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Review Article

Herbs in Oral Precancerous Lesions and Conditions

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ABSTRACT:
Herbs have been used in ancient medicine for their medicinal benefits and antioxidant properties. Antioxidants are capable of deactivating free radicals before they attack cells. They are abundant in fruits and vegetables as well as in other foods such as nuts, grains, meat, poultry and fish. For the past decade there has been increase in the awareness and knowledge regarding antimicrobial, antioxidant, antifungal, antiviral, anti-inflammatory and anti-carcinogenic properties of herbs. This article throws light on antioxidant properties and mechanism of action of lycopene, turmeric, aloe vera, tea, spirulina, allicin, green tea, neem on oral pre-cancerous lesions and conditions.
Key words: Herbs, antioxidants, oral pre-cancerous lesions/ conditions.

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INTRODUCTION

Free radical is a molecule or molecular fragment containing an unpaired electron in the valence shell (ie. radical) and capable of existing independently. (ie. free). Reactive oxygen species (ROS) include both free radicals as well as non-radical derivatives of oxygen.[1]

Oxidative stress has been described as a process derived from the inability of the body's endogenous antioxidant defences to scavange free radical species and has been related to many pathologies such as ageing, cardiovascular disease, neurodegenerative disorders, cancer, complex regional pain syndrome and many others.[2] "Antioxidant" refers to any molecule capable of stabilizing or deactivating free radicals before they attack cells.

Humans have evolved highly complex antioxidant systems (enzymic and non-enzymic) working synergistically to protect cells and organ systems of the body against free radical damage. They can be endogenous or be obtained exogenously. They are abundant in fruits and vegetables as well as in other foods such as nuts, grains, meat, poultry and fish. Some herbs have also been reported to act as antioxidants and they are suitable in managing oral precancer lesions and conditions.[1] Antioxidant properties of herbs has been discussed in this review article and following are the commonly used herbs for treatment of oral precancerous lesions and conditions.

Lycopene

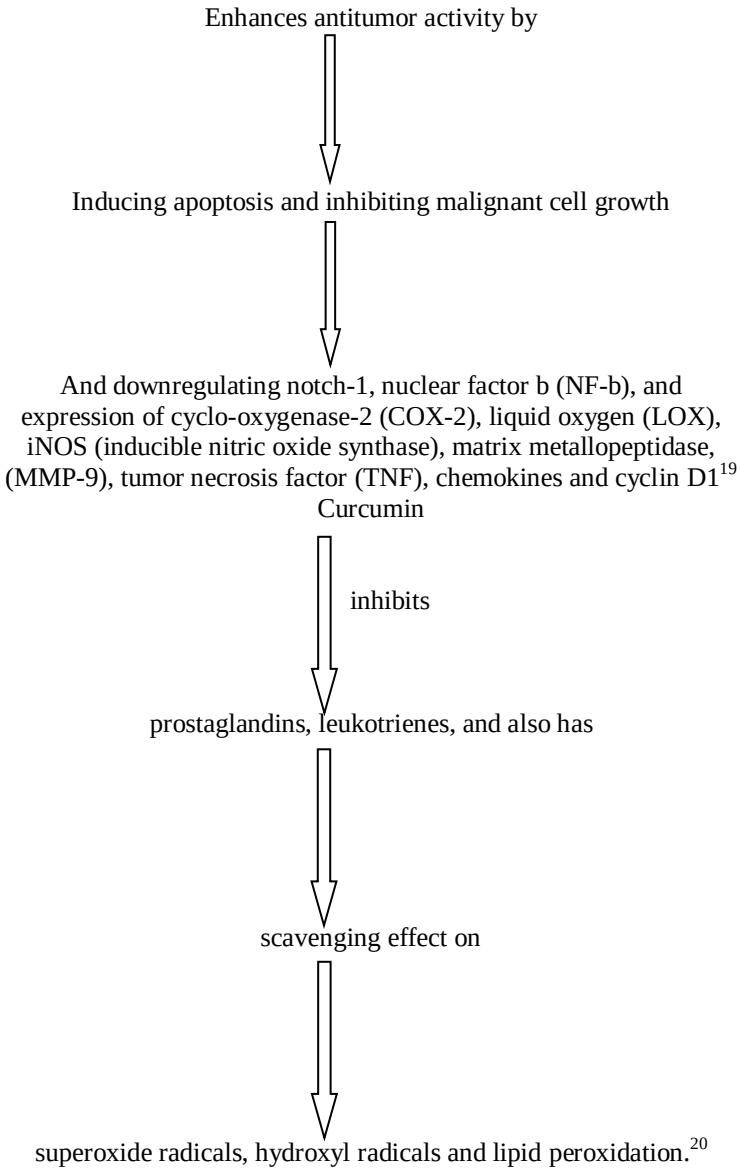
It is a bright red carotene with carotenoid pigment found in fruits and vegetables like tomatoes, apricots, papaya, watermelon, carrots, and other yellow fruits. It prevents carcinogenesis by protecting critical cellular biomolecules including lipids, lipoproteins, proteins and DNA. It has anti-cancer and antioxidant properties because of which it is used in treatment of oral submucous fibrosis, oral leukoplakia, oral lichen planus and oral cancer.[3]

