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Antioxidant Potential of Abutilon indicum (L.) Sw.

Javed Ahmad[1]* and Iffat Khan[2]

[1]Department of Biochemical Engineering and Food Technology, Harcourt Butler Technological Institute (HBTI), Kanpur, India
[2]Department of Biotechnology, Integral University, Lucknow, India

Abstract

To explore new biocompatible antioxidants with the least associated side-effects, the present study was carried out to evaluate the antioxidant activity of leaf extracts of *Abutilon indicum* L. (Malvaceae). The methanol extract was prepared and screened for *in vitro* antioxidant activities using Ferric Reducing Antioxidant Power (FRAP) assay. The reducing power of a methanolic leaf extract of *Abutilon indicum* was markedly enhanced with the increasing concentrations. In addition, the potential antioxidant(s) from the plant extract of *Abutilon indicum* were partially purified by thin layer chromatography. The results indicate a strong antioxidant activity of the extract.

Keywords: Antioxidant; FRAP; Free radicals

Introduction

The free radical mediated damage may play role in many disorders, in particular coronary heart disease (CHD), diabetes and cancer [1,2]. It is well known that free radicals cause cell damage through mechanism of covalent binding and lipid peroxidation with subsequent tissue injury. Antioxidant properties of certain flavonoids from plant origin have already been established [1,3]. Currently, there has been an increased interest globally to identify antioxidant compounds that are pharmacologically potent and have low or no side effects for use in preventive medicine. Antioxidant compounds in food play an important role as a health-protecting factor and it neutralizes the free radicals. Research in the area of preventive medicine shows that functional nutrition plays the key role in reducing the risk factor of certain chronic diseases [4]. The use of traditional medicine is widespread in Africa and medicinal plants are still a large source of natural antioxidants that might serve as leads for the development of novel drug against free radical induced diseases. Medicinal plants are commonly used in treating and preventing specific ailments and diseases and are considered to play a beneficial role in health care [5-7].

Abutilon indicum (Linn) of family Malvaceae is a medicinal plant, commonly known as Thuthi / Atibala, is distributed throughout the hotter parts of India and used in our traditional system of medicine for various diseases like diabetes, leprosy, ulcer, jaundice etc. [8] Plants contain several compounds such as phenolics, terpenoids, flavanoids, pigments and other natural oxidants including Vitamin A, Vitamin C and Vitamin E that have been associated with protection from treatment of chronic diseases such as heart diseases, cancer, diabetes and hypertension as well as other medicinal conditions [9]. It has been reported in the Siddha system of medicine as a remedy for jaundice, piles, ulcers & leprosy [10]. The plant is also reported to possess analgesic activity [11] and to have an effect on fertilization [12]. Antifungal activity of this plant also reported by Prabhuji et al. [13]. In some places, juice from the leaves of the plants is used in combinations with the liquid extract of *Allium cepa* to treat jaundice. The leaf extract of *Abutilon indicum* has been already reported for the hepatoprotective activity [14-16]. It also used to treat several disorders including diabetes mellitus [17]. To explore new biocompatible antioxidants with the least associated side-effects, the present study was carried out to partially purify *Abutilon indicum* leaf extract and to evaluate the antioxidant activity of the extract.

Material and Methods

Plant material

The fresh leaves of *A. indicum* were collected from Dasauli in Lucknow district in the month of January-February and were authentified by Dr. M. Sarfaraz Hussain, Faculty of Pharmacy, Integral University, Lucknow, India.

Preparation of plant extract

The dried leaf powder (30 gm) of *A. indicum* was extracted successively with 250 ml of methanol in a soxhlet extractor for 8 hrs. The solvent was evaporated at 30-35°C. The yield was a dark brownish solid residue weighing 2.44 g (8.13% w/w).

Ferric reducing antioxidant power (FRAP)

The reducing capacity of plant extract was measured following the method of Benzie. The assay was carried out in a total volume of 1.0 ml containing a suitable aliquot of plant extract (at concentration dependent (10-50 µg) and at volume dependent (10-100 µl) manner) in 0.1 ml and 900 µl of freshly prepared FRAP reagent, prepared by mixing 10.0 ml of 22.78 mM sodium acetate buffer, pH 3.6, 1.0 ml of 20 mM ferric chloride and 1.0 ml of 10 mM 2, 4, 6-tripyridyl-s-triazine solution prepared in 40 mM HCl (in a ratio of 10 ml : 1 ml : 1 ml). Before starting the reaction, both FRAP reagent and Reagent blank were preincubated for 5 min at 30°C. Incubation was done for 5 min at 30°C and then samples (each of 400 µl) was added to the FRAP reagents and put in an incubator at 37°C. Samples (1µl) were taken out for every minute up to 4 min and absorbance was recorded at 593 nm against a reagent blank. Ferrous sulphate was used as a standard for calculating the "total antioxidant power".

