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Accumulation of Elements in Homemade Herbal Medicinal plants

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Abstract— A case is taken up to study the accumulation of trace elements in homemade medicine with the help of herbal medicinal plants, namely *Aegle Marmelouz, FicusBenghalensis, Trigonella Foenum-Graecum, Prickly Chaff flower, Colocasia Esculenta etc.* The common people of North-East Karnataka region are traditional and hence they adopted homemade/traditional items. One such type is homemade medicine for treatment of different types of disease viz, cold, cough, diabetes, fever, judies, skin disease etc. The above said plants were collected in consultation with practitioner called Desi Vaidya's. The collected medicinal plants were dried in room without any ventilation which is free from dust. A fine powder was prepared with the help of grinder and mesh and using the oven about 10 grms of sample was made available in the form of ash. The standard solutions were prepared for all these ash samples for major/minor and trace elemental analysis. A single beam iCE 3000 Series spectrometers was used for analysis which is completely automatic in control and has a capacity for all element analysis. The whole system is controlled via a data station running Thermo Scientific iCE SOLAAR software which runs under a Windows® operating system. This study reveals that fourteen trace elements were detected by the AAS viz., Mg, Al, Si, K, Ca, Ti, V, Cr, Mn, Fe, Cu, Zn, Mo and Cd among these, the elements like Ca, Fe, K, Al, and Mg shows higher concentrations in some herbal medicinal plants. From the analysis of medicinal plants, it is noticed that the collected herbal medicinal plants are very useful for preparation of homemade medicine; the detected trace elemental contents are below the WHO permissible limit (1984-2005) values. Further, the biochemical studies of the samples are under progress.

Keyword: AAS techniques, Herbal medicinal plants, major/minor and Trace elements, etc.

I. NTRODUCTION

Medicinal plants have been identified and used throughout human history plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions, and to cure against illness from predators such as insects. At least 12000 such compounds have been isolated so far; a number estimated to be less than 10% of the total. Chemical compounds in plants mediate herbal medicines do not differ in terms of how they work. This enables herbal medicines to have beneficial pharmacology, but also not gives any form of side effects. Plants are critical to other life on this planet because they are the basis of all food webs. Our planet is autotrophic, creating its own food using water, carbon dioxide, and light through a process called photosynthesis. Some of the earliest fossils found have been aged at 3.8 billion years. These fossils deposits show evidence of photosynthesis, so plants or the plant like a castors of plants, have lived on this planet longer than most other groups of organisms. Man has been using several plants and herbs even from prehistoric times to cure various ailments. Plants based drugs are being increasingly used in many African, Asian, and Latin American countries. Usage of traditional herbal medicines, which is widely prevented in developing countries, has spread to the industrialized nations also as a complementary way to treat and prevent diseases according to WHO report.

Due to the increasing industrialization and environmental pollution, the study was also extended to estimate the level of toxic elements present in these medicinal plant samples. Even though the direct link between the essential elemental content and their curative capacity is not yet established, the experimental data of the present world will be of immense importance in the synthesis of new Ayurveda formulations. Also, it will help in deciding the proportion of various active constituents and managing dose of a particular formulation.

The Medicinal plants were collected near the Karpakpalli village of Humnabad taluk, which is a Medicinal Plant Conservation Area (MPCA) has been established. It is a part of saidapur Reserve forest. Situated at an altitude of 600-700 meters and the MPCA is spread over about 150 hectares. The terrain is undulating and vegetation is dry deciduous scrub type. It is the Northern most member of the Medicinal plants conservation network established by the Karnataka Forest Department and the Foundation for Revitalization of Local Health Traditions (FRLTH) jointly. The uniqueness of the MPCA is characterized by representation of the medicinal flora of the driest regions of the southern India.

Considering the importance of trace elements in various human metabolic processes and also considering their curative properties, in the present investigation we have used one of the sensitive analytical techniques like AAS, PIXE, INAA, etc. to study the essential elemental content in different parts of medicinal plants and herbs. Atomic absorption spectrophotometer (AAS) is an analytical technique that measures the concentrations of elements. Atomic absorption is so sensitive that it can measure down to ppb (parts per billion) or ppm (parts per million) of a gram (μg dm^{-3}) or 10^{-6}) in a sample. The technique makes use of the wavelengths of light specifically absorbed by an element present in the sample.. They correspond to the energies needed to promote electrons from one energy level to another, ie., higher energy level. Atomic absorption spectroscopy has many uses in different areas of chemistry 1) clinical analysis.2) Environmental analysis.3) Pharmaceuticals.4) Industry.5) Mining 8) Agriculture.

