RESEARCH ARTICLE

Phytochemical screening and elemental analysis of leaves and stem barks powder of *Woodfordia fruticosa*

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Abstract

Aim: Present study deals to investigate essential and trace elements of leaves and stem barks of *Woodfordia fruticosa*. **Material and Methods:** Vibrational assignments, intensities and wavenumber (cm^{-1}) of dominant peak were obtained from energy dispersive X-ray absorption spectra. Percentage weight of trace elements present in plant parts was obtained from energy dispersive X-ray spectrometer and microphotograph from scanning electron microscope. The qualitative tests of various phytochemicals were carried out from the plant parts of leaves and stem barks. **Results and Discussions:** Concentrations of eight elements such as magnesium, phosphorus, chlorine, potassium, calcium, platinum, silicon, and iron had been determined by energy dispersive X-ray analysis. Preliminary phytochemical screening revealed that plant contains tannins, flavonoids, glycosides, carbohydrates, fats, and fixed oil. **Conclusion:** The present study provides information about the availability of some essential minerals and phytoconstituents, which can be useful to provide dietary elements and it may also help in developing new drug formulations.

Key words: Energy dispersive X-ray spectroscopy, essential and trace elements, phytoconstituents, *Woodfordia fruticosa*

INTRODUCTION

Primary and secondary metabolites of the medicinal plants are the backbone of the modern medicine. Man uses secondary metabolites as medicine, flavoring agents, and for immunomodulatory drugs. Primary and secondary metabolites play an important role in increasing defense system of human body. Bioactive molecules and element produce specific physiological action in the human body. Essential and trace elements are the composition of primary and secondary phytoconstituents of the medicinal plants. These elements play a key role in many biochemical functions. Macro- and micro-elements are required for maintenance of human health as well as defense system. The human body requires more than 20 elements for the smooth functioning of the body. The various types of elements are required in amounts ranging from 50 ug to 18 mg per day for the body functioning. Deficiencies in such essential nutrients lead to diseases include bone and muscle abnormalities, metabolic disorders, and nervous disturbances. Elements with toxic effects are harmful in the human body, even at low concentration. Therefore, the identification of elements and their concentration in the food products as well as in herbal formulation are an essential step before releasing such products into the markets.[1,2] The present study has been undertaken to determine phytoconstituents as well as phytoelements of leaves and stem barks of *Woodfordia fruticosa* which is useful in future for determining the efficiency of drugs against the various disease of human body.

MATERIALS AND METHODS

Plant Collection and Identification

The leaves and stem barks of *W. fruticosa* were collected from the forest of Jashpur district, Chhattisgarh, India. Plants

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samples were identified and authenticated by Botanist from Department of Botany, Guru Ghasidas Vishwavidyalaya, Bilaspur, and Chhattisgarh, India. Voucher specimen number SLT/Med. Plant/01/2009 was deposited in the Department of Pharmacy, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, for further reference.

Preparation of Extracts

Powdered samples were extracted using Soxhlet apparatus with various solvents such as petroleum ether, chloroform, ethanol, and distilled water separately. All extracts were qualitatively analyzed for the screening of phytoconstituents. Phytochemical analysis revealed that tannins, flavonoids, glycosides, carbohydrates, fats, and fixed oil are found in this plant as phytoconstituents.

Energy Dispersive X-ray Spectroscopy (EDS)

Samples were cleaned, dried and powdered by the blender. Powdered samples were passed through sieve number 120 um. Samples were sent to Central Instrumentation Facility of B.I.T. Mesra, Ranchi for EDS which is connected with scanning electronic microscope (SEM). EDS was observed by Herguth EDS at the Central Instrumentation Facility of B.I.T. Mesra, Ranchi, Jharkhand, India.

RESULTS

Qualitative phytochemical screening revealed that plant Contains phytoconstituents such as tannins, flavonoids, glycosides, carbohydrates, fats, and fixed oil. Percentage of elements found in leaves and stem barks of *W. fruticosa* obtained by EDS is shown in Table 1 and Figure 1 and EDS spectroscopy in Figures 2 and 3, SEM image [Figures 4 and 5]. EDS spectroscopy revealed that leaves of *W. fruticosa* contain carbon, hydrogen, phosphorus, chlorine, potassium, calcium, platinum, sulfur, and iron. Stem barks of *W. fruticosa* contain carbon, hydrogen, magnesium, phosphorus, chlorine, potassium, calcium, platinum, sulfur, silicon, and iron. Carbon and hydrogen are the backbones of these plants.

