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Comparing of antioxidant and H2O2 induced free radical scavenging activity of Sesbania grandiflora and Acacia nilotica plants

Jaideep Singh[*1], Ruchi Singh[1], Shiv Kumar[1]

1. Indira Gandhi Institute of Pharmaceutical Sciences, IRC Village, Bhubaneswar - 751015

[Email: jaideep_singh4444@yahoo.co.in]

Abstract: *Sesbania grandiflora* leaves and *Acacia nilotica* is among the well known plant of India. The plant is widely cultivated mainly in northern regions of India. *Sesbania grandiflora* leaves and *Acacia nilotica* bark extract exhibited antioxidant activity when subjected to the test like hydrogen peroxide radical scavenging test. The present study aimed to compare the antioxidant activity of dried leaf and bark extract (methanolic) of *Sesbania grandiflora* leaves and *Acacia nilotica.* The obtained results were for hydrogen peroxide radical scavenging test (33.44 µg/ml) for *Sesbania grandiflora* whereas (42.81µg/ml) for *Acacia nilotica*.

Keywords: *Sesbania grandiflora*, *Acacia nilotica*, H_2O_2, Antioxidant

Introduction:

Oxygen is a highly reactive atom that is capable of becoming part of potentially damaging molecules commonly called "free radicals." Free radicals are capable of attacking the healthy cells of the body causing them to lose their structure and function. It is essential in many living organism for the production of energy to fuel biological processes. It is one of the most important routes for producing free radicals in foods, drugs and even in living system. Cell damage caused by free radicals appears to be a major contributor to aging and to degenerative diseases of aging such

as cancer, cardiovascular disease, cataracts, immune system decline, and brain dysfunction. Overall, free radicals have been implicated in the pathogenesis of at least 50 diseases. Fortunately, free radical formation is controlled naturally by various beneficial compounds known as antioxidants. [1]

Plant extracts and plant products such as flavonoids and other polyphenolic constituents have been reported to be effective radical scavengers and inhibitors of lipid peroxidation.[2]

Different phytoconstituents and herbal products which are safer then synthetic medicines and beneficial in the treatment of diseases caused by free radicals. It also protects the body by preventing the free radicals to cause tissue injury. Phytoconstituents are conferring less side effect and compatible to body physiology. Therefore, it is demand of the modern era to use such phytoconstituents or phytomedicines.[3]

Sesbania grandiflora L. is an Indian medicinal plant which belongs to family Leguminosae. It is cultivated in south or west India in the ganga valley and in Bengal. The plant contains rich in tanins, flavonoides, coumarins, steroids and triterpens. The plant used in colic disorder, jaundice, poisoning condition, small-pox, eruptive fever, epilepsy etc.[4-6] The tanins, flavonoides, coumarins, steroids and triterpens were present on all organ tested, with more or less important contents according to the intensity of coloring obtained. The alkaloids are generally found in the form of traces.

All parts of *Sesbania grandiflora L.* are utilized for medicine in Southeastern Asia and India including preparations derived from the roots, bark, gum, leaves, flowers, and fruit. In Folk Medicine it is resorted to be aperient, diuretic, emetic, emmenagogue, febrifuge, laxative, and tonic.[7-9]

Material and Method:

Collection of Plant material-

The leaves of *Sesbania grandiflora* were collected near Kanichikudi temple, Samalpatti to Oothngrai main road, Krishnagiri district, Tamil Nadu state in the month of October and was authenticated by Dr. K. Ravikumar, Assistant Director, Foundation of revitalisation of Local Health Traditions, Bangalore.

The bark of *Acacia nilotica* was collected in the month of October near Thiruvadhigai Anaicut, panruti Taluk, cuddalore district, Tamil Nadu state and was authenticated by Dr. K. Ravikumar, Assistant Director, Foundation of revitalisation of Local Health Traditions.

Preparation of plant extracts-

The freshly collected leaves and bark of *Sesbania grandiflora* and *Acacia nilotica* respectively were dried in shade under the control conditions and powdered. The powered leaves and bark of the plants (500g) were extracted in solvents with increasing polarity from petroleum ether, chloroform, ethyl acetate, methanol and water for 24 hours with each solvent, by successive extraction method (Soxhlet apparatus) at a temperature of 30º to 35º C. The extracts were concentrated by evaporating the solvent on water bath until it got reduced to a semisolid mass obtain methanolic extract of *Sesbania grandiflora* and *Acacia nilotica* plants.

