

Research Article

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Phytochemical and Elemental Evaluation of Chrozophora plicata Leaves, Bannu, KPK, Pakistan

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Abstract

The main objective of our current research work is to evaluate and explore the phytochemistry of the methanolic crude extract of Chrozophora plicata leaves and elemental ions analysis by using flame photometer to determine the concentration of alkali and alkaline earth metals ions following wet digestion method. Chrozophora plicata was collected from district Bannu in the month of May 2016. Results obtained from the various activities showed that the Chrozophora plicata leaves methanolic crude extract possess much quantity of flavonoids and polyphenolic compounds which are good scavengers of the free radicals that cause oxidative stress and can be used against cancer, arthritis and diabetes. Important phytochemicals such as flavonoids, phenolic and alkaloids were present in the Chrozophora plicata leaves extract. Furthermore the biologically important ions results also suggest that the powder of the Chrozophora plicata leaves possess a significant composition of Li, Na, K, Ca, Ba ions. The present study results suggest as a whole that the Chrozophora plicata already used in Greek medicine SAFI can be used to design new drugs and natural antioxidants.

Keywords: Chrozophora Plicata; Phytochemistry; Elemental ions analysis

Introduction

Chrozophora plicata is a plant belongs to the genus *Chrozophora*. It is on bloom in the month of May and June (Nasir and Ali., 1986). Urdu name for *Chrozophora plicata* is Nilkanthi or Subali. Plants are used as a food because of their nutritional value as well as for the treatment of various diseases, which is termed as Ethno-pharmacology. The history of ethno-pharmacology was too ancient for centuries. The past old cultures in which the roots and base of pharmacology was found were Africa, North America, Central and South America, China, Australia, Europe and the Arabs. Modern scientific research in the field of ethno-botany and ethno-pharmacology has been certified the traditional use of different plants for their medicinal values previously used by different cultures. These systems clearly influenced the modern drugs development and the isolation of novel compounds with therapeutic values (Gurib Fakim., 2006). The majority of the current modern research in natural sciences is directed towards the discovery of commercially useful compounds from these medicinal plants (Light

et al., 2005). Modern pharmacopeia, approximately 25% of drugs was derived from the plants and their fruitful analogues compounds were prepared synthetically in the labs (Selvin and Lipton, 2004). The plants and food extracts possess phenols and flavonoids, which donate proton or electrons and make stable free radicals. While itself does not form toxic. Natural antioxidant increases the antioxidant capacity of the blood plasma and thus reduces the risk of certain diseases. The secondary metabolites like Phenols and flavonoids have been reported to be potent free radical scavengers. Phyto means plant, thus the term phytochemistry collectively means to isolate and elucidate the structure, configuration and conformation of naturally occurring constituents of plants without reference to their systematic position. The phytochemical screening of the respective extract involves to identify the presence or absence of phenols, flavonoids, carbohydrates, Anthraquinone glycosides and sterol etc as well as to quantify the Alkaloids, Saponins, Tannins and Sterols which have significant importance in the medicinal world. The above mentioned phytochemicals play an important role in curing of diseases. As for example the important plant

origin Alkaloids such as vincristine and vinblastine extracted from *Catharanthus roseus* are used as anticancer. Quinine and Quinidine extracted from *Cinchona ledgeriana* used for the treatment of malaria. Codeine extracted from *Popover somniferum* used as sedative and analgesic (RamawatandJain,2013). *Medicinal plants have been supporting and maintaining human health for hundreds of thousands of years (Bruneton, 1995). Components of some food and bioactive constituents of folk medicinal plants and vegetables are used as antimicrobial agent (Bagamboula et al., 2003). The Alkali and Alkaline earth metal ions which are biologically important are tested and quantified in the powder of Chrozophora plicata leaves by using Flame Photometer (Jabeen et al., 2010).*

Methods

Plant Specimen Collection

The leaves of *Chrozophora plicata* was collected, shade dried at room temperature and powdered using pestle and mortar.