DISCUSSIONS

The active constituents of medicinal plants and the number of trace elements play an important role in body metabolism which can be used medicinally for the therapeutic effect.[3] The elements Fe^{+2}, K^{+}, Mg^{+2}, Na^{+}, Ca^{+2}, Co^{+3}, Mn^{+2}, Zn^{+2}, and Cu^{+3} have been classified as essential, and Ni^{+3} and Cr^{+3} are possibly essential, and Cd^{+2}, Pd^{+4}, and Li^{+1} are non-essential elements of the human body.[4] Potassium is the essential element Which is the principle of intracellular cation and helps to regulate osmotic pressure and PH equilibrium. It plays an important role in maintaining of normal glucose tolerance and release of insulin from beta cells of Langerhans.[5,6] Potassium

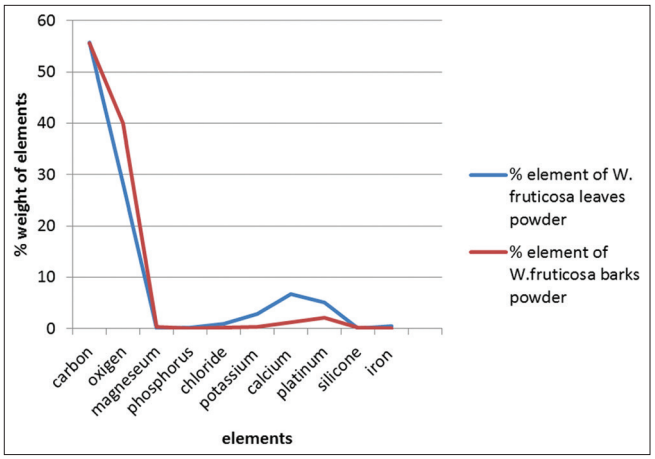

Figure 1: Graphical presentation of elements found in *Woodfordia fruticosa* leaves and barks

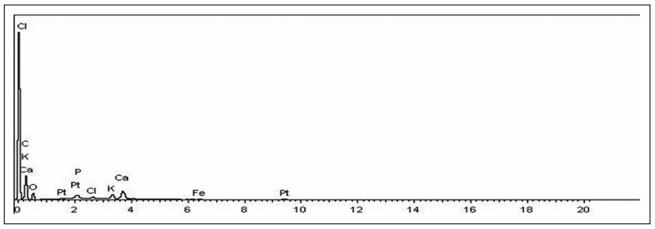

Figure 2: Energy dispersive X-ray spectroscopy spectrum for *Woodfordia fruticosa* leaves powder

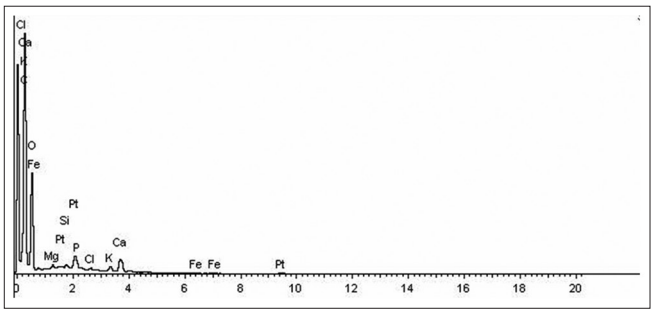

Figure 3: Energy dispersive X-ray spectroscopy spectrum for *Woodfordia fruticosa* stem barks powder

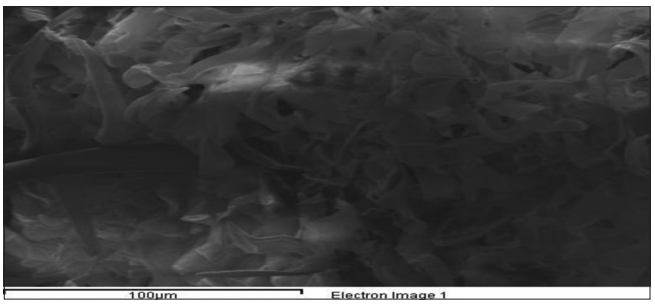

Figure 4: Scanning electronic microscope - energy dispersive X-ray spectroscopy image of *Woodfordia fruticosa* leaves powder

