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Physicochemical and Phytochemical Evaluation of *Amaranthus caudatus.*

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ABSTRACT

Plant materials are rich of active compounds which showed significant medicinal activity. Characterization of these phytocostituents of medicinal plants is necessary, due to its numerous benefits to science and society. Because the information obtained, makes pharmacological studies possible. It also enables structure related activity studies to be carried out, leading to the possible synthesis of more potent drugs which reduce the toxicity. The present research deals with various physicochemical and phytochemical parameters of *Amaranthus caudatus*, such as flavonoids, reducing sugar, phenol, vitamin C, lipid, total carbohydrates etc. quantitatively. Analysis showed the presence of significant amount of secondary metabolites in this herbal plant which can be used as natural medicine.

Keywords: Phytoconstituents, Amaranthus caudatus, Physico-chemical analysis.

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INTRODUCTION

During the past decades, the contribution of herbal medicines and their preparations has attracted much interest in the pharmaceutical industry [1]. The medicinal values of these plants lie in bioactive phytochemical constituents that produce definite physiological actions on the human body.These bioactive phytochemical constituents in medicinal plant include alkaloids, flavonoids, phenolic compounds, tannins, anthracine derivatives and essential oils [2]. The use of plants and plant products as medicines could be traced as far back as the beginning of human civilization. The earliest mention of medicinal use of plants in Hindu culture is founds in "Rigveda", which is said to have been written between 4500 - 1600 B.C. and is supposed to be the oldest repository of human knowledge. In Ayurveda, the foundation of medicinal science of Hindu culture, in its eight division deals with specific properties of drugs and various aspects of science of life and the art of healing [3]. Phytochemical screening is of paramount importance in identifying new source of therapeutically and industrially valuable compound having medicinal significance, to make the best and judicious use of available natural wealth. In this note, our present study demonstrates various physicochemical parameters determination quantitatively of *Amaranthus caudatus*.

The plant as a whole of *Amaranthus caudatus* L. is widely used in the under developed and developing countries such as India , Africa , south Africa , Bangladesh , Pakistan as a source of overcoming protein and starch profile. *Amaranthus caudatus* belongs to the family Amaranthaceae. This plant is used as anti-diarrheal, anti-hemorrhagic, nutritive, tonic, astringent, diuretic [4].

MATERIALS AND METHODS

Collection and identification of plant material

The *Amaranthus caudatus* leaves were obtained from cultivated farmlands located at Salem, Tamil Nadu, India, and confirmation of collected sample was made from Leo Chem. Research and Private Ltd, Bangalore.

Preparation of plant extract

The collected sample was cleaned with de-ionized water and was subjected to sun-drying for 2-3 days. The sun-dried sample was ground into fine powder. A fine dried powdered sample was obtained which was used for further analysis.

Moisture and ash content

The moisture content of the fruit sample and waste were determined by hot-air oven method and ash content was calculated by keeping the sample in a muffle furnace and ashed at a temperature exceeding 525 °C for 6 hours. The ash was then cooled in a desiccator and weighed [5].

Determination of pH, temperature and turbidity

The physical parameters like pH, temperature were measured using pH meter and thermometer. The turbidity of the plant extract was analyzed using nephelometer.

Total Carbohydrate and reducing sugar

A total Carbohydrate content was determined by Anthrone method as Standard Anthrone reagent at 630 nm. The reducing sugar was measured by alkaline 3,5 dinitrosalicylic acid (DNS) method [6].

Determination of Proteins

Estimation of proteins present in the different samples was performed by using Bradford Reagent Method having BSA (Bovine Serum Albumin) as Standard at 595 nm absorbance.

Vitamins

Ascorbic acid: Estimation of ascorbic acid was done at 520nm. After TCA is added filter whole solution and take only 0.5ml [7, 8].

Total phenols determination

The total phenolics content in different solvent extracts was determined with the Folin-Ciocalteu's reagent (FCR)**.** In the procedure, different concentrations of the extracts were mixed with 0.4 ml FCR (diluted 1:10 v/v). After 5 min 4 ml of sodium carbonate solution was added. The final volume of the tubes were made upto 10 ml with distilled water and allowed to stand for 90 min at room temperature. Absorbance of sample was measured against the blank at 750 nm using a spectrophotometer. A calibration curve was constructed using catechol solutions as standard and total phenolic content of the extract was expressed in terms of milligrams of catechol per g of dried weight [9].

Total flavonoid determination

Total flavonoid content was determined by Aluminium chloride method using catechin as a standard. 1ml of test sample and 4 ml of water were added to a volumetric flask (10 ml volume). 5 min after adding 0.3 ml of 5 % Sodium nitrite, 0.3 ml of 10% Aluminium chloride was added. After 6 min incubation at room temperature, 2 ml of 1 M Sodium hydroxide was added to the reaction mixture. Immediately the final volume was made up to 10 ml with distilled water. The absorbance of the reaction mixture was measured at 510 nm against a blank spectrophotometrically. Results were expressed as catechin equivalents (mg catechin/ g of dried weight [9].