***Corresponding author:** Javed Ahmad, Department of Biochemical Engineering and Food Technology, Harcourt Butler Technological Institute (HBTI), Kanpur, India, E-mail: Javedkkhaan@gmail.com

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Results and Discussion

Ferric reducing power determination

In this study, we used a FRAP assay because it is quick and simple to perform, and the reaction is reproducible and linearly related to the molar concentration of the antioxidant.

Figure 1 (concentration dependent), and Figure 2 (volume dependent), reveal the reductive capability of methanolic extracts of *Abutilon indicum*. The reducing power of the extract increases with the increasing concentration (Table 1 and Table 2 shows concentration and volume dependent activities, respectively.)

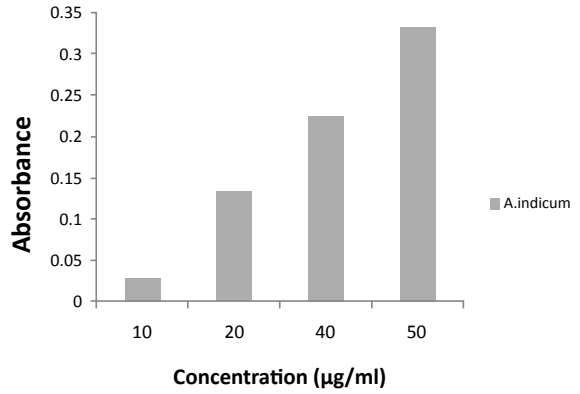

Figure 1: Ferric reducing power determination of *Abutilon indicum* methanolic leaf extracts.

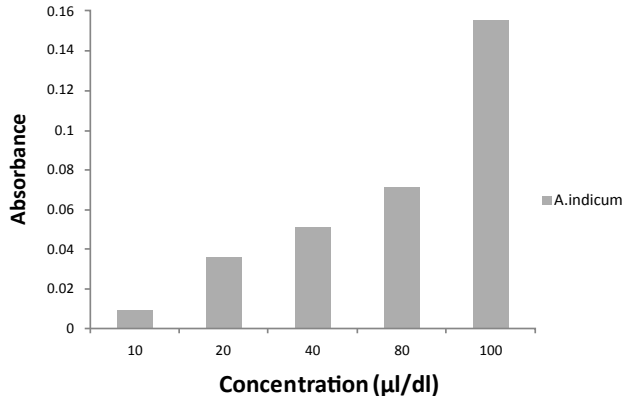

Figure 2: Ferric reducing power determination of *Abutilon indicum* methanolic leaf extract in volume dependent manner.

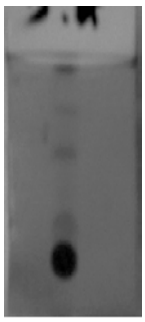

Figure 3a: TLC of methanolic extract of Abutilon indicum plant

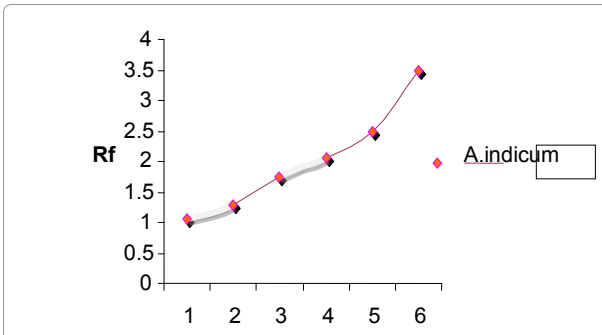

Figure 3b: Methanolic extract of Abutilon indicum with their RF values.

Concentration (µg/ml)	Absorbance (593 nm)	FRAP (n moles/mg)
10	0.0285 ± 0.35	0.838 ± 0.1007
20	0.1331 ± 0.68	4.643 ± 0.05016
40	0.2250 ± 0.41	7.856 ± 0.1051
50	0.3331 ± 0.67	11.627 ± 0.06661

Table 1: Shows the absorbance of *Abutilon indicum* methanolic leaf extract at various concentrations in FRAP.

Concentration (µl/dl)	Absorbance (593 nm)	FRAP (n moles/dl)
10	0.0096 ± 0.00306	0.3375 ± 0.10668
20	0.036 ± 0.00707	1.2565 ± 0.24678
40	0.0513 ± 0.01206	1.7916 ± 0.42094
80	0.0713 ± 0.03164	2.4903 ± 1.10503
100	0.1523 ± 0.07336	5.3183 ± 2.56189

Table 2: Shows the absorbance of *A. indicum* methanolic leaf extract in volume dependent manner using FRAP method.

Partial purification of the extracts

The TLC of methanolic extract of *Abutilon indicum* plant is shown in Figure 3a and Figure 3b with their R_F values. From the figures it is evident that there are many components that are responsible for the antioxidant activity. Hence, further investigations are required to isolate, purify and characterize those compounds which are responsible for the antioxidant activity.

Conclusion

It is well known that free radicals are one of the causes of several diseases. The result of the present study reveals a strong antioxidant activity of the leaf extract of *Abutilon indicum*. The constituents that are responsible for the antioxidant activity are unclear; hence further studies are required to evaluate the antioxidant activity of the purified fractions.

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