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RESEARCH ARTICLE

SURVEY ON SOME FOOD PLANTS AS SOURCES OF ANTIOXIDANTS

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Abstract

We investigated the total phenolic contents in eight plant foods used as traditional vegetables and fruits and well-known as sources of antioxidant. Total phenolic contents ranged from 0.87 to 7.02 mg gallic acid/g dw in *Alocaccia indica* and *Solanum indicum,* respectively. The plant foods possess valuable antioxidant properties for culinary and possible nutritive use.

Key words: Antioxidant compound; Total phenolic content; Plant foods; Iran; India

Introduction

Crude extracts of fruits, herbs, vegetables, cereals, and other plant materials rich in phenolics are increasingly of interest in the food industry because they retard oxidative degradation of lipids and thereby improve the quality and nutritional value of food. Antioxidants are compounds that can delay or inhibit the oxidation of lipids or other molecules by inhibiting the initiation or propagation of oxidative chain reactions (Velioglu *et al.*, 1998). The antioxidative effect is mainly due to phenolic components, such as flavonoids (Pietta, 1998), phenolic acids, and phenolic diterpenes (Shahidi *et al.*, 1992). Typical phenolics that possess antioxidant activity have been characterized as phenolic acids and flavonoids (Kahkonen *et al.*, 1999). Phenolic acids have repeatedly been implicated as natural antioxidants in fruits, vegetables, and other plants. Rosmarinic acid, an important phytochemical, has been found to be a potent active substance against human immunodeficiency virus type 1 (HIV-1) (Mazumder et al., 1997; Loliger, 1991).

With this background, present study attempted to evaluate some plant foods as new potential sources of natural antioxidants and phenolic compounds.

Materials and Methods

Three species of fruits and vegetables viz *Alocacia indica Sch, Eulophia Ochreata Lindl ,, Momordica* dioicia *Roxb.*, were purchased from were collected from three various localities of Maharashtra, India. Five wild edible plants viz *Asparagus officinalis, Chlorophytum comosum, Codia myxa, Portulaca oleracia and Solanum indicum* were collected from three areas in around Behbahan, Iran in April 2008 (Table 1). Fresh fruits and vegetables were cleaned with water and external moisture wiped out with a dry cloth. The edible portion of the individual fruits was separated, dried in a hot air oven at 50°C for 1 h. The dried samples were powdered in blender for further study. Some of the plants such

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as *Asparagus officinalis, Chlorophytum comosum and Portulaca oleracia* dried under shade so as to prevent the decomposition of chemical compounds. The Plant foods analysis were carried out in Lab. of Department of Food Science, Ramin Agricultural University, Ahvaz, Iran.

Table 1. *Species, habitat and consumption of vegetables and fruits in Behbehan, South Iran and Pune, South India.*

Botanical name	Family	Plant part(s) used	Habitat	Typical consumption	Country
Alocacia indica Sch.	Araceae	Stem	Roadside weed	During famine	India
Asparagus officinalis DC	Liliaceae	Stem	Garden	Regularly	Iran
Chlorophytum comosum Linn.	Liliaceae	Root Tubers	Garden	During famine	Iran
Cordia myxa Roxb.	Boraginaceae	Fruits	Disturbed	Regularly	Iran
Eulophia ocherata Lindl.	Orchidaceae	Tubers	Disturbed	Regularly	India
Momordica dioica Roxb.	Cucurbitaceae	Fruits	Disturbed	Regularly	India
Portulaca oleracia Linn.	Portulacaceae	Stem and leaves	Garden	Regularly	Iran
Solanum indicum Linn.	Solanaceae	Fruits	Disturbed	Regularly	India

Chemical reagents

The chemical reagent ABTS [2,20-Azino-bis (3-ethylbenzthiazoline-6-sulfonic acid)] was purchased from CALBIOCHEM (Darmst adt, Germany). All other chemicals used were of analytical and HPLC grade and obtained from Sigma Co. (St. Louis, MO).

