



EVALUATION OF PHYSICOCHEMICAL AND PHYTOCHEMICAL PARAMETERS OF *AMARANTHUS SPINOSUS* LEAVES

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ABSTRACT

The present study was carried out to provide physicochemical and phytochemical details about the plant *Amaranthus spinosus*. The physicochemical result obtained can be used for the identification of powdered drugs. In the phytochemical screening, different types of extracts were prepared to find the presence of secondary metabolites. Phytoconstituents like fixed oils, fats, carbohydrates, glycosides, gum and mucilage, phenolic compounds, flavonoids, tannins, proteins, amino acids and saponins showed positive tests in the extracts. *Amaranthus spinosus* belongs to the family Amaranthaceae. It is commonly known as Spiny amaranth or Pig weed and found throughout the world. In India it is found at roadsides, waste places and fields. The whole plant is used as a laxative. Traditionally it has been used as diuretic, antidiabetic, antipyretic, anti-snake venom, antileprotic, anti-gonorrhoeal, anti-inflammatory, anthelmintic and immunomodulatory. The root paste of the plant is used to cure skin disease. A red pigment obtained from the plant is used for colouring foods and medicines.

KEYWORDS: *Amaranthus spinosus*, Plant, Physicochemical, Phytochemical, Leaves, Extract

INTRODUCTION

Herbal drugs constitute a major part in all the traditional systems of medicine. Herbal medicine is a triumph of popular therapeutic diversity. Herbal medicine also referred to as botanical medicine or phyto medicine, is defined as the use of whole plant or part of plants to prevent or treat illness¹. WHO has been promoting traditional medicines as a source of less expensive, comprehensive medical care especially in the developing countries. Eighty percent of the world's population relies on medicinal plants for their primary health care². Such herbal medicines are easily available, cheaper, time tested and considered safer than some of the modern synthetic drugs. *Amaranthus spinosus* belongs to the family Amaranthaceae. *Amaranthus spinosus* as the name indicates "amara" meaning bitter and "spinosus" meaning spiny. *Amaranthus spinosus* is commonly known as Spiny amaranth or Pig weed, is an annual or perennial herb, native to Tropical America and found throughout India in roadsides, waste places and fields³. The plant is self-fertile, prefers light (sandy), loamy and heavy (clay) soils and requires well drainage. The plant prefers acidic, neutral and basic soils. It cannot grow in the shade. It requires moist soil. The whole plant is used as laxative^{4,5}. Traditionally it has been used as diuretic, antidiabetic, antipyretic, antsnake venom, antileprotic, anti-gonorrhoeal³, anti-inflammatory⁶, immunomodulatory⁷ and anthelmintic⁸. The root paste of the plant used to cure skin disease⁹. A red pigment obtained from the plant is used for colouring foods and medicines. Yellow and green dyes can be obtained from the whole plant.

MATERIALS & METHODS**Plant Material Collection**

The fresh leaves of *Amaranthus spinosus* were collected in bulk from roadsides and waste lands of Guwahati, Assam (India) and was authenticated by the Botanist, Dr. Sadhan Choudhury, Head of the Department of Botany, Pandu College, Guwahati, Assam. The leaves were shade-dried at room temperature for 10 days, coarsely powdered and stored in air tight containers for further studies.

Extraction of the plant drug

The powdered drug was taken and subjected for successive solvent extraction. The extraction was carried out with the

solvents in the increasing order of the polarity i.e. Petroleum ether (60 - 80°C), benzene, chloroform, acetone, methanol and chloroform water. The liquid extracts were collected in a tarred conical flask. The solvent was removed by distillation. The last traces of solvent were removed under vacuum. The extracts obtained for each solvent were weighed and percentage yield(w/w) were calculated.

Phytochemical screening¹⁰

Phytochemical screening was done to investigate the active constituents of the plant. In order to detect the various constituents present in the different extracts of *Amaranthus spinosus* leaves, these were subjected to qualitative test analysis using standard methods.

Physicochemical parameters¹¹

On proximate analyses powdered leaf of *Amaranthus spinosus*, the total ash, acid insoluble ash, water soluble ash, water soluble extractive value, alcohol soluble extractive value and moisture content were reported in table form.

