



Research Article

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CONTENT OF ELEMENTS IN AYURVEDIC MEDICINAL PLANTS ANALYZED BY USING FAAS INSTRUMENTS

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ABSTRACT

In this present study total four different family medicinal plants namely *Azadirachta indica*, *Cascabela thevetia*, *Ficus benghalensis* and *Cassia angustifolia* leaves parts collected from the different places of Bidar, Kalaburagi & Yadgir districts. By using standard ratio of FAAS instruments, the solution samples for analysis of elements were prepared. Further analysis of the total 7 essential elements like Mg, Mn, Fe, Cu, Zn, As and Pb were done respectively. The Flame Atomic Absorption Spectrometer (FAAS) is analytical, or radiation source instrument and it is useful for the quantitative analysis of any materials. The average concentration of elements varied between 0.01 mg/L to 1.7 mg/L in all 4 studied Ayurvedic medicinal plants. Here Mg and Pb concentration found to be in higher range, compared to the other elements. Further all studied elemental content were found to be under the permissible limits of WHO. Results could be useful in study of metabolic, enzymatic and physical activity of the samples and also useful for the new modern medicinal preparations. The variations of elemental concentrations in environmental samples were dependents on earth geological soil formation.

Keywords: Medicinal plants, Regions, WHO Limits, Elements and FAAS method.

INTRODUCTION

The word medicinal plant stands for the value of medicine and significant uses. It includes various types of names like herbalism, herbology and herbal medicine; the word 'herb' was coming from Latin. The knowledge of medicinal plants Ayurvedic, herbal etc system of medicine and its usefulness were exposed from earlier civilizations. In the years of before 3300 B.C to 500 B.C and according to the study of the past events and research traditionally it is developed over the years during 4000 B.C to 1600 B.C. It is developed as a system of Ayurveda, Unani and Chinese traditional medicine in different countries like India, Ancient Egypt, China, Mexico, Sri Lanka, Pakistan and United States¹⁻³. Basically, it is used as primary health care system of human beings and afterwards, it is using as a basic raw material of physical and chemical science. Such type of study and information about the medicinal plant was given by the World Health Organization (WHO) and other National and International bodies.

According to the World Health Organization 80% of world population utilize the medicinal plant materials, because of it is highly intermitted on best and safe remedies or drugs of the medicinal plants with the extraction method. Generally, plants contain compounds that provide useful drugs to optimizing the metabolites process and therapeutic purposes³⁻⁵.

MATERIALS AND METHODS

Ayurvedic Medicinal plants materials

The selected four Ayurvedic medicinal plants collected accordingly WHO guidelines and each sample collected in between the distance of 5 km to 30 km surrounding of Bidar,

Kalaburagi and Yadgir district lies in Kallayana- Karnataka⁶⁻⁸. The sampling satiation of selected regions situated in the Easter latitude - longitude is 76° 37' - 76° 55' and Northern latitude - longitude is 17°15' - 17°28', Northern latitude - longitude is 17°15' - 17°28' also Easter side is 77°16' - 77°34' and Northern latitude - longitude is 17°46' - 17°59' respectively. In the present study, nearly 1/2 kg of fresh leaves sample was collected from the selected medicinal plants of the respective places. The Table 1 shows that Botanical name, family and common names of medicinal plants. Here selected four medicinal plants, which are collected 4 leaves samples each from local Bidar, Kalaburagi local and Yadgir districts local and Figure 1 shows that images of samples^{9,10}.

Sample Preparation

The collected leaves of plant samples were washed with a distilled water to remove clay, sand and dust, etc; the cleaned samples were dried in the airtight lab at room temperature for 20 days.

The dried leaves of the plants were mechanically powdered using a mixer grinder and finally sieved with a mesh of size 300 micrometers (µm) to get a fine powder, then stored in an airtight polythene plastic. The sample solution was prepared by adopting standard procedures: One-gram measured powder medicinal plant sample was added into the ratio of 0.1:10:90=100 ml, that is AR grade conc.-H₂SO₄ + Double Distilled water, here 100 ml solution subjected to the analysis elements¹¹.

Table 1: Collected Medicinal plants

Botanical Name	Family	Common name
<i>Azadirachta indica</i>	Meliaceae	Neem
<i>Cascabela thevetia</i>	Apocynaceae	Yellow oleander
<i>Ficus benghalensis</i>	Moraceae	Banyan
<i>Cassia angustifolia</i>	Fabaceae	Emperor's candlesticks

Table 2: Concentrations of Elements in Ayurvedic Medicinal Plants, (in mg/L)