Total phenolic compound analysis

The amount of total phenolics in eight plant foods extracts were determined with the Folin-Ciocalteu reagent using the method of Spanos and Wrolstad (1990), as modified by Wilson and Lister, (2001). To 50 ml of each sample (three replicates), 2.5 ml 1/10 dilution of Folin-Ciocalteau's reagent and 2 ml of Na_2CO_3 (7.5%, w/v) were added and incubated at 45 C for 15 min. The absorbance of all samples was measured at 765 nm using a SPECTRAmax-PLUS384 UV–vis spectrophotometer. Results were expressed as mg of gallic acid equivalent per g of dry weight (mg GAE/g dw).

Statistical analysis

Three replicates of each sample were used for statistical analysis. Data were subjected to analysis of variance, and means were compared by least significant difference (LSD). Differences at $P<0.05$ were considered to be significant.

Results and Discussion

Results showed that total phenolic amounts of *Momordica dioicia Roxb* (396mg/100g) and of *Cordia myxa Roxb* (402 mg/100g) were comparable with total phenolic amount of Mint vegetable (399.8 %), but the amounts were more than total phenolic amounts of other vegetables (Kaur and Kapoor, 2002, Osawa, 1994). Total phenolic amount of *Solanum indicum Linn* (702 mg/100g) was more than total phenolic amounts of Black berry (417-555%) (Sellappan, 2002) and Cranberry (527.2%) (Sun, 2002). Therefore, antioxidant capacity of *Solanum indicum Linn* was high and antioxidant capacity of *Alocacia indica Sch.* was low. Phenolic compounds could be a major determinant of antioxidant potentials of food plants and could therefore be a natural source of antioxidants and because Phenolic compounds have been associated with the health benefits derived from consuming high levels of fruits and vegetables. Therefore, *Solanum indicum Linn.* has high preservation capacity and nutritional values, because total phenolic compounds prevent from

damage of nutrients contain double bonds such fatty acids, flavor compounds even proteins and amino acids and other compounds (Larson,1988; Simon *et al*., 1999).

The amount of total phenolics varied in different plant foods and ranged from 0.87 to 7.02 mg GAE/g of dry material. The highest total phenolic levels were detected in *Solanum indicum* and the lowest in *Alocaccia indica* (Figure 1). The amount of total phenolic compounds in all tested plant foods was higher than the other *Lamiaceous* plants reported such as Thymus vulgaris (Kahkonen et al., 1999), Mentha piperita, Melissa officinalis and Rosmarinus officinalis (Zheng and Wang, 2001).

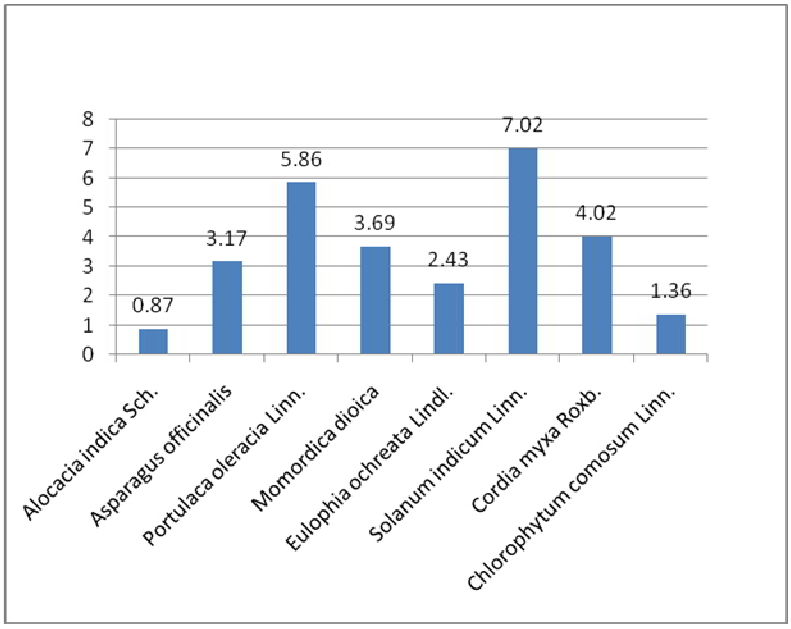

Figure 1. *Amounts of total phenolic of edible plants (mg/g)*

Some selected phenolics of these plant foods, have previously been separated and identified by comparison with authentic standards using reversed-phase high performance liquid chromatography (HPLC), and rosmarinic acid was the predominant phenolic acid in these plant foods(Sun, Chu, Wu & Liu, 2002).

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