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COMPARATIVE ANTIOXIDANT POTENTIAL OF SOME FRUITS AND VEGETABLES USING DPPH METHOD

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Abstract:

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. In turn, these radicals can start chain reactions that damage cells. Antioxidants terminate these chain reactions by removing free radical intermediates, and inhibit other oxidation reactions. DPPH (1, 1-diphenyl-2-picryl hydrazyl) a stable free radical can be used to determine the AOS of some photochemical and food materials. Antioxidant activity for all the fruits and vegetables that were investigated. Some of the flavonoids demonstrated greater activity than ascorbic acid. Green grapes showed greater AOS then black variety. Red onions have greater potential compared to white ones probably due to the presence of high concentrations of quercetin flavonoids in red variety. Carrots though they contain beta-carotinoids, which are antioxidants, did not showed good activity probably due to insoluble nature of the components in the methanol.

Fresh fruits like green and black grapes, apples. Mangos, bananas. Oranges and pineapples. Vegetables like red & white onions, tomatoes, carrots, spices like garlic, dry and wet ginger, turmeric and others like tea, coffee and chyavanprash obtained from the local market of Warangal, were included in the study for comparing there antioxidant potential. Some pure flavonoids obtained as a gift samples from different phytochemical laboratories, like quercetin, rutin, luteolin, chrysin, 7,3',5'- trihydroxyflavone, procumbentin, gossypin, diosmin, alfa-

napthoflavone, methyl-hesperidin were also included in the study for comparing their activity with standard antioxidant, ascorbic acid

A suitable aliquot of extract, diluted to 2.8 ml with methanol. To this 0.2 ml of 0.005 Mm of DPPH (Sigma Chemical Company Inc., USA) was added before the absorbance was taken and mixed thoroughly. The change in the discoloration of DPPH solution was an index of the antioxidant activity that was measured at 517 nm wavelength.

Key Words: Antioxidant, Ascorbic acid, Flavonoids, DPPH (1, 1-diphenyl-2-picryl hydrazyl).

Introduction:

Free radicals are chemical species possessing an unpaired election that can be considered as fragments of molecules that are generally very reactive. All fruits and vegetables contain various quantities of flavonoids and other components that are responsible for the free radical scavenging activity. DPPH (I.,I-diphenyl-2-picryl hidrazyl) a stable free radical an be used to determine the AOS of some photochemical and food materials. There are several reports stating that DPPH is used as a free radical source and it is use to study the antioxidant activity of compounds [1-5]. The antioxidant activity of several drugs like antileprotic and anti-inflammatory drugs was studies using DPPH method [6,7]. Antioxidant biofactor is a unique processed food grain which contains different food materials; among which green tea and ascorbic acid are the components used for their antioxidant principles. There is also a significant raise in antioxidant principles in plasma and saliva after the consumption of fruits, vegetables and antioxidant biofactor [8]. The radical scavenging activity in the DPPH discoloration assay was used for various phytochemical extracts [9]. The present study aims at assessing the antioxidant activity of a few selected flavonoids and to study the antioxidant status of various fruits and vegetables that may or may not contain flavonoids.

It is evident from Table, that there is good antioxidant activity for all the fruits and vegetables that were investigated. Some of the flavonoids demonstrated greater activity than ascorbic acid. Green grapes showed greater AOS then black variety. Red onions have greater potential compared to white ones probably due to the presence of high concentrations of quercetin flavonoids in red variety. Carrots though they contain beta-carotinoids, which are antioxidants, did not showed good activity probably due to insoluble nature of the components in the methanol. Di-

allyl mono-, di-, and tri-sulfides, are organosulfur compounds present in ginger and garlic oil might have contributed to the antioxidant potential [10]. Tea possesses high activity because of the presence of several catechins that are responsible for antioxidant activity. Similar results were reported by earlier authors [11]. There is greater activity in instant coffee compared to the coffee seeds, probably due to the presence of added antioxidants of due to the refining of the powder by spray drying process. The good antioxidant activity of the chyavanprash, a popular polyherbal formulation available throughout India is due to the presence of several phytochemicals, like flavonoids and other components that are responsible for free radical scavenging.

Pure flavonoids also exhibited antioxidant activity some showed greater activity than ascorbic acid itself. The activity could be due to the interaction of antiperoxidative flavonoids namely, quercetin. Quercetrin, rutin, myretitin, phloretin, phloridzin, catechin, morin, and taxifolin with DPPH free radical [12]. The lack of activity for alfa-naphoflavone, methyl hespiridine, chrysin and diosmin, may be attributed to the insufficient number of free radical scavenging hydroxyl groups.

