

# *In vitro* free radical scavenging activity of different extracts of *Adansonia digitata* L.

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**Abstract**— The species *Adansonia digitata* L. (Bombacaceae) is a multipurpose tree with enormous range of medicinal and economic importance. The objective of the current study was to investigate the free radical scavenging potential of *A. digitata*. The methanol extracts of different parts i.e., leaf, seed, bark, fruit wall and floral extracts of *A. digitata* were screened for antioxidant activity using DPPH assay. Results from this study showed that the maximum and minimum percentage of free radical scavenging activity was exhibited by methanol extracts of seed and fruit wall (27.69 & 20) as measured by using DPPH assay. These results showed the antioxidant potential of this medicinal plant to make use in the preparation of drugs with free radical scavenging activity.

**Keywords**— *A. digitata*, DPPH assay, Free radical scavenging activity, Methanol extracts.

## I. INTRODUCTION

Free radicals are produced in a living system due to the various metabolic processes that are taking place inside it and generate reactive oxygen species (ROS) which generally occur in the mitochondrial respiratory chain and may also be due to atmospheric pollutants, drugs and xenobiotics. Under conditions of continuous emotional stress, free radical molecules are highly reactive and damage macromolecules like proteins, lipids and DNA further contributing to conditions result in oxidative stress and involved in many metabolic disorders such as cancer, ischemia, aging, adult respiratory distress syndromes, rheumatoid arthritis (Yu, 1994; Halliwell & Gutteridge, 1999; Patel *et al.*, 2013; Young and Woodside, 2001). Several studies have shown that plant derived antioxidant compounds from different parts of the plant scavenge free radicals and modulate oxidative stress-related degenerative effects (Ames *et al.*, 1993; Ramarathnam *et al.*, 1995; Joseph *et al.*, 1999). Approximately 60% of the commercially available anti-tumor and anti-infective agents are of natural origin (Cragg *et al.*, 1997). The ingestion of fresh fruit, vegetables and tea rich in natural antioxidants has been associated with prevention of cancer and cardiovascular diseases (Willcox *et al.*, 2004). The optimum

intake of plant foods may decrease the risk of occurrence of these diseases (Johnson, 2001).

Medicinal plants considered as an important source of new biologically active compounds. It is estimated that there are about 2, 500,000 species of higher plants and the majority of these plants have not been studied for their pharmacological activities (Ram *et al.*, 2004). It is well known fact that free radicals of natural origin play a key role in alleviating several diseases such as arterio-sclerosis, high blood pressure, cancer, inflammation, renal failure and liver disease, thus antioxidant potential of medicinal plants is highly used for the prevention, or for the curative treatment of several diseases (Trichopoulou *et al.*, 2007).

The species *Adansonia digitata* L. (Bombacaceae) is commonly called as *Baobab tree* (Bremer *et al.*, 2003). It is a multipurpose tree and considered as *Kalpavriksha* as it is widely used for food and non-food products such as medicines, fuel, timber, fodder (Siddibe *et al.*, 2002). Being a native of Africa, it is also found in Australia, India. The tree is well known for its medicinal properties as all the parts are screened for bioactive compounds and found to be rich in phytochemicals such as flavonoids and phenols (Samatha *et al.*, 2015; Samatha *et al.*, 2016). Its wide range of medicinal properties such as antipyretic due to the presence of 'Adansonin' (Wickens, 1982), antiviral, analgesic (Hudson, 2000), antimicrobial (Adjanohoun, 1989) and well known for its anti-sickling activity hence being employed in the treatment of *sickle cell anemia* (Adensanya, 1988).

In view of its enormous range of medicinal properties, the present investigation has been undertaken in order to find out the free radical scavenging potentials of extracts of different parts of the *A. digitata*.

## II. MATERIALS AND METHODS

### 2.1 Collection of plant material

The different parts of the tree, i.e., leaf, seed, stem bark, fruit wall and flowers were collected from the tree growing at DKW College for Women, Nellore, Nellore District, Andhra Pradesh, India.

