

Antioxidants -RICH HEALTHY FOOD

Dr.Amena Khatoon*, ,Dr Mohd. Azeem **

*Associate professor Luqman unani medical College Bijapur, Karnataka, India.

**Unani Consultant, Hyderabad, Telangana, India.

Abstract: Antioxidant, the word itself is magic. It is a molecule that inhibits the oxidation of other molecules. Antioxidants have been reported to prevent oxidative damage caused by free radicals. When the blood antioxidant capacity is lowered by stress, physical exertion or metabolic function, oxidative stress occurs and the risk of chronic disease increases exponentially. Food items containing antioxidants maintain the health and vitality of individuals and also cure disease, without causing toxicity. Phenols, flavinoids and radical scavenging activity of the plants have been studied for antioxidant property. Major amount of phenols were determined in certain food plants such as Amla (*Emblica officinalis* L.), Haldi (*Curcuma longa* L.), Aam (*Mangifera indica* L.), Karela (*Momordica charantia* L.). This review focuses on food items used as antioxidant for various approaches to reduce the ill effects.

Key words: food, Oxidative stress and Antioxidant

Introduction

Antioxidant, the word itself is magic. It is a molecule that inhibits the oxidation of other molecules. Antioxidants have been reported to prevent oxidative damage caused by free radical, ^(1,2) which arise normally during metabolism. Environmental factors such as pollution, radiation, cigarette smoke and herbicides can also spawn free radicals. Oxidative stress has been shown to be involved in the development and pathogenesis of a wide variety of diseases ranging from hypertension, diabetes, arthritis, ageing and related disorders, immune and inflammatory disorders, postmenopausal syndrome to Alzheimer's and other neurodegenerative disorders.

Plant antioxidants are more than mere supporting players in the battle against cellular damage and disease. As folklore has long instructed, certain plants play specific role in disease prevention and treatment. A well known hepatic antioxidant, *silymarin*, from the milk thistle (*Silybum marianum*), for example, inhibits liver damage by scavenging free radicals among other mechanisms. ^(4,5) This powerful antioxidant protects the liver against alcohol and pharmaceutical injury.

A lot of medicinal plants, traditionally used for thousands of years, are present in a group of herbal preparations of the Indian traditional health care system proposed for their interesting antioxidant activities. Among the medicinal plants used in alternative system for their therapeutic action, some of these have been thoroughly investigated such as Amla (*Emblica officinalis* L.), Haldi (*Curcuma longa* L.), Aam (*Mangifera indica* L.), Karela (*Momordica charantia* L.),

Sandal (*Santalum album* L.), Asgandh (*Withania somnifera* linn) are viewed for their historical, etymological, morphological, phytochemical and pharmacological aspects.⁽³⁾ The plants described below contain antioxidant properties used in traditional medicine in the past, but they are indicated only empirically. Hence it is the need to study these drugs scientifically.

Amla: (*Emblica officinalis* linn):

Many citrus fruits are considered as powerful antioxidants. Among them Amla is one of the most potent antioxidant. It is known since ancient times for its medicinal value and is commonly used in alternative medicine. It is used in well-known rejuvenative herbal preparations. It is said that Amla can bring back youth and grace to an ageing body and provide renewed vitality in the young.

The fruit is reputed to have the highest content of vitamin C and is being considered as a good replacement for vitamin C than ascorbic acid. Juice has 20 times more vitamin C than orange juice. Studies indicate that the naturally occurring vitamin C is easier for the body to absorb than synthetic vitamin C. It has also been found that vitamin C accounts for approximately 45-70% of the antioxidant activity in Amla.

The extract of Amla has been found to improve glucose metabolism in diabetes. Treatment with extract of Amla brought about effective normalization of blood sugar levels. Administration of the extract of Amla significantly reduced various oxidative stress indices commonly seen in diabetes such as serum level of creatinine etc.^(6,7) Amla is also effective in reducing triglyceride and cholesterol levels and has been found to be useful in patients with abnormal cholesterol levels, and also protected the heart against injury from free radicals.^(8,9)

The extract has been shown to protect the skin from the damaging effects of free radicals. Amla is suitable for use in anti-ageing, sunscreen and general-purpose skincare products.^(11, 12) Further, the extract of the herb was also found to protect the liver and kidney from the harmful effects of anticancer drugs.^(13,14)

They also increased bone marrow cellularity and normalised the ratio of homochromatic erythrocytes & polychromatic erythrocytes.

Tea (*Camellia sinensis*):

Tea infusion is characterized by a high content of flavonoids. Flavonoids are a large group of phenolic products of plant metabolism with a variety of phenolic structures that have unique biological properties and may be responsible for many of the health benefits attributed to tea. Many in vitro studies show that the flavonoids present in tea have strong antioxidant and metal-chelating properties and may therefore protect cells and tissues against free oxygen radicals. A large number of studies support the hypothesis that oxidative damage to DNA, lipids and proteins may contribute to the development of cardiovascular disease, cancer and

neurodegenerative diseases. Reactive oxygen and nitrogen species are formed in the human body and endogenous antioxidant defenses are not always sufficient to counteract them completely. Diet-derived antioxidants may therefore be particularly important in protecting against chronic diseases. ^(16, 17) Tea is an important source of flavonoids in the diet with levels approaching 200 mg/cup for a typical brew of black tea. ⁽¹⁹⁾ The flavonoids found in green and black tea are very effective antioxidants in vitro and may therefore be active as antioxidants in the body. In this review we will evaluate the human studies that investigated the antioxidant functions of tea in vivo. The uptake of tea flavonoids has been studied extensively as well as the changes in antioxidant capacity of plasma after tea consumption. Ultimately, it is necessary to determine whether tea consumption leads to reduced oxidative damage in the body. Products of oxidative damage to macromolecules have been identified in biological materials such as plasma, urine and blood cells and may serve as biomarkers for oxidative damage. Biomarkers have been studied in a number of human intervention trials to investigate the antioxidant effects of tea and tea flavonoids in vivo.

