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ANTIOXIDANT POTENTIAL OF MEDICINAL PLANT *IPOMOEA CAIRICA* (L) SWEET

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ABSTRACT

In present study, the *in-vitro* antioxidant activities of the methanolic extracts of leaves and flowers of *Ipomoea cairica* were determined by spectrophotometric method. Antioxidant activities of extract were expressed as percentage of DPPH radicals inhibition. The methanolic extract of *Ipomoea cairica* leaves showed maximum antioxidant activity of 83.52% and methanolic extract of *Ipomoea cairica* flowers showed maximum antioxidant activity 81.85 % at 500 µg/ml concentrations. This study reveals that leaves and flowers of *I. cairica* can be used as natural sources of antioxidants.

INTRODUCTION

Ipomoea cairica belongs to family Convolvulace. The genus *Ipomoea* has approximately 500-600 species all over the world (Austin and Huaman, 1996). It is a weed and is found throughout the tropical and subtropical regions of the world (Cao *et al.,* 2005). It is also knows as rail-road creeper (Arora *et al*., 2013). *Ipomoea cairica* is used in Brazilian folk medicine for curing rheumatism and inflammations (Ferrira *et al*., 2006). Aqueous extract from *I. cairica* showed anti-RSV (respiratory syncytial virus) activity *in vitro* (Ma *et al.* 2002). The ethanolic extract of this plant presents an antinociceptive effect (Ferreira *et al.,* 2006). Arctigenin was the most cytotoxic and presents also antioxidant and anti-inflammatory activities (Cho *et al.,* 2004), as well as, inhibited the replication of human immunodeficiency virus (Eich *et al*., 1996). The essential oil of *I. cairica* possesses remarkable larvicidal properties (Thomas *et al.,* 2004; Samuel *et al.,* 2014). The major bioactive constituents isolated from the plant *Ipomoea cairica* were alkaloids, sterols, flavonoids, reducing sugars, tannins, saponins, terpenoids, anthraquinones, glycosides and phenols (Ralte, 2014). Plant products were recorded as rich sources of a phytochemicals and have been found to possess a variety of biological activities including antioxidant potential (Harman, 1992).

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Natural antioxidants are in high demand for application as nutraceuticals, bio-pharmaceuticals, as well as food additive because of consumer preference. Many disorders in human organism such as atherosclerosis, arthritis, Alzheimer disease, cancer etc., may be the result of increased concentrations of free radicals in an organism. Reactive oxygen species (ROS) and Reactive nitrogen species (RNS), as the most frequent pro-oxidants, either originate from normal metabolism or are induced by UV radiation and different pollutants. Harmful effects of disturbed antioxidant and pro-oxidant balance can be largely prevented by intake of antioxidant substances (Ghosh *et al.,* 2008; Ognjanovic *et al.,* 2008). Antioxidants have already been found in plant materials and supplements. The antioxidants obtained from plants are of greater benefit in comparison to synthetic ones (Rohman *et al.,* 2010; Zheng and Wang, 2001). The use of natural antioxidants from plants does not induce side effects, while synthetic antioxidants were found to have genotoxic effect (Chen, 1992; Kahl and Kappus, 1993). Considering these facts the medicinal plant *Ipomoea cairica* were screened for their antioxidant potential in leaves and flowers.

MATERIALS AND METHODS

Collection of plant material and Preparation of extracts

The plant leaves and flower were collected from Gorakhpur District.

Table 1. Absorbance of extract of leaves and flower of *Ipomoea cairica* in DPPH Assay

Absorbance				
	Leaves		Flowers	
Concentration (µg/ml)	Extracted sample	Ascorbic Acid	Extracted sample	Ascorbic Acid
50	0.295	0.091	0.319	0.091
100	0.234	0.091	0.303	0.091
200	0.191	0.090	0.223	0.090
300	0.172	0.092	0.180	0.092
400	0.167	0.094	0.178	0.094
500	0.158	0.092	0.174	0.092
control		0.959		0.959

Table 2. Percentage Antioxidant activities of methanol extract of leaves and flowers of *Ipomoea cairica* in DPPH Assay

