

Evaluation of Antioxidant Activity of *Bauhinia rufescens*

¹Samaila Samaila Yaradua, ²Abubakar Abdullahi Lema

¹Department of Biology, Umaru Musa Yaradua University, Katsina
P.M.B 2218 Dutsinma Road, Katsina State, Nigeria.
samaila.yaradua@umyu.edu.ng

²Department of Biology, Umaru Musa Yaradua University, Katsina
P.M.B 2218 Dutsinma Road, Katsina State, Nigeria.
abubakarlema@gmail.com

ABSTRACT: Evaluation of antioxidant activity of *Bauhinia rufescens* stem bark extract was studied for its free radical scavenging property using hydrogen peroxide scavenging assay (H₂O₂). The acetone, methanol and water extract showed good dose dependant free radical scavenging property in the Hydrogen Peroxide (H₂O₂) scavenging assay. The result shows that *Bauhinia rufescens* possesses antioxidant activity when compared to the standard ascorbic acid. As the concentration of the hydrogen peroxide (H₂O₂) decreases while the concentration of the extract increases. This proved that *Bauhinia rufescens* is a promising agent of antioxidant activity.

Key word: *Bauhinia rufescens*, hydrogen peroxide, ascorbic acid, antioxidant activity

INTRODUCTION

For metabolism to occur in living organism oxygen is needed. Oxygen is a highly reactive molecule that damage living organism by producing reactive oxygen species (Davies, 1995). The reactive oxygen species (ROS) produce in living cells include they oxygen free radicals; anion (O₂⁻), hydroxyl radical (OH) and some non-radical hydrogen peroxide (H₂O₂) derivatives of oxygen are normally produced in living organisms with the potential of reaching with almost all types of molecules in living cells (McCord, 1985). The harmful effects of free radicals are neutralized by the enzymatic antioxidant defenses including the superoxide dismutase (SOD), glutathione peroxide (GPx) and catalase (CAT). However, overproduction of the ROS arising from either mitochondrial electron transport chain, excessive stimulation of NAD(P)H, or exposure to environmental pollutants, cigarette smoke, ultraviolet rays, some parasitic infections, radiation and toxic chemicals results in oxidative stress a phenomental disturbance in the equilibrium status of pro-oxidant/antioxidants reaction in living systems, which mediates damage to cell structures, including lipids and membranes proteins and DNA [1]. Moreover, in humans, lipid oxidation is also thought to induce physiological obstruction, causing aging of the cells and carcinogenesis [2]. A large number of experimental studies indicate that lipid oxidation products, called free radicals, can harm healthy cells, create harmful molecules,

and contribute to the degenerative processes related to aging and diseases, e.g cancer cardiovascular disease, and neurodegenerative disorders, such as Alzheimer's disease [3,4].

Antioxidants are now known to play an important role in protection against disorders caused by oxidant damage; free radicals are produced under certain environment conditions and during normal cellular function in the body. These molecules are missing an electron, giving them an electric charge. To neutralize this charge, free radicals try to steal an electron from or donate an electron to a neighboring molecule. This process, called oxidation, creates a new free radical from the neighboring molecule. The newly created free radical, in turn, searches out another molecule and steals or donates an electron, setting off a chain reaction that can damage hundreds of molecules. Antioxidant halts this chain reaction.

Recently, there has been considerable interest in finding natural antioxidants from plant mate trials to replace synthetic ones. Natural antioxidant substances are presume to be safe since they occur in plant, and are seen more desirable than their synthetic counterparts. Data from both scientific reports and laboratory studies shows that plants contain large variety of substances called "plant chemicals" or "phytochemicals" that possess antioxidant activity [5]. Medicinal plants are an important source of antioxidant [6]. Natural antioxidant increase the antioxidant capacity of the

plasma and reduce the risk of certain diseases such as cancer heart diseases and stroke [7].

Bauhinia rufescens is a shrub or small tree with tiny leaves and slow growth. Leaves are very small, bilobate almost to the base, with semi-circular lobes, glabrous, with long petioles, grayish-green, flowers greenish-yellow to white and pale pink, in few-flowered racemes. It is often found in dry savannah, especially near streams banks. It is found in the entire Sahel and adjacent Sudan zone, from Senegal and Mauritania across North Ghana and Niger to central Sudan and Ethiopia. Native to Chad, Ethiopia, Ghana, Kenya, Mali Mauritania, Nigeria, Senegal, Sudan, Tanzania and Uganda.

Oxidative damage cause by unstable molecules such as free radicals and other reactive oxygen species have posed serious problems to human health all the globe. In view of the ever increasing importance of the health promotion and of the benefit, related to the use of antioxidant and rich preparations, I here undertaken the present work to evaluate the antioxidant activity of *Bauhinia rufescens* stem bark extract in comparison with ascorbic acid as a standard

Aim and Objectives of the research

Aim: to evaluate the antioxidant activity of *Bahaunia rufescens* stem bark extract.

