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Phytochemical Screening and Evaluation of Antioxidant Potential of *Achyranthes aspera* L. Leaves

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Abstract- *Achyranthes aspera* L**.** belonging to the family Amaranthaceae commonly known as 'Aghedo' is an important medicinal herb found as a weed throughout India. The roots of this plant are of huge importance in Ayurvedic formulations. This paper aims to study the important phytochemicals and the antioxidants present in *Achyranthes aspera* L. leaves. The phytochemical screening was performed by Harborne Method (1998) and the antioxidant activity was assessed by DPPH free radical scavenging assay. The results suggested the presence of Alkaloids, Carbohydrates, Glycosides, Amino Acids, Proteins, Tannins, Terpenes, steroids, flavonoids and phenols. The DPPH free radical scavenging assay results showed the IC_{50} values of *A. aspera* L. leaves extracts as 54.53 µg/ml and that of ascorbic acid was 3.75µg/ml. The results lead us to conclude that *Achyranthes aspera* L. is a good source of antioxidants and a natural drug which has immense healing activities.

Keywords: *Achyranthes*, weed, phytochemicals, antioxidants, healing.

1. INTRODUCTION

Achyranthes aspera L**.** belonging to the family Amaranthaceae commonly known as 'Aghedo' is an important medicinal herb found as a weed throughout India. It is a stiff erect annual herb. Stems are angular, ribbed and simple or branched from the base, often with tinged purple colour, branches (1-2m height) absolutely quadrangular, striate, pubescent and with thick leaves. The plant possesses activities like antiperiodic, diuretic, purgative, laxative, antiasthmatic, hepatoprotective, anti-allergic and various other important medicinal properties. Decoction of powdered leaves with honey or sugar candy is useful in early stages of diarrhoea and dysentery. (Srivastav *et al.*, 2011).

2. METHODOLOGY

The plant parts were collected from the Gujarat University campus identified by Prof. Hitesh Solanki at Department of Botany with the help of flora of Gujarat (Shah, 1978) and the voucher specimen was submitted to Gujarat University Herbarium. The leaves were collected, washed and dried in shade according to WHO Quality control standards. The leaves when properly dried were grinded to fine powder and stored in airtight containers for further use. The dried powdered leaves were extracted with methanol. 5 grams of powder was mixed 50 ml of methanol for 24 hours. Extracts were filtered, concentrated, dried and stored in refrigerator for further use.

3. *PHYTOCHEMICAL ANALYSIS*

Qualitative tests were performed for the following phytochemicals according to the Harborne method (1998) Alkaloids, Flavonoids, Carbohydrates, Glycosides, Steroids, Triterpenoids, Proteins, Amino Acids, Fixed oils and Fats, Tannins and Phenolics, Saponins, Gums, Mucilages. The presence of phytochemicals extracted in both the plant samples was confirmed by standard protocols. (Harborne, 1988)

Test for Alkaloids

The alkaloids were detected using Dragendroff's test, Wagner's test, Mayer's test and Hager's test. Formation of Orange red, Reddish brown and Dull white precipitates indicated the presence of alkaloids.

Test for Carbohydrates
The carbohydrates were tested by using Benedict's test-Reddish brown precipitates, Fehling's test-Brick red colour, Molisch test-reddish violet ring indicated the presence of carbohydrates.

Test for Glycosides
The glycosides were tested by Keller-Killiani test-brown ring to violet ring below brown ring indicated the presence of glycosides.

Test for Proteins and Amino Acids
The proteins were tested by Xanthoproteic test-orange colour, Ninhydrin test-purple colour precipitates indicated the presence of proteins and amino acids.

Test for Tannins
The tannins and phenolics were tested by adding 2-3 drops of ferric chloride to 1ml of extract and the formation of a dark blue or greenish black colour shows the presence of tannins.

Test for Terpenes
Terpenes were tested by Salkowski's test. 2ml of extracts were mixed with 1ml of chloroform and conc. H_2SO_4 solution. A reddish brown colour at the interphase indicated the presence of terpenoids.

Test for Steroids
The steroids were tested by Libermann-Buchard Test-Brown ring formation and Libermann-sterol test- colours from red, violet, blue to green.

