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PHYTOPHARMACOGNOSTIC INVESTIGATION OF *BAUHINIA TOMENTOSA* LINN

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ABSTRACT

The current study reveals about the pharmacognostic characteristics of the roots of *Bauhinia tomentosa* Linn. (Family: Fabaceae). The following study measures different physical and chemical characters, which are useful in the microscopical as well as microscopical study of the root of the plant.

Keywords: *Bauhinia tomentosa*, alloxan, antidiabetic, glucose tolerance test.

INTRODUCTION

Bauhinia is a genus of more than 200 species of flowering plants in the sub family Cesalpinioideae of the large flowering plant family Fabaceae, with a pantropical distribution. The specie name "*tomentosa*" means hairy and it refers to the velvety/hairy Pods[1]. These plants can be found along the coastal strip from southern Kwazulu-Natal to Maputoland, Mpumalanga as well as Mozambique, Zimbabwe, tropical Africa and as far as India and Srilanka[2].

The flower from this tree, rich in pollen and nectar, attract various insects such as butterflies and bees. *Bauhinia tomentosa* is an erect shrub with downy branches, leaves broader than long, coriaceous, pubescent below. *Bauhinia tomentosa* is deciduous, but can be evergreen in a mild climate. The adult plants can tolerate a moderate amount of frost, but the seedlings and younger plants should be shielded from the frost. It prefers full sun and needs a moderate amount of water. It produces bright yellow flowers; fruits are pea like, slender and velvety. They are light green, turning a pale brown with age.

Fruit is used as a diuretic. Flowers, buds, and dried leaves are used in dysentery. Root bark is used in inflammation of liver[3]. Seeds are tonic and aphrodisiac. Infusion of stem bark is useful as an astringent gargle[4]. Leaves have anti-diabetic Action[5]. Plant is used in snake bite and scorpion string.

EXPERIMENTAL

Plant Material

Collection of Plant was done from Khush Nursery, Jhansi. Authentication was done by Dr. Tariq Hussain, Head and Scientist, Biodiversity and Angiosperm Technology Department, NBRI, Lucknow. Accession No. is 94002.

Preparation of Extract

The powdered root of *Bauhinia tomentosa* was packed in soxhlet apparatus and continuously extracted with petroleum ether (60 - 80^{0}C) till complete extraction. The solvent was removed by distillation and then concentrated extract was dried under reduced pressure using rotatory evaporator (at temperature not exceeding 40^{0}C) and then moderate heating on water bath. A yellowish brown extract was obtained. From the drug petroleum ether was removed and the defatted drug was extracted with ethanol (95%) till complete extraction, after completion of extraction the solvent was removed by distillation and then concentrated extract obtained was dried under reduce pressure at temperature not exceeding 40^{0}C and then moderate heating on water bath. The ethanolic extract obtained was brownish black in Colour. The ethanolic extract was kept in Petri dish and it was stored in dessicator at cool place.

PHYSICAL EVALUATION

Ash value

Ash value was determined by accurately weighing drug. 2-3 gm of the air dried crude drug in a silica dish and incinerated at a temp. 450^{0}C until free from carbon, cooled and weighed, charred mass was exhausted with hot water residue and collected on an ashless filter paper. Residue and filter paper was incinerated until the ash became white[6]. Filtrate was evaporated to dryness and ignited at a temp not less than 450 ^{0}C.

(a) Acid insoluble ash

Ash was boiled with 25 ml of 2M HCl for 5 min. Insoluble matter was collected in a silica crucible then washed with water, ignited, cooled in a dessicator and weighed.

(b) Water soluble ash

Ash was dissolved in distill water and insoluble part collected on ashless filter paper and ignited to a constant weight at 450^0C. Weight of the insoluble part was subtracted from that of ash, the weight of soluble part of ash was obtained.

Loss on drying

The amount of moisture content in the sample was calculated by determining the % loss on drying. In this the powdered drug sample was placed on a tarred evaporating dish and dried at 105^0C for 6 hrs in an oven and weighed.

Foreign organic matter

For determining the foreign organic matter, 100 gm of original sample was weighed and spread out in thin sheet. The sample was inspected with an unaided eye or with use of 6X lens and foreign organic matter was separate, which was then weighed and percentage was determined.

Swelling index

The swelling index is the volume in ml taken up by the swelling of 1 gm of plant material under specific conditions. Swelling factor is also an important factor for the pharmacognostic studies as every medicinal plant materials have specific swelling properties.

1 gm of powdered plant material was taken in a cylinder. 25 ml of water was added and the mixture was shaken thoroughly at the interval of 10 min for an hour. The mixture was allowed to stand for 3 hrs at room temperature. The volume occupied by the plant material was measured including the sticky mucilage.

Extractive values

Extractive values are useful for the evaluation of a crude drug. This is helpful in qualitative and quantitative estimation of specific chemical constituent present in crude drug. The extractive values are determined in two solvents that are ethanol and water.