Code no	Mg	Mn	Fe	Cu	Zn	As	Pb
Bai1	0.8227	0.0617	0.5175	0.0372	0.0571	0.0889	1.2634
Kai1	1.5318	0.0583	0.3360	0.0140	0.0454	0.0623	1.4993
Yai1	0.7415	0.0505	0.2709	0.0126	0.0492	0.0442	1.1887
Bct2	1.5223	0.0809	0.8691	0.0256	0.0440	0.0167	1.1903
Kct2	1.7712	0.0791	1.3327	0.0268	0.0464	0.0494	1.3529
Yct2	1.4891	0.0754	0.3268	0.0153	0.0242	0.0811	1.5681
Bfb3	0.7169	0.0475	0.3933	0.0066	0.0296	0.0355	1.2311
Kfb3	0.6917	0.0479	0.1949	0.0117	0.0264	0.0478	1.3169
Yfb3	1.1365	0.0622	0.0864	0.0056	0.0394	0.0802	1.5538
Bse4	1.4130	0.0717	0.5576	0.0134	0.0604	0.0123	1.5243
Kse4	1.5183	0.0693	0.4703	0.0109	0.0407	0.0571	1.4324
Yse4	1.3252	0.0718	0.4477	0.0218	0.0479	0.0783	1.4875
WHO Limits	35 mg/l	2 mg/l	20 mg/l	3 mg/l	27 mg/l	0.2 mg/l	10 mg/l



Azadirachta indica



Cascabela thevetia



Ficus benghalensis



Senna

Figure 1: Medicinal plants leaves images



Figure 2: FAAS instrumentation

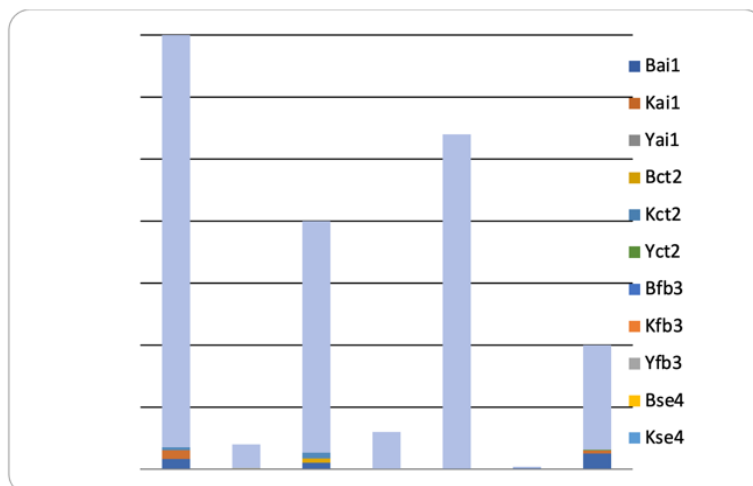


Figure 3: Analyzed elemental content in studied medicinal plants

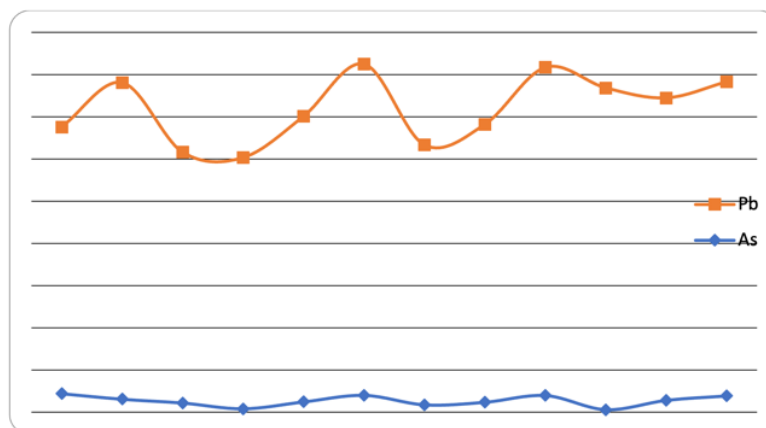


Figure 4: Toxic elements content

Experimental Method

The Flame Atomic Absorption Spectroscopy. (Dept. of USIC Gulbarga University) Model-Thermo scientific iCE 3000 Series spectroscopy. It is operated over on SOLAR window software and the flame types are Air- C₂H₂ Air-acetylene flame and N₂O- C₂H₂, Nitrous oxide- acetylene flames with different wavelength (180-900 nm) of the elements. Elemental concentration s calculated on the basis of Beer-Lamberts Law, it is the relation between absorbance and concentrations of an absorbing liquid solution. Detection limits: Flame Type: Air-C₂H₂ Air-acetylene flame and N₂O- C₂H₂, Nitrous oxide-acetylene flame, Band pass: 0.5 nm, Unit: mg/L, Burner height: 7.0 mm, Al and Cr elements Burner height: 11.0 mm and 8.0 mm, Al and Cr elements Flame Type: N₂O- C₂H₂. The instruments Atomic Absorption Spectrometer is Absorption Spectroscopy, in this method the Hollow-Cathode Lamp used as a source, Emits light of specific wavelength to be absorbed by the elements. FAAS instrumentation setup shows in below Figure 2.