Objectives: -

- To determine free radical scavenging activity
- To determine reducing power assay
- To ascertain the role of natural antioxidant

MATERIALS AND METHOD

Plant Materials

Fresh stem bark of *Bauhinia rufescens* was collected from Batagarawa Local Government of Katsina Stae, Nigeria. The plant sample was identified in the herbarium of Biology department, Umaru Musa Yaradua University, Katsina, Nigeria.

Chemical and Reagent

Acetone, methanol, sodium hydroxide (NaOH), potassium dihydrogen phosphate (KH₂PO₄), hydrogen peroxide (H₂O₂), 50mM phosphate buffer pH 7.4 and ascorbic acid

Plant Extraction

The stem bark were allowed to air dry at room temperature, then ground to fine powder using laboratory blender. 50g of the sample was separately placed in a round bottom flask containing 500ml each of acetone, methanol and distilled water; this was followed by mixing and agitation for about six hours and was then allowed to stand overnight. They were filtered using muslin cloth and concentrated under reduce pressure to dryness t 40°C the percentage yield for each extract obtained (i.e acetone, methanol and distilled water) was used directly for the evaluation of antioxidant activity.

HYDROGEN PEROXIDE SCAVENGING ASSAY (H₂O₂)

A solution of hydrogen peroxide (40mM) was prepared in phosphate buffer (50mM pH 7.4) the concentration of hydrogen peroxide was determined by absorption at 230nm using spectrophotometer. Extract (1mg/ml) in distilled water is added to hydrogen peroxide absorbance at 230nm is determine after 10 minutes against a blank solution containing phosphate buffer without peroxide, the ascorbic acid was used at the same concentration for standard. The percentage of hydrogen peroxide scavenging is calculated as follows:

$$\% \text{ scavenged (H}_2\text{O}_2) = (A_0 - A_1 / A_0) \times 100$$

Where: -A₀ is the absorbance of the control

A₁ is the absorbance of the test.

RESULT

Percentage of yield extract of stem bark of *Bauhinia rufescens*

The percentage yield of acetone, methanol and water extract of *Bauhinia rufescens* stem bark were presented in the table below. The result show that acetone, methanol and distilled water have almost equal percentage yield of extract even though the acetone prove to have slight high percentage of the yield, than water and lastly methanol

Table: Percentage of yield extract of stem bark of *Bauhinia rufescens*

Extract	% of yield extract
Acetone	19.2
Methanol	14.3
Distilled water	16.7

Evaluation of antioxidant activity of *Bauhinia rufescens* stems bark extract

The result of the absorbance of the extract from the stem bark extract of *Bauhinia rufescens*, and ascorbic acid are presented in the table below

Table: Evaluation of antioxidant activity of *Bauhinia rufescens* stems bark extract

Extract	Absorbance
Acetone	4.603
Methanol	4.415
Distilled water	4.403
Ascorbic	4.360

The result shows that the *Bauhinia rufescens* stem bark possess high antioxidant scavenging activity because the scavenging activity is even higher that the standard use which is ascorbic acid, the result of the hydrogen peroxide scavenging activity of the *Bauhinia rufescence* stem bark extract is shown below:

Table: Hydrogen peroxide scavenging activity of *Bauhinia rufescens* stems bark extract and ascorbic acid

Extract	Concentration	%scavenging
Ascorbic acid	1mg/ml	71.81±1.47
Acetone	1mg/ml	72.35±1.90
Methanol	1mg/ml	72.03±0.87
Distilled water	1mg/ml	72.81±0.44

Statistical Analysis

The experiment were done in triplicate, the result are given as mean \pm standard deviation (SD)

DISCUSSION

The result of evaluation of antioxidant activity of *Bauhinia rufescens* stem bark extract shows the presence of antioxidant activity which is even more higher than the ascorbic acid used as standard as seen table 3. The current work revealed that the concentration of antioxidant were higher in acetone and water extract when compared with the methanol extract. Obviously, these may be unconnected with differences in polarity and thus, different exorability. Several studies indicated that some African and Chinese medicinal plants posses more power potent antioxidant activity than common fruits and vegetables [8] and phenolic compounds were linked with antioxidant activity of these plants [9,10]. The best health and nutrition results can be achieved not only from the consumption of fruits and vegetables with high antioxidant capacities, but also from medicinal herbs and plants [9].

The hydrogen peroxide assay has been used as reliable and reproducible parameter to search the invitro general antioxidant activity of pure compound as well as the plant extract [11, 12]. The decrease in absorbance by the hydrogen peroxide scavenging assay increase in concentration of the extract suggested that the *Bauhinia rufescens* stem bark extract posses' high antioxidant activity. The methanol, acetone and water extract of the stem bark was found to highly scavenged free radicals in that there was no significant difference between the stem bark extract and standard ascorbic acid at the same concentration (table 2). The reducing power of compounds could serve as indicator of potential antioxidant property [13]. The higher absorbance indicates the strong reducing power potential of the extract.

Further studies to ascertain the pharmacological properties of the plant are recommended.

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