Total ash value

Total ash value was found by incinerating the powdered drug at temperature 450°C until freed from carbon and then cooled. The weight of total ash was taken and the percentage of it was calculated with reference to the air dried sample.

Acid insoluble ash

The total ash obtained was boiled for 5 minutes with 25 ml of 2N Hydrochloric acid, filtered and the insoluble matter was collected on ash less filter paper, washed with hot water, ignited in tarred crucible, cooled and the residue obtained was weighed. Finally the percentage of acid insoluble ash was calculated with reference to the air dried drug.

Water soluble ash

The total ash obtained was boiled with water for few minutes. The insoluble matter was collected on ash less filter paper, washed with hot water and ignited at temperature not exceeding 450°C. The difference in weight represents the water soluble ash. The percentage of water soluble ash was calculated with reference to the air dried drug.

Water soluble extractive value

Coarsely powdered leaf was macerated with chloroform water (2.5ml chloroform in 1000ml water) in a closed flask. It was filtered rapidly and the filtrate was evaporated to dryness in a tarred flat bottomed shallow dish, dried at 105°C

and weighed. The percentage of water soluble extracts were calculated with reference to the air dried drug.

Alcohol soluble extractive value

Coarsely powdered leaf was macerated with alcohol in a closed flask, it was filtered rapidly and 25ml of the filtrate was evaporated to dryness, dried at 105°C and weighed. The percentage of alcohol soluble extracts were calculated with reference to the air dried drug.

Moisture content

Known weight of the powdered leaf was taken and dried in oven for 30 minutes, cooled and the percentage of moisture content was calculated with reference to the air dried drug.

Table 1: Data showing Colour, Consistency and yields of different extracts of powdered leaf of *Amaranthus spinosus*

Extracts	Colour	Consistency	% yield(w/w)
Petroleum ether	Dark green	Sticky	2.56%
Chloroform	Blackish green	Sticky	1.72%
Acetone	Brown	Semisolid	0.98%
Methanol	Dark green	Semisolid	6.97%
Aqueous	Dark brown	Semisolid	13.62%

Table 2: Data showing phytochemical screening of different extracts of powdered leaf of *Amaranthus spinosus*

Phytoconstituents	Petroleum ether	Chloroform	Acetone	Methanol	Aqueous
Alkaloids	-	-	-	-	-
Glycosides	-	+	+	+	+
Saponins	+	+	+	+	+
Phytosterols	-	-	-	-	-
Phenolics & tannins	-	-	-	+	+
Proteins & amino acids	-	-	-	+	+
Fixed oils & fats	+	+	+	+	+
Carbohydrates	+	+	+	+	+
Gums & mucilage	-	-	-	-	-

(+) indicate presence while (-) stand for absence

Table-3: Data showing Physiochemical parameters of different extracts of powdered leaf of *Amaranthus spinosus*

Physical parameters	(Percentage w/w)
Total ash	06.8%
Acid insoluble ash	01.20%
Water soluble ash	01.60%
Alcohol Soluble Extractive Value	06.65%
Water Soluble Extractive value	12.25%
Moisture content	08.90%

RESULTS

Extractive values

Extractive values obtained from *Amaranthus spinosus* leaves have been reported in table 1.

Phytochemical screening

The results of phytochemical screening have been reported in table 2. From this analysis it was found that methanolic and aqueous extracts contains more active constituents as compared to other extracts.

Physiochemical parameters

The results of physiochemical parameters have been reported in table 3.

DISCUSSION

Evaluation of all the data demonstrates that *Amaranthus spinosus* leaves contain phytoconstituents like fixed oils and fats, carbohydrates, glycosides, gum, mucilage, phenolic compounds, protein and amino acids, tannins and saponins which may be responsible for various pharmacological actions. Physiochemical evaluation is an important parameter to identify the drug and to establish its quality and purity. Ash values are used to determine the presence of impurities like inorganic salts, carbonates, phosphates, silicates and silica. Adhering dirt and sand is determined by acid insoluble ash and the inorganic elements present in the drug is determined in water soluble ash value. Moisture content of the drug should be at a minimal level to avoid microbial growth during storage. Extractive values obtained by exhausting crude drugs are indicative of approximate

measures of their chemical constituents which will be useful in future study.

CONCLUSION

The present work was carried out to examine the physiochemical and phytochemical parameters and this can be useful to identify the drug and to establish its quality and purity.

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