Steps in Plant Extract Preparation

Chrozophora plicata leaves powder of 250 g was mixed with 3 liters of methanol (80%, analytical grade) and sealed it. The Bluish color appeared immediately. The container was randomly shaken for the interval of 8-9 hours. After two weeks the plant mixture was filtered by using filter paper sheet (J.C. Binzer paper fabric. K.G, West Germany: equivalent to Whatmann No.1). Then the filtrate was concentrated by using rotary evaporator at 37 °C. Then the crude extract was put into a china dish for complete evaporation of methanol. Semisolid gum having 16 g mass was extracted which was used for research purpose.

Methods for Phytochemical Screening Qualitatively and Quantitatively

Different qualitative chemical tests were conducted for the detection of Alkaloids, Flavonoids, Phytosterols, Triterpenoids, Phenols, Tannins and Saponins etc., in the methanolic crude extract of *Chrozophora plicata* leaves. Following standard methods discussed by (Khandelwal, 2004), (Harborne, 1998), (Dahiya *et al.*, 2006) and (Kokate, 1994).

For quantitative analysis the standard protocols of Harborn, 1998(alkaloids and sterol), Obadoni and Ochuko, 2001 (saponin) and Van Buren and Robinson 1969 (Tannins) was followed with slight modifications.

Methodology for Elemental Analysis

To evaluate the elemental composition of the powder of *Chrozophoraplicata* leaves. The standard wet digestion method was chosen to determine Alkali and alkaline earth metal ions by using Flame Spectrophotometer. Analysis of alkali and alkaline earth metal ions Li⁺, Na⁺, K⁺, Ca⁺⁺ and Ba⁺⁺. The standard protocol was carried out three times and the average was recorded.

Sample Digestion

The sample was digested by following the method discussed by (Hseu, 2004) with slight managements. For this purpose 1g of the respective powder was taken in a conical flask and then added 40ml homogeneous solution of HNO₃ and H₂O₂ in ratio 2:1 preparation respectively (as 26.5ml HNO₃ and 13.5ml H₂O₂). It was kept for 24 hours at room conditions. To increase the solubility the sample solution was heated, using hot plate at 130 °c until the volume was reduced to 6ml. Then the solution was transferred into 25ml volumetric flask passed via filter paper (Whatmann No. 42). The filtrate was diluted up to the mark by means of de-ionized water. The sample was then analyzed by using Flame Photometer in triplicate.

Procedure

Flame Photometer was turned on. Air pressure was adjusted at 10 psi and the flame brightened the standard running solutions of known concentrations and analyzed in a stepwise way. As that firstly the 3-varriedconcentrations of Li⁺-ions were analyzed and then the sample of *Chrozophora plicata* leaves was analyzed. And their data given in ppm on the digital screen was noted. Than the three varied concentrations of Na⁺-ions and the sample against them was examined. Same wise the K⁺, Ca⁺⁺ and Ba⁺⁺ was determined in the *Chrozophora plicata* leaves.

Results

Table 1: Results of Phytochemical Detection Tests

S. No.	Phytochemical Detection Tests	Results
1	Carbohydrates Detection Tests	Negative
a.	Benedict Test	Negative
b.	Fehling Test	Negative
c.	Molisch's Test	Negative
2.	Alkaloid Detection Tests	Positive
a.	Hager's Test	Positive
b.	Wagner's Test	Positive
3.	Pythosterol and Triterpenoid Tests	Positive
a.	Lieberman's test	Positive
b.	Salkowski Test	Positive
4.	Phenol Detection Test	Positive
5.	Flavonoid Detection Tests	Positive
a.	Alkali reagent Test	Positive
b.	NH ₄ OH Test	Positive
c.	Zn-HCl reduction Test	Positive
6.	Tannins Detection Tests	Positive
a.	FeCl ₃ Test	Positive
b.	Alkali reagent Test	Positive
7.	Anthocyanins detection Test	Negative
a.	HCl Test	Negative
8.	Saponins Detection Test	Positive
a.	Frothing method	Positive
9.	Anthraquinone glycosides Detection Test	Positive

Result of Quantitative Analysis in Pie-Chart showing the Phytochemical Composition

Tannins were in maximum proportion and sterol was in minimum proportion. The Alkaloids were in significant amount. Saponins are also present in a moderate proportion. Complete results shown in figure 1.