Mechanism: Lycopene induces scavenging of reactive oxygen species (ROS), up-regulation of detoxification systems, interference with cell proliferation, induction of gap junctional communication, inhibition of cell cycle, progression and increasing p53 protein levels in cancer cells.[21]

Turmeric

Oral cancer frequently evolves through precancerous lesions and conditions. At this stage, treatment can result in high cure rate. Antioxidants have the potential to prevent and reverse the multiple steps involved in oral carcinogenesis. Curcumin (diferuloymethane) a yellow colouring agent is present in turmeric is one of the potential antioxidants.

MECHANISM OF TURMERIC



A study was conducted by Rai B, Kaur J, Jacobs R, Singh J. in Belgium in 2010 in which antioxidant, anti-inflammatory and pro-apoptotic effects of curcumin was examined in subjects which were affected by oral pre-malignant lesions and conditions like leukoplakia, oral submucous fibrosis and oral lichen planus. It was observed that DNA damage and lipid peroxidation decreased, and local as well as systemic status of antioxidants including levels of vitamin C and E increased.[5]

In 58 OSMF patients, forms of turmeric like alcoholic extracts, turmeric oil, and turmeric oleoresin were effective in decreasing the number of micronucleated cells.[6]

Aloe vera

Aloe has been proved to show biologic anti-inflammatory properties over a wide range. It has sterols which inhibit acute inflammation, similarly to cortisone. It does not show any side effects. For management of oral submucous fibrosis it can be very safe mode along with proper habit restriction. Supplied as 70 mg gel/packet. It is believed that aloe works in a manner similar to aspirin (4 mg), hyaluronidase (1500 IU), and placental extracts (2 ml) rendering a reduction in burning sensation of 82%, 84%, 51%, respectively.[7]

Plants are major source of medicine. It has been well mentioned in literature that many incurable oral diseases when treated with ayurvedic medicines show good prognosis. One such ayurvedic medicine is Aloe vera. It is called as 'wound healing hormones' as it is a mannoprotein containing amino acids. Gel of leaves of aloe vera contains polysaccharides that enhance promotion of wound healing. It also has anti-inflammatory, immunomodulatory and antioxidant properties. Sterols in aloe vera have strong ability to inhibit inflammation which is similar to cortisone in action without any side effects.[8]

Mechanism: Aloe vera, in presence of copper shows pro-oxidant properties. Aqueous extract of aloe vera causes DNA degradation by the generation of reactive oxygen species such as superoxide anion and hydroxyl radicals.[22]

Tea

Another most ancient and popular beverages consumed around the world is tea.

Tea pigments are **oxidized products of polyphenols**, derived from tea leaves that could improve microcirculation and hemorrheology.[9]

Mechanism: Li and Tang found that tea pigments (tablets) act by:

- decreasing high blood viscosity, and
- increasing the activity of superoxide dismutase.[10]

Spirulina:

It is microalgae which contains phenolic acid, tocopherols, and beta-carotene thus exhibiting antioxidant properties.

Study was conducted by Shetty P et al in 2013 in which 40 patients of oral submucous fibrosis were divided into two groups A and B. Group A was given Spirulina 500mg orally twice daily for 3 months and Group B was given placebo capsules for same duration. Signs and symptoms of patients were evaluated in both groups and it was observed that Group A patients showed significant improvement in mouth opening even after 3months. Like this, many studies show remarkable improvement in oral mucosal lesions and conditions treated by spirulina.[11]

Mechanism: C- phycocyanin (C-PC) is one of the major Bili proteins of Spirulina with antioxidant, radical scavenging and apoptosis properties. It has ability to scavenge free radicals, including alkoxyl, hydroxyl and peroxyl radicals.[23]

Allicin

'Allicin' is derived from Latin term of garlic plant, Allium sativum.