Foaming index

Foaming study is done in order to check the presence of the saponins in the sample. As saponins when shaken with the water produces foam.

A diluted extracted of 1 gram of the drug was taken successively in test tubes and shaken for 15 secs., two shakes per second. Allowed to stand for 15 min and measured the height of the foam.

Fluorescence analysis

Many herbs fluoresce when the cut surface or powder is exposed to UV light and this can help in their identification.

PHYTOCHEMICAL SCREENING

The pharmacological activity depends on the active constituents of the crude drug, hence plant extracts were subjected to photochemical screening for detection of various plant constituents present. The ethanolic extract of *Bauhinia tomentosa* root was subjected to different chemical tests separately for identification of various active constituents. Various tests are as follows:

Qualitative chemical tests

Different chemical test were performed for the identification of different type of chemical constituents present in the drug. The result is compiled in the Table 2.

Thin layer chromatography (TLC)

Thin layer Chromatography technique was used for the qualitative determination of the chemical constituent of the *Bauhinia tomentosa* Linn. The Adsorbent used in the preparing TLC plate was Silica Gel G. Different solvent system were tried, the

best resolution was obtained with the combination of Chloroform : Ethyl Acetate : Formic Acid : Acetic Acid in the ratio 66.6 : 33.2 : 0.05 : 0.05. Iodine was used as a detecting agent[7]. The Results of TLC was compiled in Table 3.

High performance thin layer chromatography

Ethanolic extract of Bauhinia tomentosa roots was subjected to HPTLC analysis for qualitative as well as the quantitative determination of the chemical constituents present in the *Bauhinia tomentosa* Linn.

Column chromatography

It is used for separation and isolation of different constituents of ethanolic extract of *Bauhinia tomentosa.*

Silica gel (60 – 120 Mesh) was used to pack the column and the packing was done by wet packing method[8]. Eluent used was hexane, chloroform and ethyl acetate single and in combination. Fractions obtained by the column chromatography were collected.

RESULTS AND DISCUSSION

The study on the Ash value shows the total ash value of the *Bauhinia tomentosa* Linn., was found to be 5.73%, while the acid insoluble ash and water soluble ash was found to be 2.37% and 3.75% respectively. The amount of the moisture content was found to be 8.54%. The foreign organic matter was found to be 3.82% and the extractive values with ethanol and water was 5.28% and 2.66% respectively and on determining the foaming index no foam was observed**.** The result of the above study is compiled in Table 1.

Different chemical tests were performed to determine the nature of the chemical constituent. The results of Chemical tests are compiled in Table 2.

The Thin Layer Chromatography was performed to confirm the number of the compound present in the sample and it was found that the four different compound were identified, with different Rf values (Rf_1 = 0.4, Rf_2 = 0.54, Rf_3 = 0.69 and Rf_4 = 0.83). The results of the TLC performed were compiled in Table 3. Then the extract was subjected to column where the identified compounds were separated.

TABLE 1

S. No.	Physical Parameters	% Value
1	Total Ash Value	5.73
	▪ Acid Insoluble	2.37
	▪ Water Soluble	3.75
2	Loss on Drying	8.45
3	Swelling Index	37.6
4	Extractive Value	
	▪ Ethanolic	5.28
	▪ Aqueous	2.66
5	Foaming Index	No foam

TABLE 2

S. No.	Chemical Test	Inferences
1	Glycosides	
	▪ Keller-killiani test	+ve
	▪ Borntrager test	-ve
2	Proteins	
	▪ Biuret test	-ve
	▪ Xanthoprotein test	+ve
	▪ Tests for proteins containing sulphur	+ve
	▪ Precipitation test	+ve
3	Amino acids	
	▪ Ninhydrin test	-ve
4	Flavonoids	
	▪ Alkaline reagent test	+ve
	▪ Lead acetate test	+ve
	▪ Ferric chloride test	+ve

Table: 2 Continued

5	Alkaloids	
	▪ Dragendroff's test	-ve
	▪ Mayer's test	-ve
	▪ Hager's test	-ve
6	Carbohydrates	
	▪ Molish test	+ve
	▪ Fehling solution test	-ve
7	Tannins and phenolic compounds	
	▪ Lead acetate solution test	-ve
	▪ 5%$FeCl_3$ solution	-ve
	▪ Dil. HNO_3	+ve
	▪ Acetic acid solution	-ve
8	Saponins	
	▪ Foam test	-ve
9	Steroids	
	▪ Salkowaski reaction	+ve
10	Acidic compounds	
	▪ Sodium-bi-carbonate test	-ve

TABLE 3

Spot No.	Rf Value	Colour of Spot	Resolution
1	0.4	Dark Brownish Yellow	Fair
2	0.54	Brownish Yellow	Slight tailing
3	0.69	Light Brownish Yellow	Good
4	0.83	Dark Brownish Yellow	Good

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