DETERMINATION OF SOME ELEMENTS, PHYTOCHEMICAL AND PHYSICO-CHEMICAL PARAMETERS OF LEAVES OF *ACTINODAPHNE BOURDILLONII* GAMBLE

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ABSTRACT

The present study attempts to evaluate the elements, phytochemical and physicochemical parameters of the leaves of *Actinodaphne bourdillonii* Gamble. Which is found distributed in the Western Ghats. Determination of elements showed that element concentrations in the leaves of *A. bourdillonii* were as follows: Zn- 1.966 ppm, Fe- 5.206 ppm, and Cu - 2.099 ppm. The analysis of major minerals revealed that the concentrations of Ca - 40.08 ppm, K-33.05 ppm Mg-22.61 ppm and Na-8 ppm were observed. All the elements were determined in Atomic Absorption Spectrophotometer (AAS) and Flame photometer. The result of the phytochemical constituents of methanolic extract of the leaves showed the presence of Alkaloids, Cardiac glycosides, Saponin, Tannin, Terpenoids and Phlobatannins. The physicochemical parameters like ash content, moisture content and pH were also studied. Such information could be helpful in standardization of herbal products.

KEY WORDS: Western Ghats, physicochemical, Atomic Absorption Spectrophotometer, Flame photometer, Alkaloids, Cardiac glycosides, Saponin.

1. INTRODUCTION

Herbal medicine has its origin in ancient cultures including those of the Egyptians, Chinese, Americans and Indians. It involves the medicinal use of plants to treat disease and enhance general health and wellbeing. About 250,000 higher plant species on earth, more than 80,000 species are reported to have at least some medicinal value and around 5000 species have specific therapeutic value. In India over 2,500 species are credited with medicinal value. About 1100 plant species are used in Indian systems of medicines. The herbal products today symbolize safety in compare to the synthetics that are considered as unsafe to human and environment. Phytochemical evaluation of plant is essential to study the pharmacological activities. The WHO has used modern techniques to ensure quality control of medicinal plants products. (Raina, 2003)

2. MATERIALS AND METHODS

2.1. Collection and authentication of plant material: The leaves of the plant were collected from Munnar, Idukki district Kerala, (Lat 10°1'22"N; Long 77°2'22"E) India. The plant was authenticated by the Rapinat Herbarium and Centre for Molecular Systematic, St.Joseph's College (Campus) Tiruchirappalli 620020, and Tamilnadu, India with the voucher number of RD 001. Leaves were shade dried for 21days and milled into a powder, and stored in an air-tight container for present study.

2.2. Preparation of plant extracts (Mann, 2009): 10g of the powder was macerated in 100ml of methanol and placed in a mechanical shaker for 48 hours. The extract was filtered using No.1 Watt man filter paper. The filtrate was concentrated using rotary evaporator and used for qualitative phytochemical analysis.

2.3. Elemental analysis: The elemental contents of the plants were carried out according to Martin Prevel et al (1984) using an Atomic Absorption Spectrophotometer (AAS) and Flame photometer

2.4. Digestion of plant materials (Khan, 2009): A homogeneous solution of HNO_3 and H_2O_2 in 2:1 strength was prepared. One gram of dried, powdered leaf sample was dissolved in this solution. To increase the solubility, the sample solution was heated on hot plate at 130°C until the volume was reduced to 3 ml. Then, the digest was allowed to cool and transferred into a 100ml standard flask and made up to the mark with de-ionized water. The mineral analysis of the resulting solution was determined using Atomic Absorption Spectroscopy (AAS) and Flame photometric method.

2.5. Preliminary phytochemical screening: The preliminary phytochemical analysis of the crude extracts of leaves of *A. Bourdillonii* were carried out according to the method described by Harborne (1998) and Trease (1989).

2.6. Physico-chemical parameters

2.6.1. pH range: The pH of of water soluble portions of leaf powder of *A. bourdillonii* was determined by using a digital pH meter equipped with a combined electrode.

2.6.2. Loss on drying / Moisture content: Two grams of leaf powder of *A. bourdillonii* was taken in an evaporating dish. It was dried at 105°C for 5 hours in an oven and cooled in a desicator for 30 minutes and weighed without delay. The loss of weight was noted. Percentage of moisture content was calculated on the basis of sample taken initially.

2.6.3. Total ash: Five grams of powder in a silica dish was kept in muffle furnace at the temperature not exceeding 450˚C until it was white, indicating absence of CO2. It was then cooled in desicator and weighed. The percentage of total ash was calculated on the basis of sample taken initially.

2.6.4. Water-soluble ash: To the crucible containing the total ash, twenty- five (25) ml of water was added, covered with a watch-glass and boiled gently for 5 minutes. The insoluble matter was collected on an ash less filter-paper and washed with hot water and ignited in a crucible for 15 minutes in a muffle furnace at 105°C. The residue was allowed to cool in a suitable

desicator for 30 minutes, and then weighed without delay. Weight of the insoluble matter was subtracted from the weight of total ash. The % of Water - soluble ash content was calculated on the basis of sample taken initially.