Hydrogen peroxide radical scavenging activity analysis:

The ability of the leaf and bark methanolic extract to scavenge hydrogen peroxide was determined according to the method as reported by **Tanwar M. et.al. (2011).**[10]

The procedure involved UV-spectrophotometric determination of Hydrogen peroxide radical scavenging. Three solutions i.e. Standard, Test and Control were prepared.

Preparation of Standard Ascorbic acid solutions:-

Different concentrations (10-50 µg/ml) of the ascorbic acid were prepared in phosphate buffer (PH 7.4). 3.4ml of each solution of ascorbic acid solutions were mixed with 600µl of 0.1 M phosphate buffer solution and 600µl of 40mM H_2O_2 solution. After 10 minutes absorbance of different concentrations & ascorbic acid solutions were taken at 230nm against phosphate buffer (PH 7.4) as blank.

Preparation of Test solutions:-

Various concentrations of the leaf and bark methanolic extract were prepared in phosphate buffer (7.4) to give solutions of concentration (10 - 50µg/ml). 3.4ml of each solution of this leaf and bark extract was mixed with 600µl of 40mM H_2O_2 solution.

After 10 minutes (approximately) absorbance of different concentrations of the extract solutions were taken at 230nm against phosphate buffer (PH 7.4) as blank.

Preparation of Control solution:-

For control 3.6ml of phosphate buffer (pH-7.4) solution was mixed with 600µl of 40mM H_2O_2 solution. After 10 minutes absorbance of control was taken at 230nm against phosphate buffer (pH 7.4) as blank.

Percentage Hydrogen peroxide radical scavenging activity of leaf and bark methanolic extract and ascorbic acid were calculated by using the formula:

$$I\% = [\{A_o - A_1/A_o\}] \times 100$$

Where,

- I% = Percentage inhibition
- A_o = Absorbance of control (PH 7.4 Phosphate buffer solution and H_2O_2)
- A_1 = Absorbance of ascorbic acid / plant extract with H_2O_2 after 10 min.

Statistical Analysis:-

The statistical significance was assessed using one-way analysis of variance (ANOVA) followed by Bonferroni Multiple Comparisons Test. The values were expressed as mean ± SEM and $P<0.05$ were considered significant.

Result:

Hydrogen peroxide free radical scavenging activity analysis:-

Hydrogen peroxide radical scavenging of *S. grandiflora* leaves and *A. nilotica* bark extracts was estimated by using Ascorbic acid solution as standard. The inhibition data (Table no. 1, 2 and 3) were recorded against the selected concentration (10 - 100 µg/ml).

Standard inhibition curve for Hydrogen peroxide radical scavenging of ascorbic acid (Fig no. 1) and inhibition curve for methanolic extract of *S. grandiflora* leaves and *A. nilotica* bark (Fig no. 2 and 3) were plotted. From these IC_{50} values of percentage inhibition of hydrogen peroxide radical scavenging of the Ascorbic acid and methanolic extracts of leaves of *S. grandiflora* and *A. nilotica* plant were

calculated using regression equation (Table no. 4).

Table 1: Percentage Inhibition data of hydrogen peroxide radical scavenging of ascorbic acid

Conc. of ascorbic acid (µg/ml)	% Inhibition
10	45.06
20	55.60
30	63.65
40	71.71
50	81.83