### 2.2 Preparation of extract

Freshly collected material was washed thoroughly under running tap water and shade dried for 45 days made into fine powder using an electronic blender. In the present investigation, leaves, seeds, fruit wall, stem bark and flowers of *O. indicum* were extracted successively with methanol and water using a soxhlet apparatus for 8 hours and stored in air tight containers at room temperature until use.

### 2.3 Chemicals and Drugs

All the commercial and analytical grade chemicals were obtained from S.D. Fine Chemical Pvt. Ltd., Mumbai, Sigma Chemical Company, U.S.A.

### 2.4 Determination of *in vitro* antioxidant activity

Free radical scavenging activity (FRSA) was performed for the methanol extracts of *A. digitata* using the methods of Attarde *et al.*, (2010); Sumangala *et al.*, (2012) and Samatha *et al.*, (2014). For estimation of anti-oxidant activity *in vitro*, a stable free radical  $\alpha, \alpha$  diphenyl- $\beta$ -picryl hydrazyl (DPPH) was used.

### 2.5 Procedure

The extracts were tested for their ability to bleach DPPH radical. Crude extracts of the different parts of the plant were prepared at various concentrations (200, 400, 600, 800, 1000 $\mu$ g/ml) in methanol and analyzed against 4ml of 4% DPPH. Briefly, to 1ml of the extract, 1ml of methanol and 4ml of DPPH was added and incubated in dark for 20 min. Control was maintained with only methanol and DPPH. Quercetin was used as standard antioxidant. The reduction of DPPH radical was measured at 517nm using Spectrophotometer.

## III. DATA ANALYSIS

All the experiments were repeated thrice and the results were obtained. FRSA of different extracts was detected using following formula:

Percentage of FRSA= (Ab. of Control – Ab. of Test sample / Ab. of Control X 100)

Table.1: Showing the percentage of free radical scavenging activity (FRSA).

Type of Extract	% of FRSA
Leaf	21.53
Floral parts	26.15
seed	27.69
Fruit wall	20.69
Bark	24.61

## IV. RESULTS AND DISCUSSION

The results on the free radical scavenging potentials of different parts of *A. digitata*, using DPPH assay were presented in Table. 1. All the extracts of *A. digitata* exhibited antioxidant activity.

The present investigation revealed that the methanolic extracts of seed (27.69) showed highest percentage of free radical scavenging activity followed by floral extracts (26.15) in comparison to other extracts. Whereas, bark of stem and leaf exhibited 24.61 & 21.53 percentages of FRSA respectively, while fruit wall showed least value of 20.69% FRSA.

As the various fractions of *A. digitata* exhibited different radical scavenging activities, thus indicating different percentages of phytochemical constituents present in the solvent extracts of different parts of the tree. It is also important to note that for obtaining fractions with high antioxidant activity selection of extraction methods from natural sources plays an important role.

The amount of protection provided by any one antioxidant will also depend on its concentration, its reactivity towards the particular reactive oxygen species being considered, and the status of the antioxidants with which it interacts (Vertuani *et al.*, 2004)

The presence of high content of phenolics and flavonoids in different extracts has directly contributed to the antioxidant activity of *A. digitata* by neutralizing the free radicals (Samatha *et al.*, 2016). According to Yen *et al.*, (1993), phenolics are ubiquitous secondary metabolites in plants and possess a wide range of therapeutic uses such as antioxidant, antimutagenic, anticarcinogenic, free radical scavenging activities and also decrease cardiovascular complications. The polyphenolic compounds, such as flavonoids exhibit several biological effects such as anti-inflammatory, anti-hepatotoxic, anti-ulcer, anti-allergic, anti-viral and anti-cancer activities. They are capable of effectively scavenging the reactive oxygen species because of their phenolic hydroxyl groups and are potent antioxidants (Cao *et al.*, 1997). They possess a higher therapeutic potential due to their enormous range of pharmacological and biological actions.

## V. CONCLUSION

It can be concluded that all the methanolic extracts of different parts of the *A. digitata* showed the free radical scavenging activity and exhibited different radical scavenging activities, due to the possession of different amounts of phytochemical constituents present in them. Thus, methanolic extracts of various parts of this valuable tree can be utilized in the preparation of antioxidant drugs administered in the treatment of various ailments.

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