Test for Flavonoids
Flavonoids were detected by Shinoda test. Few ml extract with 50% methanol. Heat. Add Magnesium metal and few drops of conc. HCl-green to blue colouration. (Tiwari *et al.*, 2011)

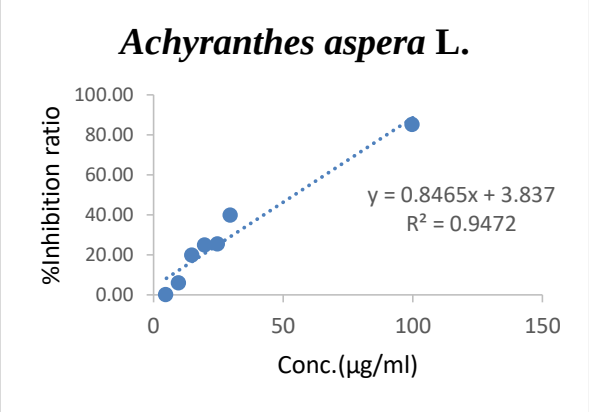
Test for Phenols
Phenols were tested by Ferric Chloride test. Take Few ml extract, add 5ml distilled water and few drops of 5% ferric chloride solution-Blue green colour indicated presence of phenols.

DPPH (2, 2-diphenyl-1-picrylhydrazyl Free Radical Scavenging Activity)
DPPH assay was performed according to Shekhar and Anju (2014) with slight modifications. Free radical Scavenging *A. aspera* leaves extract was measured by 2, 2-diphenyl-1-picrylhydrazyl. In brief, 0.1mM solution of DPPH in methanol was prepared. This solution was added to 3ml of different extracts in methanol at different concentrations (5, 10, 15, 20, 25, 30,100 µg/ml). The mixture was shaken vigorously and allowed to stand at room temperature for 30 mins. Then absorbance was measured at 517nm by using spectrophotometer (UV-VIS Shimadzu). Ascorbic Acid was used as reference standard compound and experiment was performed in triplicate.
The IC_{50} value of the sample, which is the concentration of the sample required to inhibit 50% of the DPPH free radical was calculated using log dose inhibition curve. Lower absorbance of the reaction mixture indicated higher free radical activity. The present DPPH scavenging effect was calculated using the following equation:
DPPH scavenging effect (%) or Percent inhibition= A_0-A_1/A_0 ×100 where A_0 was the absorbance of control reaction and A_1 was the absorbance in presence of test or standard sample.

4. RESULTS AND DISCUSSION

Group of Phytochemicals	Results
Alkaloids	++
Carbohydrates	++
Glycosides	+
Proteins and Amino Acids	+
Tannins	++
Terpenes	++
Steroids	+
Flavonoids	++
Phenols	++

Figure No. 1: Phytochemical Analysis of *Achyranthes aspera* L. leaves methanolic extract.



Graph no. 1: DPPH Free Radical Scavenging Assay of *Achyranthes aspera* L. leaves methanolic extract.

The plant has been of immense importance in Ayurveda. Hence, the leaves were assessed for their phytochemical and antioxidant potential. Fig. 1 The phytochemical analysis revealed the presence of various phytochemicals like Alkaloids, carbohydrates, glycosides, proteins, amino acids, tannins, terpenes, steroids, flavonoids and phenols.

Graph1. The DPPH free radical scavenging activity showed an increase in the activity with the increase in the concentration of the plant extracts. The IC_{50} values of extract and standard were found to be 54.53µg/ml and 3.75µg/ml. The plant extract did not possess very good activity in comparison to standard. However, the use of synthetic antioxidants like BHA and BHT can be carcinogenic and liver damaging in the long run. Hence, use of medicinal plants is advisable compared to the synthetic antioxidants. (Qureshi and Solanki, 2015). So, *Achyranthes aspera* L. leaves possess good potential to cure certain ailments and leaves too can be used for various formulation development.

5. CONCLUSION

The *Achyranthes aspera* L. plant is highly important in Ayurvedic medicines. However, the use of leaves can also be done in formulations due to its good antioxidant potential and presence of essential phytochemicals. The use of synthetic antioxidants can be damaging in the long run. Hence, it is very much advisable to use the antioxidants based on plants. *Achyranthes aspera* L. leaves can be used in formulations and as a replacement for synthetic antioxidants.

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