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NUTRITIONAL IMPORTANCE OF BAUHINIA TOMENTOSA (LEAVES)

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ABSTRACT
Background:The leaves of Bauhinia tomentosa leaves belong to the family (Fabaceae) an indigenous medicinal plant having various aspects of curative values. Objectives:The leaves of Bauhinia tomentosa leaves plant was studied with aim of standardizing and preparing an appetite stimulating kashayam. Methods:The collected leaves were dried and standardised by various parameters such as pH, Moisture contents and different extractive values. The active secondary metabolites present in leaves were identified by preliminary phytochemical screening. The Bio-active constituents like carbohydrates, Flavonoids, Tannins, Crude fibre and Vitamin-C were estimated by different standard methods. Metals and Minerals distributed in the leaves were determined by XRF (X-ray Fluorescence Spectroscopy). Conclusion:Taking kashayam of 30 to 50 leaves of Bauhinia tomentosa twice a day, including in daily diet in the form of chutney, kootu and soup significantly improves the immune system.

KEY WORDS: Crude fibre, Fabaceae, Tannins, Flavonoids, XRF, Vitamin-C.

INTRODUCTION

India has rich indigenous herbal resources about 20,000 plant species of which about 2500 are of medicinal values [1] and medicinal plant are generally known as “Chemical Gold Mines” many primary and secondary metabolites of the herbs are important in many pharmaceutical preparations of the 250,000 higher plant species on earth more than 80,000 are medicinal in nature [2].

The popularity of Ayurveda has raised a demand for herbal supplements over the last few years. Ayurvedic remedies come in different forms tablets, syrups, capsules, oil, etc These different forms are called Ayurveda dosage [3]. The basic principle of Ayurveda dosage is the process by which various herbs are taken in raw form and converted into highly effective medicines [4].

The most widely used Ayurveda herbal product is the liquid kashayam. It is an herbal decoction made with water.

Digestion problem may lead to several symptoms that interfere with daily activities. There are many causes of digestive problems. Including life style auto immune disorder, mental health issues, genetics and family history. Eating diet rich in fibre is an easy way to improve the ADME properties of the digestive system. The USPA recommends adults up to this age of 5 to 25g

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and 38g of fibre a day for women and men respectively. Those over the age of 50 should have 20g and 30g.However most Americans consume an average of just 10-15g of fibre a day [5].

The main role of fibre is to keep the digestive system healthy. Research shows that many Australians are not getting energy dietary fibre [6]. A diet low in fibre has linked to constipation, obesity, heart disease, diabetes and bowel cancer. Having a diet rich in micronutrients will help the pancreas produce more insulin [7]. Vitamins and minerals are organic compounds that our bodies use in very small amount for a variety of metabolic processes. Basically, they keep us healthy and help one bodies to function.

Macroscopic study:

Bauhinia tomentosa leaves is well known for the therapeutic efficacy [8]. It is commonly known as "Keenjana" in tamil. The dried leaves, buds and flowers are prescribed in dysentery [9].

MATERIALS AND METHOD

All the chemicals and reagents used were of analytical grade purchased from Qualigens (Mumbai,India).

The Medicinal plant Bauhinia tomentosa leaves was collected in the month of August from Kamarajar college of pharmacy, Cuddalore district, Tamilnadu, India. The leaves were identified by Dr.P.Thamizhiniyan, Professor and Head, Department of Botany, Annamalai University, Chidambaram, Tamilnadu, India.

Figure 1: Bauhinia tomentosa L; Showing its macroscopic character

Crude Fiber

2 g of powder is accurately taken in beaker and added 50 ml of 10% v/v nitric acid. Boiled with constant stirring. Strain using Buchner funnel. Give washing with boiling water until it is free from acid and transfer the residue to beaker and added 50 ml of 2.5 % w/v sodium hydroxide solution and boiled and again washed with hot water. Transfer the residue in a cleaned and dried crucible. Calculate the percentage of crude fibre is determined.

Carbohydrate

100 mg of sample is taken in a boiling tube and hydrolyse by keeping it in a boiling water bath for three hours with 5 ml of 2.5N HCl and cooled in a room temperature and neutralize with solid sodium carbonate until effervescence ceases.

Make up the volume to 10 ml and its centrifuged, collect supernatant and take 0.5 ml and 1 ml for analysis.Various working standard of 0,0.2,0.4,0.6,0.8 and 1 ml of the solution taken and added 4 ml of anthrone reagent.Make up the volume to 5 ml in all the test tubes with distilled water, heated in a boiling water bath for 8 minutes, Cool and measure the absorbance at 630nm.

Flavonoids (Zhishen et al)

0.1ml of the extract was added to 0.3 ml distilled water, followed by 5% NaNo2 (0.03ml) maintained the temperature at 25°C for 5minutes and added 0.03ml of 10% AlCl3, keep aside for another 5 minutes and treated with 0.2 ml of 1mm NaOH. Finally,the reaction mixture was diluted to 1 ml with water and the absorbance was measured at 510 nm using Quercetin as a standard.The results were expressed in percentage basis.

Tannins

The leaves powder (3 g) was digested with 50 ml of water and heated on a water bath for 30 min with frequent stirring [41]. The supernatant was collected into a volumetric flask and the extraction was repeated until the solution becomes colorless. The solution was cooled and made up to a volume of 100 ml with distilled water,

from which 25 ml was taken with 750 ml of water and 25 ml of indigo sulphonic acid solution[1g of Indigo carmine in 50ml of sulphuric acid and make upto 1000ml with distilled water]. The contents were titrated against 0.1 M potassium permanganate solution with constant stirring until golden yellow colour appears. A blank was also performed without the sample. Each ml of 0.1 M potassium permanganate solution is equivalent to 0.004157 g of tannins. Based on the titration value, the total tannin content was calculated.

