

Antioxidant Activity in Toffees and Selected Medicinal Plants

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ABSTRACT

Medicinal plants contain high levels of natural antioxidants and exhibited strong antioxidant activity. Plants contain a large variety of free radical scavenging molecules, such as flavonoids, anthocyanins, carotenoids, dietary glutathione, and vitamins. Phenols are a main cluster of antioxidant phytochemicals with curious assets that can play a vital role in adsorbing and neutralizing free radicals. They hold potent antioxidant, anticancer, antibacterial, antiviral, and anti-inflammatory activities. In spite of the antioxidant composition of medicinal plants in human health, the investigation about their potential use as food flavors is negligibly compared with other plants of similar composition as spices, herbs, fruit, and vegetable tissues. These functional properties may be due to the terpenes and phenolic contents that can act as the principal contributors of the antioxidant and antimicrobial power of botanical materials. Chocolate is a raw or processed food produced from the seed of the tropical *Theobroma cacao* tree. *Azadirachta indica* (Neem) is a tree in the mahogany family *Meliaceae*. *Coleus ambonicus* or Karpuravalli (in Tamil), is a plant that must be grown in homes where there are children.

Keywords:

Antioxidants, Chocolate, Neem, Karpuravalli, food flavors

1.Introduction

An antioxidant is a molecule capable of inhibiting the oxidation of other molecules. Oxidation is a chemical reaction that transfers electrons from a substance to an oxidizing agent. Oxidation reactions can produce free radicals, they can also be damaging; hence, plants and animals maintain complex systems of multiple types of antioxidants, such as glutathione, vitamin C, and vitamin E as well as enzymes such as catalase, superoxide dismutase and various peroxidases. Low levels of antioxidants, or inhibition of the antioxidant enzymes, cause oxidative stress and may damage or kill cells. As oxidative stress might be an important part of many human diseases, the use of antioxidants in pharmacology is intensively studied, In vitro studies of flavonoids have displayed anti-allergic, anti-inflammatory, anti-microbial, anti-fungal and anti-cancer activities.

Azadirachta indica (**Neem**) is a tree in the mahogany family *Meliaceae*. *Coleus Ambonicus* or Karpuravalli (in Tamil), is a plant that must be grown in homes where there are children. In India, the tree is variously known as "Sacred Tree," "Heal All," "Nature's Drugstore," "Village Pharmacy" and "Panacea for all diseases." Products made from neem tree have been used in India for over two millennia for their medicinal properties, have been observed to be anthelmintic, antifungal, antidiabetic, antibacterial, antiviral, contraceptive and sedative.. The oil is also used in sprays against fleas for cats and dogs. *Coleus Ambonicus* or Karpuravalli (in Tamil), is a plant that must be grown in homes where there are children. **Chocolate** is a raw or processed food produced from the seed of the tropical *Theobroma cacao* tree. Cacao has been cultivated for at least three millennia in Mexico. The majority of the Mesoamerican people made chocolate beverages, including the Aztecs, who made it into a beverage known as xocolātl, a Nahuatl word meaning "bitter water. Cocoa solids contain alkaloids such as theobromine and phenethylamine, which have physiological effects on the body. It has been linked to serotonin levels in the brain. "White chocolate" contains cocoa butter, sugar, and milk but no cocoa solids. Chocolate contains alkaloids such as theobromine and phenethylamine, which have some physiological effects in

humans, but the presence of theobromine renders it toxic to some animals, such as dogs and cats. Dark chocolate is produced by adding fat and sugar to the cacao mixture. Dark chocolate, with its high cocoa content, is a rich source of epicatechin and gallic acid, which are thought to possess cardioprotective properties.

Carotenoids are natural pigments that are responsible for the bright colours of plants, flowers, fruit, and vegetables. In animals, carotenoids may serve as precursors of vitamin A and as colourants. *Vitamin C* (ascorbic acid) is an essential nutrient for humans. It is a water-soluble vitamin, which humans and other primates cannot synthesise themselves. *Vitamin E* is a lipid-soluble vitamin that appears in vegetable oils, whole grains, seed, nuts, and some vegetables. Alpha-tocopherol is the predominant lipid-soluble nutrient in the LDL with a concentration that is over 20 times higher than that of beta-carotene, for example (Chopra & Thurnham 1999). Oxidation of LDL is thought to play an important role in the development of atherosclerosis (Steinberg *et al.* 1989). The modification and degradation of apoB causes the LDL to be recognised by scavenger receptors of macrophages in the arterial wall. The oxidative modification of LDL enhances atherogenesis by a number of different mechanisms, in particular by attracting the monocytes into the vascular intima and transforming them into foam cells (Steinberg *et al.* 1989).