RESULTS AND DISCUSSION

The present study carried out successfully on 4 different family Ayurvedic medicinal plants of the Bidar, Kalaburagi and Yadgir regions. All detected elements are classified as major element is Magnesium (Mg), similarly micro or trace elements viz. Manganese (Mn), Iron (Fe), Copper (Cu) and Zinc (Zn)

elements. Such that, the measured toxic elements like Arsenic (As) and Lead (Pb) were found lower toxicity level in all 4 medicinal plants. The resulting variations of elemental content found to be within the permissible limits of WHO/FAO. All these estimated elements are very essential to the natural growth of medicinal plants and improve the medicinal value. Further these data helpful to study the phytochemical analysis, carbohydrate study and proteins study etc. Similarly, the present studied medicinal plants contain high metabolic activity and biological process of human and medicinal plants. Table 2 shows the data of variations in elemental content of studied Ayurvedic medicinal plants.

In Table 2 last column given the WHO permissible limits of Mg, Mn, Fe, Cu, Zn, As and Pb elements in mg/L, so present study data confirmed that results under the WHO limits. Mg observed in high range Kalaburagi samples, Mn situated in Bidar samples similarly Pb found in rich content of Yadgir samples due to the geographical soil and water content changes.

The above Figure 3 Bar graph and 3-line graph shows the trend of major, minor; trace and toxic elemental concentrations were examined by a Flame Atomic Absorption Spectrometer. Total 7 different elemental concentrations and its individual variations of Mn, Cu and Zn are similar in all medicinal plants leaf samples, and which are shown the supplementary elements of human body and the content of Mg, Fe and Pb are rich content in studied medicinal plants. In Figure 4 it is show that the Pb

content gradually increasing in all sample as compared to the As element.

CONCLUSION

The present investigation provides the information on the elemental concentrations of Ayurvedic medicinal plants in different places of Bidar, Kalaburagi and Yadgir districts. It is approaching the four different family Ayurvedic medicinal plants examined by using highly efficient fluorescence methods such that FAAS instrument. All estimated essential elemental concentration found to be within the permissible limits of WHO/FAO. Present studied data it is useful to the new researchers, medicinal practitioners to prepare new health drugs and promote the society. Here Mg, Mn, Fe, Cu and Zn are the basic elements of the phytochemical, metabolic process of human bodies and it is improving the nutrition and vitamins. The present study noticed that the accumulation of toxic elements (As and Pb) will not exceed the daily intake level, if it is exceeded it causes kidney damage, liver damage, skin cancer, neurotoxicity etc., of the human body. Again, this information may be helpful in the synthesis of new Ayurvedic medicine drugs which can be used for the control of various diseases. The profile of elements mainly depends on the geographical reproduction of water, soil, and physiological changes of environment.

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REFERENCES

1. Paulo SC Silva, Lucilaine S Francisconi and Rodolfo DMR. Gonçalves, Evaluation of Major and Trace Elements in Medicinal Plants, *J. Braz. Chem*, 2016;27(12):2273-2289.
1. Nathan Oyaro, Bethpurity Makena, Mosima. A, Osano and Nyaigoti Omwoyo. W. Determination of the Levels of selected Heavy Metals in Medicinal plants from Narok County, Kenya and variations in their levels due to hot water Infusion. *International Research Journal of Environmental Sciences*, 2014; 3(12): 5-10.
2. Gurib-Fakim A. Medicinal plants: Tradition of yesterday and drugs of tomorrow. Review article. *Mol. Aspects Med*, 2006; 27 (1):1-93.
3. Vicker A and Zollman C. ABC of complementary medicine: herbal medicine. *B.M.J*, 1999; 319 (7222):1422.
4. Bamola N, Verma P, Negi C. A Review on Some Traditional Medicinal Plants. *International Journal of Life Science and Scientific Research*, 2018; 4(1): 1550-1556.
5. Basgel S and Erdemoğlu SB. Trace elements and plant secondary metabolism. *Science of Total Environment*, 2006; 359: 82-89.
6. Ratna Raju M, Madhusudhana Rao PV, Seshi Reddy T, Raju MK, Brahmaji Rao JS and CR Venkatasubramani. Elemental analysis of medicinal plants from different sites by instrumental neutron activation analysis. *International Journal of Bioassays*, 2016; 5.3: 4892-4896.
7. Santosh Teerthe and BR Kerur. Elemental analysis of medicinal plants from North Karnataka region by AAS method. *Int. J. Res. Ayurveda Pharm.* 2017;8(3):104-108. DOI: <http://dx.doi.org/10.7897/2277-4343.083153>
8. SS Teerthe and BR Kerur. X-Ray Mass Attenuation Coefficient of Medicinal Plant Using Different Energies 32.890KeV to 13.596KeV. *Elsevier Materials Today: Proceedings*, 2016;3:3925–3929.
9. Santoshkumar S Teerthe, Kerur BR. Determination of elements in Ayurvedic medicinal plants by AAS. *AIP Conference proceeding*; 2016;1675:030092-1–030092-4.
10. Himakar Reddy K, Jhansi U, Subramanyam G. Profiling of Selected Micronutrients and Heavy Metal Elements in *Ocimum Sanctum* by Atomic Absorption Spectroscopy. *International Research Journal of Pharmacy*; 2018;9 (9): 207-209.

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