Reference: API, Part-II, Vol-I(Formulations) p-239

Vitamin –C

0.1 g of mixture was dissolved in 100 ml of boiled and cooled water and added 25 ml of 1 M sulphuric acid and titrated with 0.05M iodine by using starch solution as an indicator until a persistent violet colour is obtained. 1 ml of 0.05M iodine is equivalent to 0.008806 g of C6H8O6.

Pectin

50 g of the leaves were washed thoroughly with water and immerse in 200 ml of distilled water. The sample was heated with stirring for about half an hour and filter immediately in hot condition. Filtrate is cooled and poured into 3 volumes of acidic ethanol stirred thoroughly until the pectin precipitation out. Filtered through a muslin cloth washed with 70% acetone in order to make it free from acidic ions. Dry the product in vacuum drier.

Elemental Composition by Xrf Analysis

The powdered sample was made into pellets in a pelletizer using boric acid as a binder in the ratio of 3:1.Elemental composition of the pellets was done through X- Ray fluorescence spectrophotometer (S8 tiger, Bruker, Germany)

RESULTS AND DISCUSSIONS

Phytochemical screening showed the presence of secondary metabolites like Glycoside, Alkaloids, Saponins, Phenols, Sterols, Carbohydrates,Tannins and Flavonoids. Preliminary Phytochemical analysis and standardization obey the quality nature of Bauhinia tomentosa leaves.

Ash values are indicating the purity and mineral composition. Quantification of secondary metabolites like Fibre, Flavonoids, Tannins, Vitamin C, Pectin were found. Bauhinia tomentosa leaves was found to be rich in fibre.

The high fibre content in our dietary food normalizes bowel movement, lower cholesterol level and helps in achieving the healthy weight (10).In additional to the secondary metabolites, it also contains Phenols & Carotenoids.

Reddy et al (1999) (17). The patients with the consumption of high fibre content diet have the lower risky colon cancer (Ismaiel et al 2016) (18).Studied that higher intake of dietary fibre decreases the risk of type 2 diabetics.

Product rich in fibre, vitamin C, flavonoids increase nutrient content and digestive properties and they act synergistically, life style pattern, Consumption of Junk food and unbalanced diet. Creates secondary complicates change in lifestyle, daily exercise, consumption of balance diet improves our health and to avoid other complication. Evidence has been found that dietary fibre from whole foods or supplements may reduce the risk of cardiovascular disease by improving serum lipids and reducing serum total and low-density lipoprotein (LDL) cholesterol concentrations in adults and children. Increased fibre content decreases the glycaemic index of foods, which leads to a significant improvement in glycaemic response. Minerals are essential for many functions in the body, including building strong bones and teeth, regulating metabolism, maintaining fluid balance, transmitting nerve impulses, and supporting the immune system. Without an adequate supply of minerals, the body cannot function properly, and deficiencies can lead to a variety of health problems. Calcium is essential for building strong bones and teeth, regulating heart rate, and maintaining nerve function. Calcium deficiency can lead to osteoporosis, a condition in which bones become weak and brittle, making them more susceptible to fractures [2]. In this present study it is found that Bauhinia tomentosa leaves have 68.8% calcium which helps in supporting the immune system and maintaining the health properly.

Table:1 Qualitative analysis of Bauhinia tomentosa

S.NO	TEST	RESULT
1	Glycoside	+ve
2	Alkaloids	+ve
3	Saponins	+ve
4	Phenols	+ve
5	Sterols	+ve
6	Carbohydrates	+ve
7	Protein	-ve

(+) Presence (-) Absence

Table 2: Physiochemical characters of Bauhinia tomentosa

S.NO	Parameters	% YIELD(W/W)
1	P^H	6.9
2	Moisture content	11.8
3	Ash	6.3
4	Extractive values (a) Petroleum ether (b) Chloroform (c) Alcohol (d) Water	 5.0 10.2 11.4 29.3

Table 3: *Phytochemical estimation of Bauhinia tomentosa*

S.NO	PARTICULAR	% YIELD(W/W)
1	Fiber	11.15
2	Carbohydrate	8.53
3	Flavonoids	5.80
4	Tannins	1.66
5	Vitamin-C	0.68
6	Pectin	0.4

Table 4: Elemental composition by XRF in *Bauhinia tomentosa*

S.NO	ELEMENTS	CONCENTRATION (%)
1	Ca	68.8
2	K	18.0
3	Mg	4.3
4	P	2.5
5	S	2.1
6	Cl	1.3
7	Si	1.2
8	Na	0.6
9	Ba	0.4
10	Al	0.3
11	Fe	0.07
12	Mo	0.05

CONCLUSION

The physiochemical method of analysis and nutritional importance of Bauhinia tomentosa leaves are discussed in this paper the diets with high content of Fibre, Carbohydrate, Mineral, Flavonoid and Vitamins have been reported to have a positive effect on health. Nutritionally Bauhinia tomentosa leaves are good source of nutrient including Fibre, Mineral and Vitamins results suggest that Bauhinia tomentosa leaves can be one source of natural dietary Fibre food in addition to that of medicinal properties. Based on the study Bauhinia tomentosa can be recommended for dietary supplement rich in Macro and as well as micro nutrients.

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