It has been reported to inhibit the growth of gram positive, gram negative and acid fast bacterium, including multidrug resistant bacterium.

Mechanism: Allicin suppresses enzymatic activity of xanthine oxidase to generate superoxide. Antioxidant activity of allicin is mediated via its ability to inhibit enzymes that promote pro- oxidant status via thiol exchange. Biologically, garlic compounds contribute to endogenous antioxidant pool of compounds such as ascorbic acid, tocopherol, uric acid, glutathione and thiols.[24]

It is indicated orally in :

- Recurrent apthous ulcer
- It is used as oral adhesive tablets in 5mg which adheres to the oral mucosa and releases allicin slowly at the site of ulcer in 3-4 hours.[12]

It has side effects of increasing bleeding and irritation to gastrointestinal tract. Also it decreases blood pressure.[13]

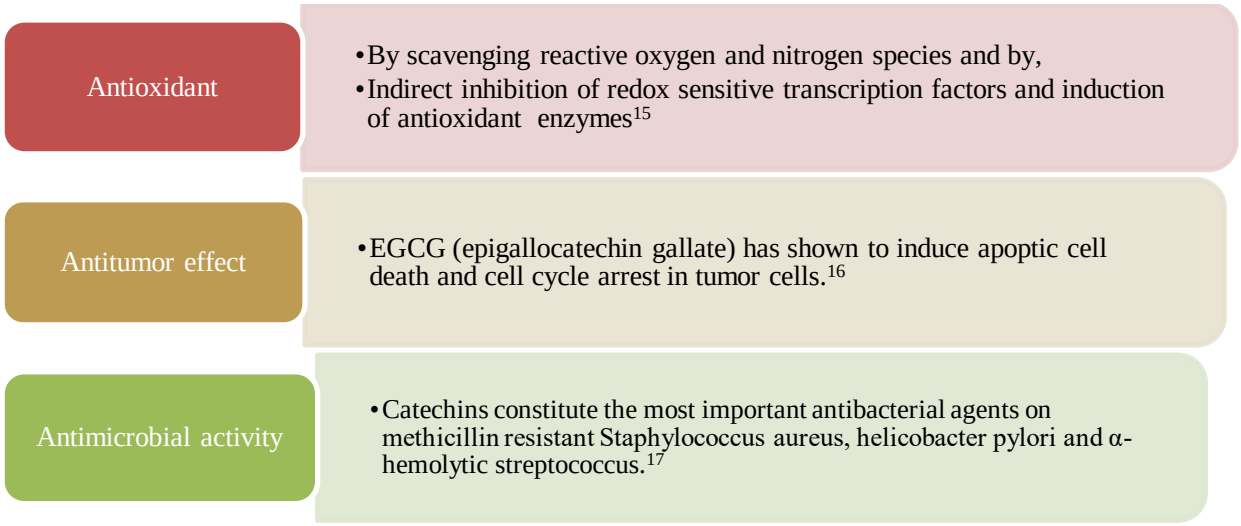
Green tea

Green tea is made from the leaves of Camellia sinensis.[14]

It is made from un-oxidized leaves and is one of the less processed types of tea and therefore contains one of the most antioxidants and beneficial polyphenols mainly catechins.

Constituents: Catechins (30%), caffeine, vitamins (A, B2, E, Folic acid, β- carotene), saponins, minerals (potassium, calcium, phosphorous, manganese), chlorophyll.

MECHANISM OF GREEN TEA



Neem:
Also known as Azadirachta indica, has antibacterial, antifungal, anti-helminthic, anti-cancer, anti-inflammatory, neuroprotective properties; used in managing oral aphthous ulcers as mouthwashes. It is available in dried form and oil form (derived from fruits and seeds of neem tree).[18]

Mechanism: Phenolic compounds in plant are responsible for exhibiting antioxidant activity by inactivating lipid free radicals or preventing decomposition of hydroperoxides into free radicals. Methanolic and ethanolic extracts of plant shows higher antioxidant capability as compared to aqueous extract.[25]

CONCLUSION:

Free radical generation is a continuous process which is unavoidable. They cause destruction of cellular macromolecules which lead to precancerous lesions and conditions and consequently to cancer. Treatment at early stage of cancer has shown high cure rate. After many clinical trials some herbs have been identified as an important viable substitute in management of oral pre-cancerous lesions and conditions by their antioxidant properties.

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