Bioavailability of tea flavonoids

Uptake of flavonoids from tea is most efficient for the monomeric catechins found in green tea and in low amounts in black tea. The results of a study on bioavailability and distribution in rats demonstrated that epigallocatechin-3-gallate (EGCG) behaves differently from epigallocatechin (EGC) and epicatechin (EC). The bioavailability of EGCG is lower and it is mainly excreted through bile whereas EGC and EC are excreted through urine and bile. ^(18, 19)

Ginger (*Zingiber officinalis* Linn)

Currently, Ginger has received new attention as an aid to prevent nausea from motion sickness. Ginger tea has long been an American herbal remedy for coughs and asthma, related to allergy or inflammation; the creation of the soft drink ginger ale, sprang from the common folkloric usage of this herb, and still today remains a popular beverage for the relief of stomach upset. Externally, Ginger is a rubefacient, and has been credited in this connection with relieving headache and toothache. ⁽²⁰⁾

The mechanism by which ginger produces anti-inflammatory activity is that of the typical non-steroidal anti-inflammatory drug. This common spice is a more biologically active prostaglandin inhibitor than onion and garlic. By slowing associated biochemical pathways an inflammatory reaction is curtailed. In one study, Danish women between the ages of 25 to 65 years, consumed either 70 grams raw onion or 5 grams raw ginger daily for a period of one week. The author measured thromboxane production and discovered that ginger, more clearly than onion, reduced thromboxane production by almost 60%. ^(21,22)

By reducing blood platelet "clumping," the oils of these herbs inhibit the fatty acid oxygenases from platelets, thus decreasing the clumping of these blood cell components. Onion also reduces our risk of heart attack or stroke. In a series of experiments with rats, scientists

from Japan discovered that extracts of Ginger inhibited gastric lesions by up to 97%. The authors **concluded** that the folkloric usage of Ginger in stomachic preparations were effective owing to the constituents zingiberene, the main terpenoid and 6-gingerol, the pungent principle. Folkloric usage of Ginger in stomachic preparations was effective due to the constituents zingiberene, the main terpenoid, and 6-gingerol, the pungent principle. ⁽²²⁾

Turmeric (*Curcuma longa*)

Turmeric is the main ingredient in curry, **and** is also an amazing source of natural medicines. It's a powerful anti-cancer as well as an anti-inflammatory medicine. ⁽²⁵⁾

Currently, **turmeric** is used in India to treat anorexia, liver disorders, cough, diabetic wounds, rheumatism, and sinusitis. In one study **turmeric** extract was tested for its anticarcinogenic and antimutagenic properties. Laboratory experiments **showed** that this ancient spice reduced the number of tumors in mice.

Numerous biochemical and epidemiological studies have demonstrated diet's role in modulating the development of cancer. Laboratory experiments have established that the active principle of **turmeric** (curcumin) is a potent anti mutagenic agent and **prevents** cancer. ⁽²⁶⁾

Curcumin may act to prevent cancer **through** free-radical **inactivation**. The test carcinogens BP and DMBA are metabolically activated to proximate mutagenic/carcinogenic epoxides, which then bind to macromolecules. One study's authors concluded that since curcumin is a potent antioxidant, it may scavenge the epoxides and prevent binding to macromolecules. In other words, this spice's cell-protective properties are similar to nutrient antioxidants, vitamins C and E, which inhibit free radical reactions.

Curcumin has three main mechanisms of action: 1) antioxidant activity; 2) lipoxygenase **inhibitor**; and 3) cyclooxygenase inhibition. By inhibiting the associated biochemical pathways, inflammation is curtailed. Modern science thus confirms what traditional healers have known for centuries, **namely**, that the fresh juice from the rhizome will reduce swelling in recent bruises, wounds and insect bites; and that the dried powdered root kills parasites, relieves head colds and arthritic aches. ⁽²⁷⁾

Honey

Honey is a natural product made by honeybees (*Apis mellifera*) which **has** a highly variable sensorial and physicochemical characteristics due to climatic and environmental conditions and diverse origin of plants from which it is harvested. Having that in mind, different honey types have diverse phenolic content and consequently different antioxidant activity. In addition, processing, handling and storage of honey may influence its composition. ⁽²⁹⁾

Due to its potential and proven positive medicinal properties, honey is particularly recommended for children and sportsmen and it can help improve the efficiency of the elderly

and invalids (Blasa 2006).⁽³⁰⁾ Because of that it is quite important to determine the antioxidative potential of honey and how can this parameter be of any help in differentiation of various honey types. (Bertoncelj *et al.* 2007) found that of all honey types they investigated, acacia and lime showed low total phenolic content and consequently lower antioxidant capacity than other honey types.

Conclusions

Based on these literary evidence further studies may be conducted of its antioxidant activity. They should be guided not only by sound clinical judgment, but also by patient's preferences, needs, and values. So that we may develop a framework for a medical system capable of incorporating those complementary food items for therapies proven to be beneficial.

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