Several studies have supplied evidence that oxidised LDL (OxLDL) is present *in vivo*. For example, OxLDL can be extracted from atherosclerotic lesions (Ylä-Herttuala *et al.* 1989, Palinski *et al.* 1989). As a water-soluble vitamin, vitamin C does not incorporate into the LDL; however, it may protect the LDL against oxidation *in vitro* (Jialal *et al.* 1990). The effects of whole diets with a high intake of fruit and vegetables on the LDL oxidation are limited and conflicting.

Plasma thiobarbituric acid-reactive substances (TBARS), which are commonly used as a marker of lipid peroxidation, have been reported to remain unaffected (Miller, III *et al.* 1998) or to increase (Freese *et al.* 2002) in response to diets high in fruit and vegetables. Additional studies on the influence of dietary fruit and vegetables.

2. Materials and Method

Estimation of total phenol by FOLIN CIOCALTEU reagent, total flavonoid and Extent of inhibition of *IN VITRO* lipid peroxidation by OKHAWA method. Antioxidant assay were estimated by DPPH method.

DPPH (2, 2- diphenyl-1-picrylhydrazyl) is a stable free radical in a methanolic solution. The DPPH method is described as a simple, rapid and convenient method independent of sample polarity for screening of many samples for radical scavenging activity. DPPH-method is described enabling the measurement of the antioxidative potential of the plant extract specific methanolic extracts. In its oxidized form, the DPPH radical has an absorbance maximum centered at about 520 nm.

3. Results and Discussion

The medicinal property of a particular plant can be determined by the presence of different natural compounds with bio-active potentials and the balanced proportion of these components give them curative or therapeutic characteristics. Any molecular species that contains an electron in its atomic orbital is known as free radical and they can be capable of independent existence within the body. These unpaired electrons have been shown some common properties that are

mainly found in most of the radicals. The conformations of free radicals are mainly unstable and this variability in its orbital, contributes for its highly reactive nature. They can donate and receive electron from other molecules and thus behave like an oxidant and reductant.

The three medicinal plants such as (neem, country borage, curry leaves) and (diarymilk, dark chocolate and milkybar) of methanolic extracts were used for estimation of flavonoids, polyphenols and antioxidants. The fresh and dry plant extracts were used for estimation. Various chemical constituents are reported to be isolated from medicinal plants which include alkaloids, phenolics, flavanoides. In this study the three medicinal plants such as (neem, country borage, curry leaves) and (diarymilk, dark chocolate and milkybar) were used to analysis the amount of flavonoids, polyphenols and antioxidant acitivity by DPPH method. The dark chocolates which possess maximum flavonoid (100 μ g) content while comparing to other samples. The small neem leaves (dry) which shows maximum amount of polyphenols (25 μ g) than other samples. In the antioxidant activity assay (DPPH) the dark chocolate extract showed high antioxidant activity. Inhibition of *invitro* lipid peroxidation in liver was identified by using the plant and chocolate extracts. The study can be extended in antifungal, antiviral activity and antitumor activity.

