest in tumor cells.

Anti-microbial mechanism

EGC, EGCG, and ECG constitute the most important antibacterial agents on methicillin resistant *Staphylococcus aureus*, *Helicobacter pylori* and α -Hemolytic streptococcus [8].

Anti-cariogenic mechanism

Catechins are found to be inhibitory against *Streptococcus mutans* and *Streptococcus sobrin* at minimum inhibitory concentration [8]. The effects of green tea extract on caries inhibition of hamsters and on acid resistance of human tooth enamel have been suggested by both *in vivo* and *in vitro* studies. Fluoride in green tea may play a role in increasing the cariostatic action along with other components in tea. The effect of green tea on caries inhibition as well as on the increment of acid resistance appears to be more correlativewith the ondialysable substances in tea [8].

Ginger

Ginger (*Zingiber officinale*) belongs to *Zingiberaceae* family. The part of the plant used is rhizome [10]. In the fresh ginger rhizome, the gingerols were identified as the major active components and gingerol [5-hydroxy-1-(4-hydroxy-3-methoxy phenyl) decan-3-one] is the most abundant constituent in the gingerol series. The powdered rhizome contains 3-6% fatty oil, 9% protein, 60-70% carbohydrates, 3-8% crude fiber, about 8% ash, 9-12% water and 2-3% volatile oil.

Ginger has strong antibacterial activity and to some extent antifungal properties. Ginger inhibits *Aspergillus*, a fungus known for production of aflatoxin, a carcinogen [11].

Nutrient Composition

Fresh ginger contains
80.9% moisture,
2.3% protein,
0.9% fat,
1.2% minerals,
2.4% fiber and
12.3% carbohydrates.

The minerals present in ginger are iron, calcium and phosphorous. It also contains vitamins such as thiamine, riboflavin, niacin and vitamin C [12].

DISCUSSION

The treatment with different extracts of *Z. officinale* was effective in reducing *in vivo* infection in *G. mellonella* and probably the biologically active compounds of the extracts were responsible for this reduction. The composition of ginger extracts is very variable, with predominance of biologically active components as gingerols, shogaol, paradols and gingerone. Gingerol and shogaol ratio within the extracts seems to be responsible by the main pharmacologic activities of *Z. officinale* [13], but dependent on factors as rhizome origin, maturity and preparation methods. Moreover, gingerone also present in oils and rhizomes, and is capable of reducing biofilm formation and consequently the *in vivo* infection [14].

Z. officinale at a concentration of 2.5 mg/mL of fresh and glycolic extracts and 5.0 mg/mL of dried extract showed antimicrobial action against *E. faecalis* by protective action against experimental infection in *G. mellonella*. The exact antimicrobial mechanism by which *Z. officinale* acts on microorganisms still needs to be clarified. However, it may be anticipated that different action mechanisms of this phytotherapeutic that lead to microbial reduction may be partly due to its hydrophobicity. As a result, there is disruption of the cell membrane lipid bilayer, making it more permeable, causing leakage of the vital cells content [15].

CONCLUSION

Zingiber officinale extract and green tea has potential antimicrobial action against root canal pathogen. Such investigation on natural products to cure diseases may create an alternative source of promising medicines. This study might open the possibilities of finding new clinically effective herbal remedy for root canal infection.

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