Percentage Antioxidant activity				
	Leaves		Flowers	
Concentration (µg/ml)	Extracted sample	Ascorbic Acid	Extracted sample	Ascorbic Acid
50	69.23	90.51	66.73	90.51
100	75.59	90.51	68.40	90.51
200	80.08	90.61	76.74	90.61
300	82.06	90.40	79.98	90.40
400	82.58	90.20	81.23	90.20
500	83.52	90.40	81.85	90.40

The plant material was washed with water to remove extraneous material and dried under shade. The air-dried leaves (500 gm) and flower (500 gm) of *Ipomoea cairica* were crushed, powdered separately and extracted with Methanol using soxhlet apparatus for 48 hours. The solvent was then removed under reduced pressure by using rotary evaporator, which obtained residue. The residue was found to be 59.25g and 34.9g respectively. The residue was stored in desiccators for further use.

DPPH Radical Scavenging Assay

The antioxidant activities were measured on the basis of the scavenging activity of the stable 1, 1- diphenyl 2-picrylhyorazyl (DPPH) free radical according to the method described Molyneux (2004) and Sikder *et al*. (2010). 32 mg DPPH was weighted accurately and dissolved in1L 80% methanol, DPPH solution was prepared in dark because highly oxidisable nature of DPPH. Ascorbic acid (10mg/ml) was used as standard. Mixer of 1ml methanol and 1ml DPPH solution was used as control. Different concentrations of the soxhlet extracted test samples were prepared *viz*. 50 µg/ml, 100 µg/ml, 200 µg/ml, 300 µg/ml, 400 µg/ml and 500 µg/ml. 3 ml of different concentration of test sample *Ipomoea cairica* extract was mixed with 1 ml of DPPH solution in dark. 3 ml of different concentration of standard solution of ascorbic acid was mixed with 1 ml of DPPH solution in dark. The prepared solution of ascorbic acid and test sample were incubated at 37^{o}C for 30 minutes. The absorbance was taken with the help of U.V. Spectrophotometer at 517 nm. The percentage activity of individual concentration of individual extract from the following formula:-

$$\% \text{ Activity} = \frac{\text{Absorbance of control - Absorbance of individual concentration}}{\text{Absorbance of Control}} \times 100\%$$

Observations

The antioxidant activities of different extracted samples were recorded in Table 1. The maximum absorbance was recorded at 50 µg/ml in leaves and flowers while minimum was recorded at 500 µg/ml. Table 2 shows percentage antioxidant activities of methanol extract of leaves and flowers of *Ipomoea cairica* in DPPH Assay which was recorded maximum at 500 µg/ml in leaves and flower and minimum at 50 µg/ml in leaves and flowers.

RESULTS AND DISCUSSION

The examination of antioxidant activities of methanol extracts from leaves and flowers *of Ipomoea cairica* showed different values (Table 1 and Figure 1). Several concentrations ranging from 50-500 µg /mL of the leaves and flower extracts of *Ipomoea cairica* were tested for their antioxidant activity. It was observed that the DPPH free radicals were scavenged by the test extracts in a concentration dependent manner. The obtained values were in a range from 66.73 % inhibition for 50 µg/ml concentration of *Ipomoea cairica* flowers to 83.52% inhibition for 500 µg /ml concentration *of Ipomoea cairica* leaves. Antioxidant activity of methanol extract of leaves and flowers of *Ipomoea cairica* showed maximum antioxidant activity *i.e*. 83.52% in leaves and 81.85% in flowers at 500 µg/ml concentration respectively (results are shown in table 2 and Figure 2).