FIGURE I: ESTIMATION OF FLAVONOIDS

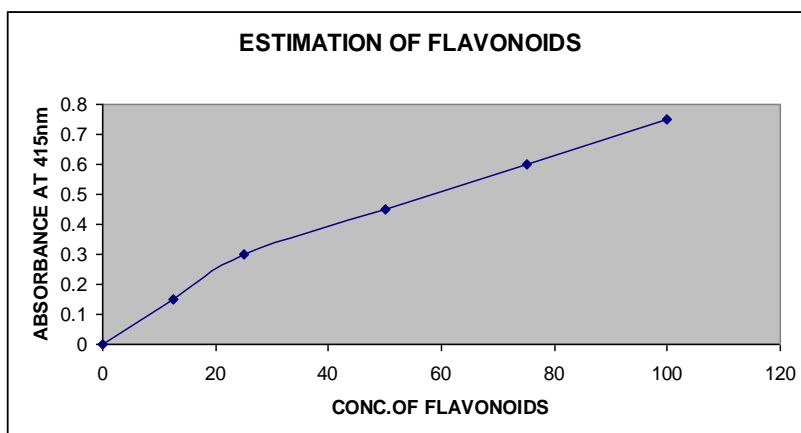


FIGURE II: ESTIMATION OF PHENOL

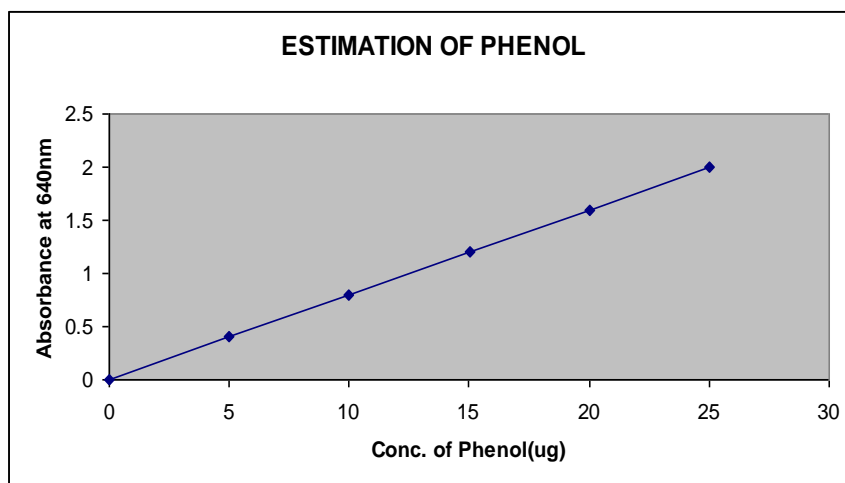


FIGURE III: ESTIMATION OF ANTIOXIDANT BY DPPH ASSAY

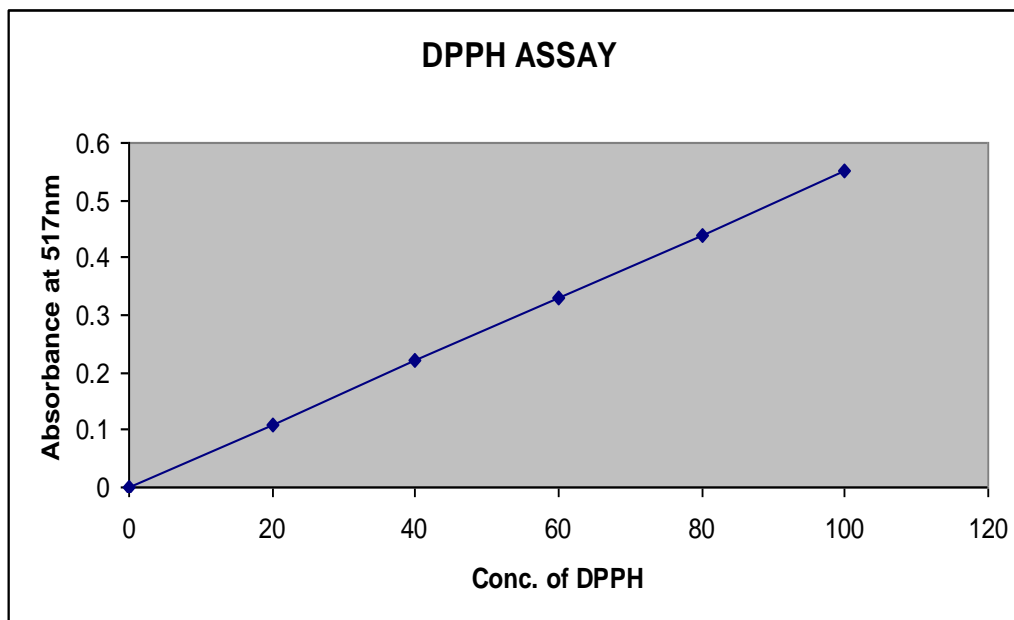


FIGURE IV: ESTIMATION OF FLAVONOIDS IN DIFFERENT PLANT SOURCES

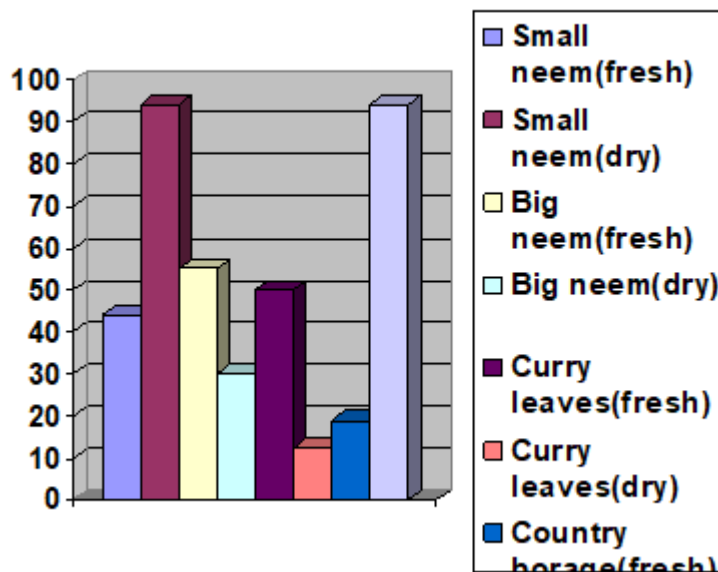