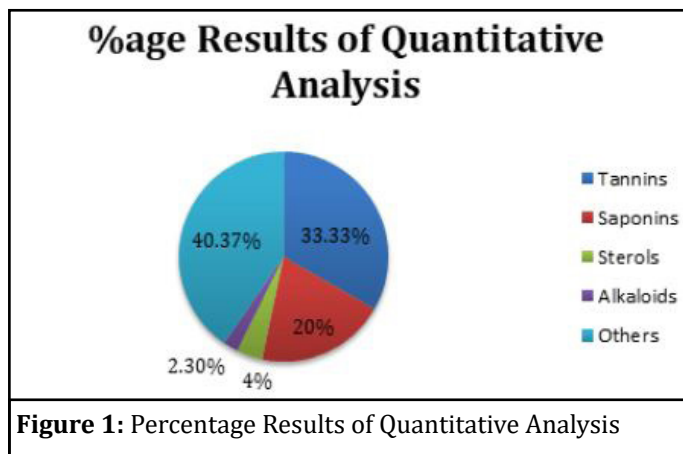


Figure 1: Percentage Results of Quantitative Analysis

Result of Elemental Analysis

The Alkali and Alkaline earth metal ions, mentioned previously were present in the powder of *Chrozophora plicata* leaves in small quantity. The amount of Lithium and Barium ions were present in *Chrozophora plicata* leaves more than sodium and calcium ions while potassium ions were present in small quantity. The results obtained from the Elemental Evaluation were tabulated below in table 2.

Table 2: Results of concentration of Alkali and Alkaline earth metals ions

Name of ions	Concentration in ppm
Li+- ions	27.7 ppm
Na+- ions	15.7 ppm
K+- ions	16.03 ppm
Ca+2- ions	14.5 ppm
Ba+2 - ions	43.13 ppm

Discussion

The phytochemical screening is most important because of the fact that it provides basic information about the phytochemicals. The *Chrozophora plicata* leaves shows the presence of phenols and flavonoids which are playing important role nowadays in treatment of diseases. The Alkaloids are also of great importance as the vincristine and vinblastine extracted from *Roses cathrenthus* plant used for the treatment of tumor and cancer (Ramawat et al., 2013). The flavonoids are responsible for the scavenging of free radicals as well as the other extra ordinary importance such as in prevention of gastric ulcer and other acute diseases too (Kumar et al., 2013). Literature survey suggests that the flavonoids and triterpenoid are responsible for various biological activities like immune modulator;

antiulcer and antioxidant. Presence of phenolic compounds contributed to the biological activities as anti-carcinogenic and anti-inflammatory who is related to the antioxidant potential of plants (ChuY, 2000). It was also reported that methanolic extracts possess highest amount of polyphenolic compounds (Hartwell JL, 1982). Therefore in current study, the methanolic extract was evaluated. So in short we can say that the methanolic extract of *Chrozophora plicata* leaves possesses polyphenolic compounds and Alkaloids which are important group of compounds. The amount of sodium is present more in aerial parts of many plants commonly than those of underground parts (Truog et al., 1953).

Barium has been not reported to have specific role in many plants. But however the natural barium in leaves of orange trees in California is found to be about 25-55ppm (Bradford et al., 1963). The Calcium has been well known to be must for the growth of taller plants, and it is a constituent of cell wall in the form of calcium pectate. For different parts and different conditions or process the calcium is required in different ratio for different plants. For example cell division and chromosome stability, activation of some enzymes and cell hydration like processes ions (Hewitt EJ, 1963) and (Jones and Lunt, 1967).

Potassium is required for plant growth and development in high amount for better production. The main key role of potassium in plants is to provide ionic environment for metabolic process in the cytosol and another function is as a growth regulator. The plants require potassium ions for opening and closing of stomata, which is regulated by means of proton pump as either by the turgidity or flaccid of the guard cells (Hopkins WG and Huner NPA, 2008). The Lithium ions in the plant obtained from the soil is varied in different plants, in fact the lithium ions are required in minor amount for the plant and hence their role is limited thus non-essential for survival of plant growth as well as development. However lithium disrupts numerous metabolic processes such as photosynthesis, DNA biosynthesis and enzyme activation in plants (Shahzada et al., 2016).

Conclusion

Chrozophora plicata leaves showed the significant phytochemicals. This research project results will be a complete ready reference for future study on antioxidant potential.

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