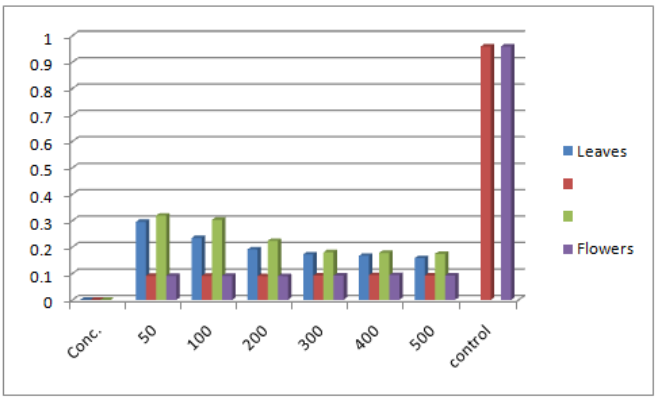

Figure 1. Bar graph showing absorption of MeOH extracts of the leaves and flowers of *Ipomoea cairica* at various concentrations in DPPH Assay

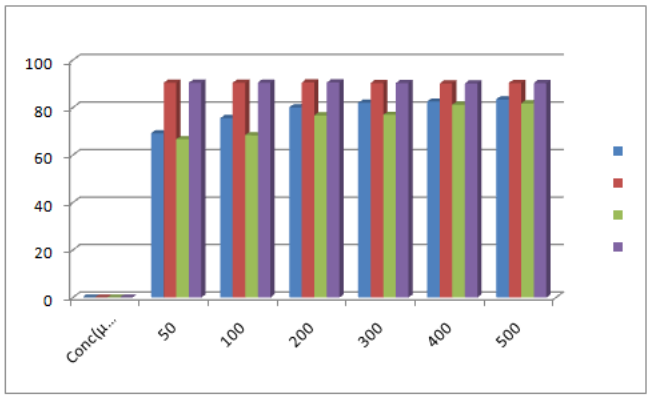

Figure 2. Bar graph showing percentage antioxidant activities of DPPH free radical by the MeOH extracts of the leaves and flowers of *Ipomoea cairica* at various concentrations

The antioxidant activity may be due to the presence of phenolic compounds such as flavonoids, phenolic acids, tannins and phenolic diterpenes (Patt and Hudson, 1990). The commercially available synthetic antioxidants have been suspected of causing or instigating negative health effects, so strong restrictions imposed over their application and there is an urgent trend to substitute them with naturally occurring antioxidants (Hosny and Rosazza, 2002). It is important to substitute synthetic antioxidants with naturally occurring safer antioxidants as the synthetics have been suspected of causing or provoking unfavourable side effects, while stronger restrictions are encountered on their application (Molynex, 2004).

Conclusion

The present work reveals that the extract from the leaves and flowers of *Ipomoea cairica* possesses maximum antioxidant activity i.e. 83.52% in leaves and 81.85% in flowers at 500 µg/ml concentration respectively. The DPPH scavenging activities of *Ipomea cairica* leaves extract showed a good correlation with its reductive potentials. Based on the result of this study it can be said that *Ipomoea cairica* leaves and flowers are effective antioxidant agents that can be used for medicine and will be a good source to treat and control many diseases. These findings could also be of commercial interest to both pharmaceutical companies and research institutes in the production of new drugs.

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REFERENCES

Arora, S., Kumar, D. and Shiba, 2013. Phytochemical, antimicrobial and antioxidant activities of methanol extract of leaves and flowers of *Ipomoea cairica*. *Int J Pharm Pharm Sci* 5(1) 198-202.

Austin, DF. and Huáman, Z. 1996. A synopsis of *Ipomoea* (Convolvulaceae) in the Americas. *Taxon* 45 3-38.

Brand-Williams, W., Cuvelier, ME. and Berset, C. 1995. Use of free radical method to evaluate antioxidant activity. *Lebensmittel Wissenschaft and Technologie* 28(1): 25-30.

Cao, S., Guzza, RC., Wisse, JH., Miller, JS., Evans, R. and Kingston, DGI. 2005. Ipomoeassins A-E, cytotoxic macrocyclic glicoresins from the leaves of *Ipomoea squamosa* from the Suriname rainforest. *J Nat Prod* 68 487-492.

Chen, C., Pearson, MA. and Gray, IJ. 1992. Effects of synthetic antioxidants (BHA, BHT and PG) on the mutagenicity of IQ-like compounds. *Food Chem* 43 177-183.