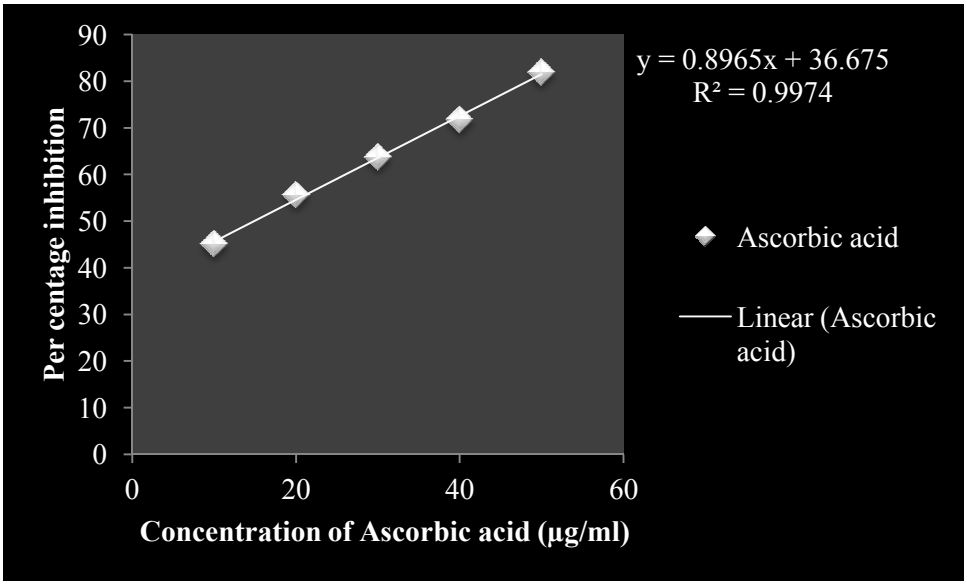

Fig no. 1: Standard inhibition curve of hydrogen peroxide radical scavenging of Ascorbic acid

Table 2:- Percentage Inhibition data of hydrogen peroxide radical scavenging by *S. grandiflora* methanolic extract of leaves.

Conc. Of methanolic *S. grandiflora* extract of leaves (µg/ml)	% Inhibition
10	23.02
20	34.23
30	46.79
40	57.31
50	68.95

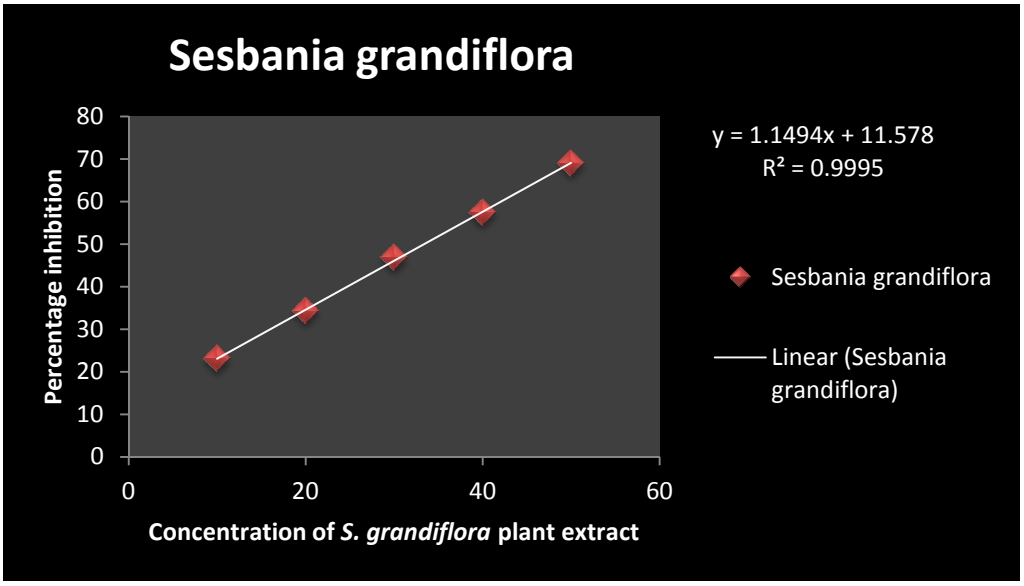

Fig no. 2: % Inhibition curve of methanolic *S. grandiflora* leaves extract.

Table 3:- Percentage Inhibition data of hydrogen peroxide radical scavenging by *A. nilotica* methanolic extract of bark.

Conc. of methanolic *A. nilotica* extract of bark (µg/ml)	% Inhibition
10	12.46
20	21.04
30	36.32