FIGURE V: ESTIMATION OF FLAVONOIDS IN DIFFERENT PLANT SOURCES

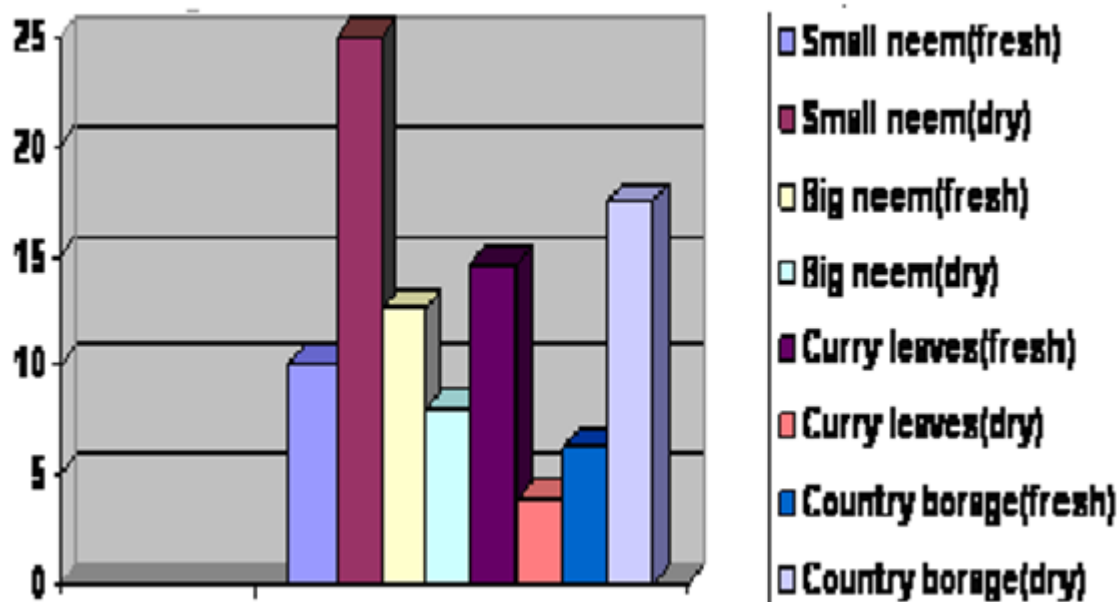


FIGURE VI: ESTIMATION OF DPPH IN DIFFERENT PLANT SOURCES

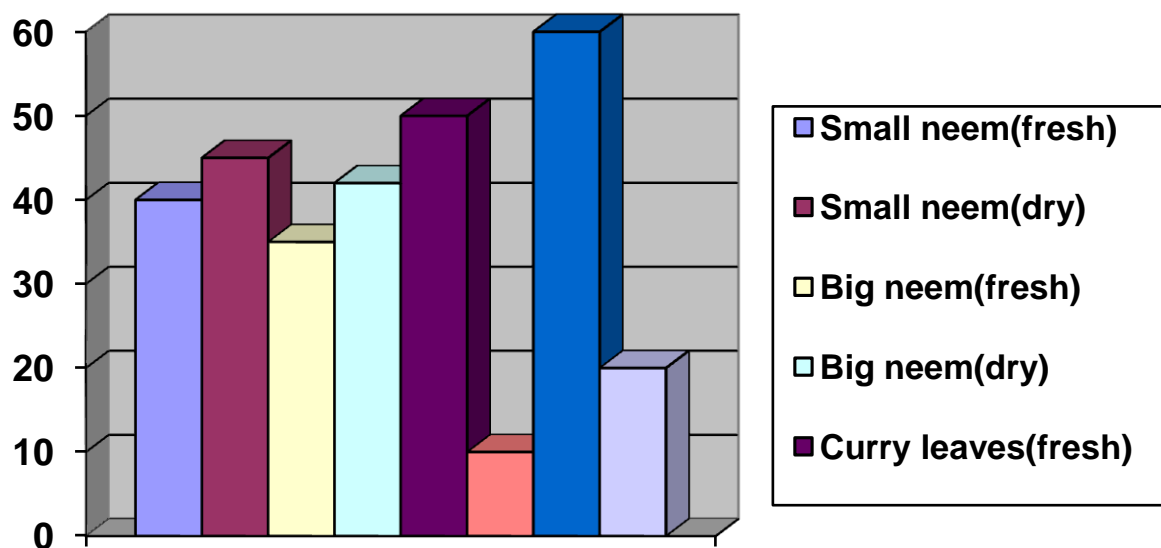
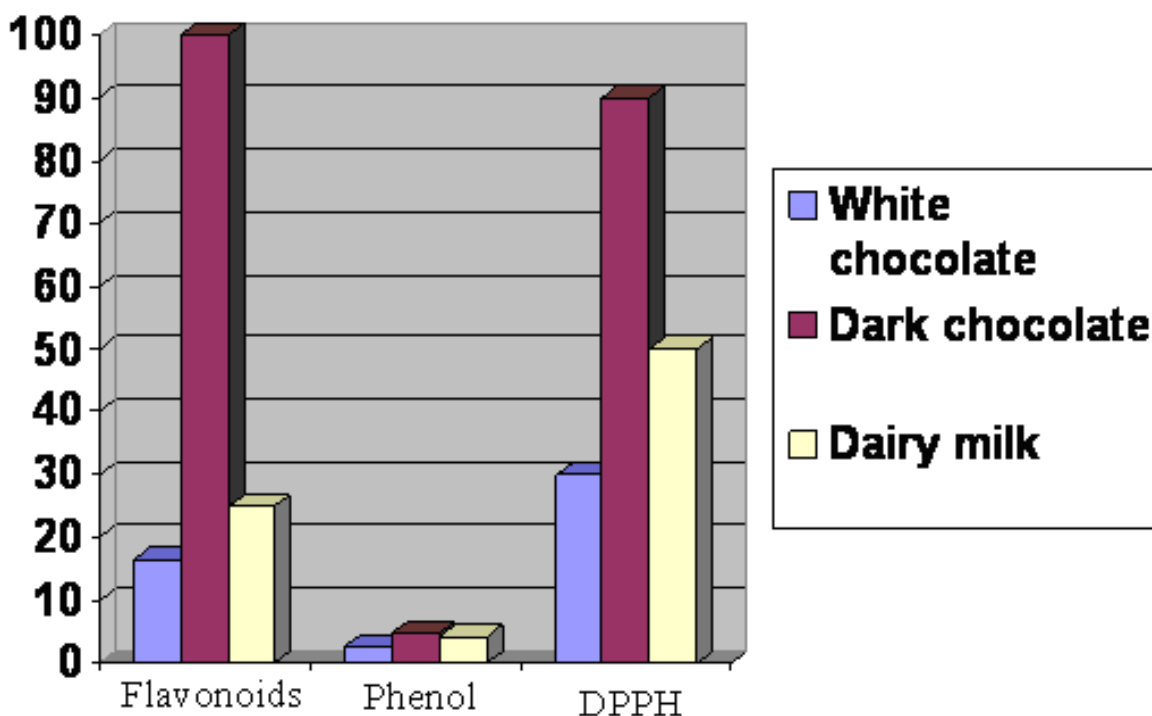


FIGURE VII: ESTIMATION OF FLAVONOIDS, PHENOL, DPPH IN DIFFERENT CHOCOLATES



4. Conclusion

The small neem leaves (dry) which shows maximum amount of polyphenols (25 μ g) than other samples. In the antioxidant activity assay (DPPH) the dark chocolate extract showed high antioxidant activity. Our further study was aimed as antifungal, antiviral activity and antitumor activity. These could be a rich source of antioxidants and free radical scavenging compounds.

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