Table 1: Percentage weight of different elements present in *Woodfordia fruticosa* leaves and stem bark powder samples observed by EDS

Name of element	Name of lines	Weight percentage of elements	
		***Woodfordia fruticosa* leaves powder**	***Woodfordia fruticosa* stem bark powder**
C	K	55.71	55.60
O	K	28.18	39.97
Mg	K	-	0.26
P	K	0.14	0.01
Cl	K	0.90	0.13
K	K	2.90	0.40
Ca	K	6.69	1.25
Pt	M	5.04	2.16
Si	K	-	0.16
Fe	K	0.44	0.06

EDS: Energy dispersive X-ray spectroscopy

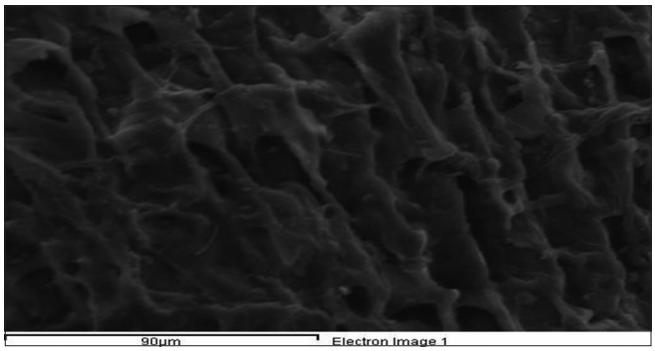

Figure 5: Scanning electronic microscope - energy dispersive X-ray spectroscopy image of *Woodfordia fruticosa* stems bark powder

is accumulated within human cells by the action of the Na^+, K^+ AT Pase (sodium pump) and it is an activator of some enzymes, particularly coenzyme for normal growth and muscle function as well as cardiac muscle. It helps in the protein and carbohydrate metabolism. Potassium deficiency causes nervous disorder, diabetes and poor muscular control resulting in paralysis.[7] Calcium has been also reported to play an important role in the bone maintenance and glucose tolerance that decreases the blood glucose Level utilizing insulin.[8] Iron is an essential component of the hemoglobin of human beings and animals. Iron is an important component of many oxidant processes, deficiency of this essential component; it affects overall oxidant system of the body.[9] It facilitates oxidation of carbohydrates, fats, proteins and it controls body weight. Magnesium plays an important role in metabolism of cholesterol as well as heart disease.[10] It regularises electrical potential in nerves and membranes. It improves insulin sensitivity and protects against diabetes and its complication.[11]

Phosphorus is the Second important element of bone found in the human body. Both calcium and phosphorus work together to build strong bones and teeth. 85% of phosphorus is present in the bones and teeth only. However, its presence is also reported in cells and tissues throughout the body. Deficiency of phosphorus causes rickets in children and osteomalacia in adults.[12,13] It plays an important role In filtration of the wastes through the kidney. It maintains growth and repairs cells and tissues of human body. It is one of the important constitutes of the genetic building blocks, DNA and RNA. Silicon plays an important role in strengthening of connective tissues and bones, useful in taking care of nails, hairs, and glowing skin in human health. It plays a key role in the prevention of some diseases such as atherosclerosis, insomnia, skin disorders, and tuberculosis. Silicon is considered by the association of American Plant Food Control Officials for elevation to the status of a plant beneficial substance as strengthen cell walls, improve plant strength, health and productivity.[14-16] Atomic nobel element, platinum health benefit is not known, but cisplatin and cisplatinum are platinum-based chemotherapy drugs used to treat various types of cancers and sarcomas. These platinum complexes react *in vivo*, binding to and causing crosslinking of DNA which ultimately triggers apoptosis.[17] Calcium is found In the plant leaf 6.69% and platinum 5.4%. It may be indicated that it can help in bone diseases and cancers. In conclusion, deficiencies of certain essential elements with a particular disease, this drug can be helpful in restoring these elements through diet and supplement for recovering the disease.

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