40	46.09
50	60.48

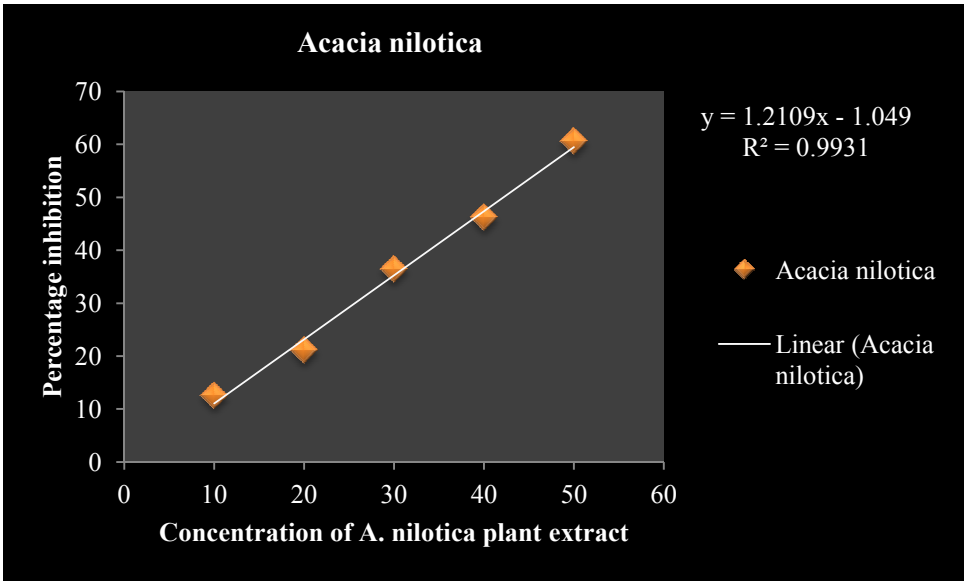

Fig no. 3: % Inhibition curve of methanolic *A. nilotica* whole plant extract.

Table 4:- Hydrogen peroxide radical scavenging IC_{50} of Ascorbic acid and methanolic extracts of *S. grandiflora* and *A. nilotica*

Sample	IC_{50}
Ascorbic acid	15.21 µg/ml
Methanolic leaves extract of *S. grandiflora*	33.44 µg/ml
Methanolic bark extract of *A. nilotica*	42.18 µg/ml

Discussion:

On the basis of IC_{50} value for standard (Ascorbic acid) and the methanolic extract of leaves and bark of *S. grandiflora* and *A. nilotica* respectively extracts were 15.21 µg/ml, 33.44 µg/ml and 42.18 µg/ml represents the antioxidant potential of the extracts and the standard.

Hydrogen peroxide concentration is decreased by scavenger compound by accelerating the conversion of H_2O_2 to H_2O depending on the antioxidant potential of the component present in the extract and therefore absorbtion value also decreases. This is due to free radical scavenging activities of ascorbic acid and methanolic extracts of *S. grandiflora* and *A. nilotica*.

Reference:

1. Mark percival, "antioxidants". Clinical nutrition insights, 1996, vol. 31, pp. 1-4.
2. Nagulendran kr, "in Vitro Antioxidant Activity and Total Polyphenolic Content of Cyperus rotundus Rhizomes". E-Journal of Chemistry, 2007, vol. 4(3), pp. 440-449.
3. Kirtikar basu, "Indian Medicinal Plants", 2nd edition, *Bishen singh Mahendra pal Singh publishers*, 1991
4. Wagh V.D., et al, "Phytochemical, pharmacological and phytopharmaceutics aspects of *Sesbania grandiflora* (Hadga) : A review", *Journal of Pharmacy Research*, 2009, Vol 2, issue 5, pp 889-892
5. Outtara M.B., et al, "Antibacterial Potential and Antioxidant Activity of Polyphenols of Sesbania grandiflora", *Current Research Journal of Biological Sciences"*, 2011, Vol 3, Issue 4, 351-356
6. Nadkarni A.K., Nadkarni K.M., "Indian materia medica", *popular book depot originally by University of Michigan*, 3rd edition, 1955
7. Gutteridge R.C., "Forage tree legumes in tropical agriculture", *Tropical grassland society of Australia Inc*, 1998.
8. Alli L.A., Salwau.A., et al,. Antiplasmodial activity aqueous root

extract of acacia nilotica. *AJBR* 2011; Vol 5: pp 214-219.

9. Mbatchou V.C., et al, "Antibacterial activities of seed pod extracts of acacia nilotica wild to artemia salina larvae. *Journal of applied biosciences* 2011; Vol 40: pp 2738-2745.
10. Tanwar M., "Antioxidant and hepatoprotective activity of Trichosanthes dioica Roxb. On paracetamol induced toxicity". International journal of pharmaceutical Studies and Research, 2011, vol. 2(1), pp. 110-121.