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RESULTS AND DISCUSSION

The physical and chemical composition of *Amaranthus caudatus* was recorded in Table 1.The aqueous extract had high moisture content (82.8 %) and ash content about 17 %. The high moisture content has a low energy value for the fruits thus suggesting usefulness in the treatment of obesity as observed [10]. The total carbohydrate content is 57.68 mg/100g which implies that this plant has significant amount of fibre. In this, content of reducing sugar is 22 %. The amount of protein is moderate (16 %). The plant extract contain ascorbic acid around 29 mg/100 g. The usual adult dose of ascorbic acid as dietary supplement is between 30 – 200mg/day (NDA).

Table 1: Physicoichemical parameters of aqueous extract of *Amaranthus caudatus*

Parameters	Aqueous extract
Ash content (%)	17
Moisture content (%)	82.2
Temperature (K)	301.15
pH	5.39-6.17
Turbidity (NTU)	6.3
Total carbohydrate (mg/100g)	57.68
Reducing sugar (%)	22
Protein content (%)	19
Ascorbic acid (mg/100g)	29

Total phenol content

The presence of these phytochemicals has been attributed to the bioactive principles responsible for ethnopharmalological activities of most medicinal plant. This dictates why efforts have been expanded in studies aimed at elucidating their levels in medicinal plant [11]. Phenols act as anti-oxidants and scavenge the hydroxyl radicals so that strain which has maximum phenol concentration exhibited the best antioxidant activity. Figure 1 shows the total phenol content of *Amaranthus caudatus* (0.29 mg/100 g).

Total flavonoid content

Flavonoids are naturally occurring in plants and are thought to have positive effects on human health. Studies on flavonoidic derivatives have shown a wide range of antibacterial, antiviral, anti-inflammatory, anticancer, and anti-allergic activities [12, 13]. Flavonoids have been shown to be highly effective scavengers of most oxidizing molecules, including singlet oxygen, and various free radicals [14] implicated in several diseases. The total flavonoid content was found 0.68 mg/100g (Figure 2).

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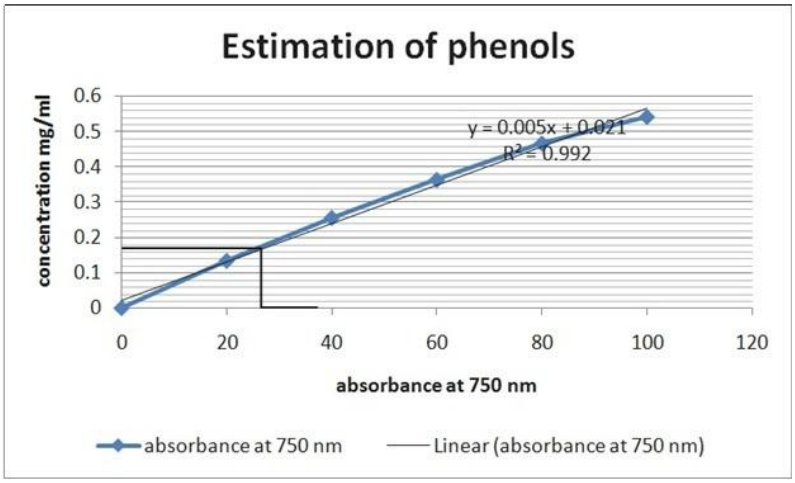

Figure 1: Total phenol content of *Amaranthus caudatus* by FCR method

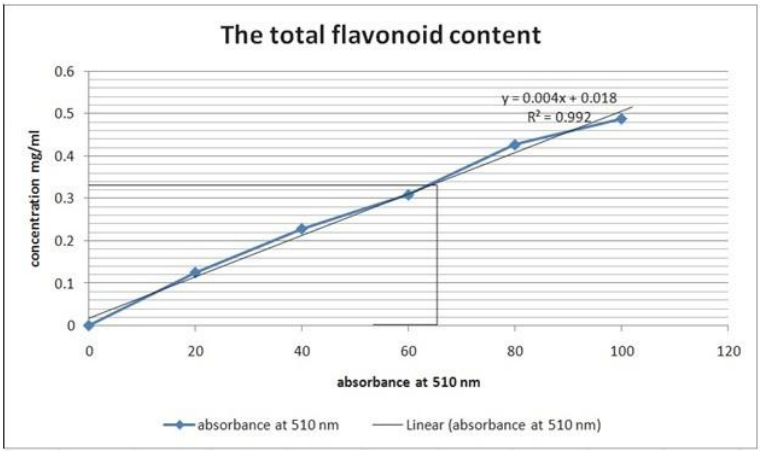

Figure 2: Total flavonoid content of *Amaranthus caudatus* by $AlCl_3$ method

CONCLUSION

The medicinal plants are widely used because of its easy availability and cost effectiveness. From this study, we can conclude that, these leaves may serve as constituents of animal and human diet. The presence of secondary metabolites that are biologically important contributes to its medicinal value and thus can be potential sources of useful drugs.

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