Cho, MK., Jang, YP., Kim, YC. and Kim, SG. 2004. Arctigenin, a phenylpropanoid dibenzylbutyrolactone lignan, inhibits MAP kinases and AP-1 activation via potent MKK inhibition: the role in TNF-alpha inhibition. *Int Immunopharmacol* 10(11) 1419-1429.

Eich, E., Pertz, H., Kaloga, M., Schulz, J., Fesen, MR., Mazumder, A. and Pommier, Y. 1996. (-)-Arctigenin as a lead structure for inhibitors of human immunodeficiency virus type-1 integrase. *J Med Chem* 39 86-95.

Ferreira, AA., Amaral, FA., Duarte, IDG., Oliveira, PM., Alves, RB., Silveira, D., Azevedo, AO., Raslan, DS. and Castro, MSA. 2006. Antinociceptive effect from *Ipomoea cairica* extract. *J Ethnopharmacol* 105 148-153.

Ghosh, T., Maity, KT., Sengupta, P., Dash, KD. and Bose, A. 2008. Antidiabetic and in vivo antioxidant activity of ethanolic extract of *Bacopa monnieri* Linn. aerial parts: a possible mechanism of action. *Iranian J Pharm Res* 7 61-68.

Harman, D. 1992. Role of free radicals in aging and disease. *Annuals of the New York Academy of Sciences* 673 598-620.

Hosny, M. and Rosazza, JPN. 2002. Novel oxidations of (+) - Catechin by horseradish peroxidase and laccase. *J Agri Food Chem* 50(17) 639-645.

Kahl, R. and Kappus, H. 1993. Toxicology of the synthetic antioxidants BHA and BHT in comparison with the natural antioxidant vitamin E. Z *Lebensm Unters Forsch* 196.

Ma, SC., Du, J., But, PPH., Deng, XL., Zhang, YW., Ooi, VEC., Xu, HX., Lee, SHS. and Lee, SF. 2002. Antiviral Chinese medicinal herbs against respiratory syncytial virus. *J Ethnopharmacol* 79 205-211.

Molyneux, P. 2004. The use of the stable free radical diphenylpicrylhydrazyl (DPPH) for estimating antioxidant activity. *Songklanakarin Journal Sci. Technol* 26(2) 211-219.

Ognjanovic, BI., Markovic, SD., Pavlovic, SZ., Zikic, RV., Stajn, AS. and Saicic, ZS. 2008. Effect of chronic cadmium exposure on antioxidant defence system in some tissues of rats: protective effect of selenium. *Physiol Res* 57 403-411.

Patt, DE. and Hudson, BJF. 1990. Natural antioxidants not exploited commercially. In*: food antioxidants*. Hudson BJF (Ed.) Elsevior Applied Science: London, UK, 171-191

Rohman, A., Riyanto, S., Yuniarti, N., Saputra, WR. and Utami, R. 2010. Antioxidant activity, total phenolic, and total flavonoid of extracts and fractions of red fruit (*Pandanus conoideus* Lam). *Int Food Res J* 17 97-106.

Ralte, V. 2014. Evaluation of phytochemical contents of *Ipomoea cairica* (L) Sweet – a qualitative approach. *Science Vision* 14(3) 145-151.

Samuel, L., Lalrotluanga, Bose, R., Kumaran, M., Gurusubramanian, G. and Kumar, NS. 2014. Larvicidal activity of *Ipomoea cairica* (L.) Sweet and *Ageratina adenophora* (Spreng). *Exp. Parasitol* 141 112-21.

Sikder, MA., Rahman, MA., Islam, MR., Kaisar, MA. and Mohmad, S. 2010. In vitro-anti-oxidant, Reducing Power, Free Radical Scavanging and Membrane Stabilizing activities of *Spilanthes carva*. *Bangladesh Pharmaceutical Journal* 13 63-67.

Thomas, TG., Rao, S. and Lal, S. 2004. Mosquito larvicidal properties of essential oil of an indigenous plant, *Ipomoea cairica* Linn. *Jpn J Infect* 57 176-177.

Zheng, W. and Wang, YS. 2001. Antioxidant Activity and Phenolic Compounds in Selected Herbs. *J Agric Food Chem* 49 5165-5170.

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