2.6.5. Acid-insoluble ash: Above obtained ash was boiled with 25 mL of 2 M hydrochloric acid for 5 minutes. The insoluble matter was collected in ash less filter paper and washed with hot water. This liquid was added to the crucible, ignited by gradually increasing the heat to 550°C for 3 hours in a muffle furnace and cooled in desiccator. Then it was weighed and the acid insoluble ash was calculated on the basis of sample taken initially.

3. RESULTS AND DISCUSSION

Table 1 shows the results of mineral composition clearly reveals that leaves of *Actinodaphne bourdillonii* constitutes the rich source of mineral elements which contains calcium (40.8 ppm), potassium (33.05 ppm), magnesium (22.61 ppm), iron (5.206 ppm), zinc (1.966 ppm), copper (2.099 ppm) and Na (8 ppm). Calcium is essential for developing and maintaining healthy bones and teeth and helps in blood coagulation, muscle contraction, nerve transmission, oxygen transport, cellular secretion of fluids and enzyme activity (Dosunmu, 1997). The health benefits of potassium include relief from stroke, blood pressure, heart and kidney disorders, anxiety and stress, as well as enhanced muscle strength, metabolism, water balance, electrolytic functions, and nervous system whereas magnesium is needed to keep muscle and nerve functions normal and to keep the heart beating rhythmically. Iron (Fe) is a component of red blood cells and the muscles that assist in the transportation of oxygen throughout the body and normal functioning of the central nervous System. Zinc plays a vital role in several metabolic functions as well as immune function. Zinc is also important in the process of metabolizing of carbohydrates and assists in preventing infections and diseases. The health benefits of copper include proper growth of the body, efficient utilization of iron, proper enzymatic reactions, as well as improved health of connective tissues, hair, and eyes. Sodium is an extremely important electrolyte and an essential ion present in the extracellular fluid. One of the health benefits of sodium is the pivotal role it plays in enzyme operations and muscle contraction. It is very important for osmoregulation and fluid maintenance within the human body (Adeyeyi and Okokiti, 1999).

Table.1.Mineral composition of the leaves of *Actinodaphne bourdillonii*

Elements	Composition
Calcium	40.08 ppm
Potassium	33.05 ppm
Magnesium	22.61 ppm
Iron	5.206 ppm
Sodium	8.00 ppm
Copper	2.099 ppm
Zinc	1.966 ppm

Table.2.Phytochemical constituents present in the methanolic extracts of leaves of *A. bourdillonii*

Parameters	Inference
Phlobatannins	+
Terpenoids	+
Phytosterols	_
Flavonoid	_
Tannin	+
Saponin	+
Cardiac glycosides	+
Alkaloids	+

Where '+' means available and '-` means absent.

Table.3.Physico-chemical characteristics of leaves of *A. bourdillonii*

Parameters	Result*
Total ash %	6.5
Water insoluble ash %	2.91
Acid insoluble ash %	1.2
Loss on drying %	4.97
pH	6.1

***average of three readings**

The results of the phytochemical analysis are shown in Table 2. This revealed the presence of alkaloids, cardiac glycosides, saponin, tannin, terpenoids and phlobatannins in the methanolic extract of leaves of *A. bourdillonii*. The presence of these phytochemicals has contributed to its medicinal value as well as physiological activity of that plants (Lewis, 1977). Phlobatannins have been reported to possess astringent properties (Setchell and Cassidy, 1999). Terpenoids are active against bacteria, fungai and virus and also to possess anti-allergenic, antisplasmodic, antihyperglycemic, antiinflammatory and immunomodulatory properties (Rabi, 2009; Wagner, 2003). Tannin acts as primary antioxidants and possesses antimicrobial, anti-inflammatory, antiallergic, anticancer and antineoplastic activity (Rievere, 2009) Saponins are active antifungal agents (Sodipo, 2000). In medicine, it is used as hyper cholesterolemia, hyperglycemia, antioxidant, anticancer and antiinflammatory. Alkaloids are one of the largest groups of phytochemicals that have led to the invention of powerful pain killer medications (Kam and Liew, 2002) and also to have antimicrobial properties (Bennett et al., 2003). Cardiac glycosides have a strong and direct action on the heart, helping to support its strength and rate of contraction when it is failing. Cardiac glycosides are significantly diuretic (Schneider and Wolfling, 2004). Physico-chemical constituents of leaves of *A. bourdillonii* were carried out and the results have been shown in Table 3. Ash value is used to find out quality and purity of crude drugs (Paramjyothi and Syed, 2010). The presence of ash is a reflection of the mineral content in the plant. The less value of moisture content of drugs could prevent microbial growth in storage. pH value (6.01) indicated that the water extract of the drug was slightly acidic.

4. CONCLUSION

The present study could be used as a diagnostic tool for the standardization. Preliminary phytochemical screening suggests that they are responsible for pharmacological activities. Considerable amount of macro elements present in the plant also proves its effectiveness in curing different mineral deficiency related disorders.

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