EXPERIMENT

1. Plant material

Fresh fruits like green and black grapes, apples. Mangos, bananas. Oranges and pineapples. Vegetables like red & white onions, tomatoes, carrots, spices like garlic, dry and wet ginger, turmeric and others like tea, coffee and chyavanprash (a poly herbal semisolid formulation which is used as a general tonic) obtained from the local market of Warangal, were included in the study for comparing there antioxidant potential. Some pure flavonoids obtained as a gift samples from different phytochemical laboratories, like quercetin, rutin, luteolin, chrysin, 7,3',5'-trihydroxyflavone, procumbentin, gossypin, diosmin, alfa-napthoflavone, methyl-hesperidin were also included in the study for comparing their activity with standard antioxidant, ascorbic acid (Sigma Chemical Company Inc, USA).

2. Extraction procedure: Food material was made into one gram paste and 4 ml of methanol were added, vortexed for 3 mins, sonicated for 5 min and centrifuged for 15 mins at 3500 rpm. One ml of supernatant was taken and diluted accordingly with methanol.

3. Sample preparation

Solutions for pure flavonoids were prepared by simple vortexing after addition of the powder in the methanol. Diosmin was not soluble in methanol hence it was dissolved by addition of small quantity of DMSO (Sigma Chemical Company Inc, USA) and the volume was made up with methanol, suitable dilutions were made with methanol.

4. Analysis

A suitable aliquot of extract, diluted to 2.8 ml with methanol. To this 0.2 ml of 0.005 Mm of DPPH (Sigma Chemical Company Inc., USA) was added before the absorbance was taken and mixed thoroughly. The change in the discoloration of DPPH solution was an index of the antioxidant activity that was measured at 517 nm wavelength. Mean values were obtained by taking triplicate samples (n=3). IC_{50} values were computed from concentration, optical density values.

Results:

In this study the antioxidant activity of fruits, vegetables and flavonoids were studied. Our studies revels that Among Friuts pineapple has high antioxidant activity i.e.4.50 IC_{50} ug/ml (The half maximal inhibitory concentration) and green grapes has least antioxidant activity i.e. 0.40IC_{50} ug/ml. Among vegetables and spices red onions has high antioxidant activity i.e.8.60 IC_{50} ug/ml and Tea has least antioxidant activity i.e. 0.0625 ug/ml. Among flavonoid procumbentin has high antioxidant activity i.e. 3.50 IC_{50} ug/ml and Quercetin has least antioxidant activity i.e. is 0.66 IC_{50} ug/ml.

Conclusion:

Established Novel method by using DPPH identified different levels of antioxidants in fruits and vegetables. Consumption of fruits and vegetables is highly influences free radical scavenger activity because of presence of antioxidants. This study helps to revel various antioxidants levels in fruits and vegetables.

Table-1: IC_{50} Values for the different fruits and vegetables including pure flavonoids for its comparative antioxidant status.

IC_{50} Values (ug/ml)		
Fruits*	Vegetables[A] & Spices[B]	Flavonoids
Green Grapes - 0.40	Red Onion - 8.60	Quercetin - 0.66
Black Grapes - 1.00	Garlic - 5.10	Rutin - 1.20
Apple - 1.02	Dry Ginger - 2.10	Luteolin - 1.22
Mango - 1.22	Wet Ginger - 2.51	7,3',5'- Trihydroxyflavone - 0.72
Banana - 3.75	Turmeric - 0.32	Procumbentin - 3.50
Orange - 2.75	Tomato - 3.10	Gossypin - 1.12
Pineapple - 4.50	Tea - 0.0625	Ascorbic Acid - 2.10
	Coffee (bru) - 0.025	Diosmin*
	Coffee (Seds) - 0.225	Alfa-Naptoflavone*
	Chyavanprash - 0.132	Methyl Hesperidin*
	White Onions**	Chrysin*
	Carrot*	

[A,B]Methanolic extract of one gram of food material was taken, *Activity less then 10%, **Activity less then 30%.

Table 2: High & Least IC_{50} Values (ug/ml)

S.No	IC_{50} Values (ug/ml)	
	High	Least
fruit	Pineapple	4.50
fruit	Green Grapes	0.40
Vegetables &Spices	Red Onion	8.60
Vegetables &Spices	Tea	0.0625
Flavonoids	Procumbentin	3.50
Flavonoids	Quercetin	0.66

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