II.MATERIALS AND METHODS:

1. PLANT MATERIAL:

The figures 1 and 2 show the region of selected 11 medicinal plants which are collected from different places of Bidar district; and located at 17.9°N 77.5°E, lies at a central position in Deccan, situated at an elevation of 2300ft from the sea level. Being located at the farthest of around 700 km in North from the state capital Bangalore, 130km in North -West from Hyderabad and 116 km North East from Kalaburagi.

Soil:

The two important soils noticed in the district are black soils and lateritic soils. Lime Concentration in the black soil is high resulting in poor infiltration capacities. This type of soil Covers mainly in

areas lying below 610m contour and along the valley portions. A lateritic soil is confined to the central portion of the district. Lateritic soils are pale to bright red color and clayey loam in nature. This soil has moderate to good infiltration characteristics. . This type of Soils covers mainly in areas lying above 610 meters (2,000ft) contour

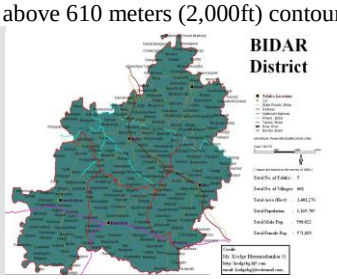

Fig 1: Karnataka map with Bidar distric Fig 2: Geographical map of bidar district

Fig 3 Datura Stramonium Fig 4 Colocasia Esculenta Fig 5 Phyllanthus Emblic

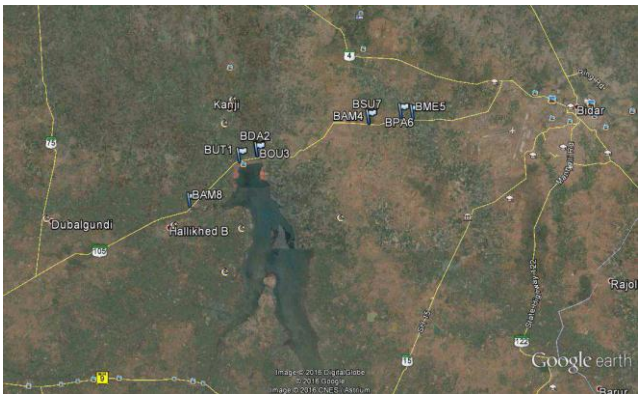

Fig 6 Sample collection position and marked by GPS

The figures 3, 4 and 5 are the different parts of herbal medicinal plants; these are very useful for the preparation of homemade herbal medicine, used to treat dog bite, snake bite, cough, cold fever, stomach problems etc. The Figure 6 is JPEG shows the collection of samples in particular region of collection using Garmin eTrex GPS.

Fig 7 Solution of hcl+ddw+1gm sample Fig 8 Standard solutions

2. SAMPLE PREPARATION:

The collected samples were cleaned and dried them in a shade which is exclusively used only for drying of medicinal plant samples. These samples were grinded till to get fine powder and then kept in oven at 200^0c to get the ash of all theses samples for spectroscopic analysis. The 1N solutions were prepared as follows for the elemental analysis using AAS method. The hydrochloric acid (HCL), Double Distilled Water and ash were taken in ratio of 25:25:1. 25ml of HCL acid in a borosil flask with the help of the pipette then add 25ml of double distilled water to the HCL. One gm of ash then add to the prepared solution contains HCL and distilled water and then closed the help of the aluminum foil. Stir the solution well for few minutes then filter with watt man paper. The well stirred solution is poured into the flask through the funnel slowly and do not fill the funnel completely so that no impurities will mix to the filtered solution without filtering. Then take 950ml of double distilled water and add the filtrate to it in a 1000ml container so that it will become a 1000ml solution to get 1N. This procedure was repeated for the remaining samples. The prepared solution were used for analysis of 18 elements (Mg, Al, K, Cr,Ti,V, Cr, Mn, Fe Cu, Zn, and Cd) of different concentrations in different elements. Below figures 7 and 8 are showd the prepared solution of samples for analysis of elements.

Table 1 Details of different medicinal plants

Botanical Name	Common Name	Family	Part Used
Recinus Communis	Caster Bean (Oudala Gida)	Euphorbiaceae	Leaves
Phyllanthus Emblica	Emblic Myrobalan (Nellikayi)	Phyllanthaceae	Nut
Punicagrantum	Pomegranate (Dalimbe)	Lythraceae	Layer
PricklyChaff Flower	Chaff Flower (Uttrani)	Amaranthaceae	Leaves
Ficus Benghalensis	Banyan (Aalada Mara)	Moraceae	Root
Carica Papaya	Papaya (Pappikai)	Caricaceae	Leaves
Colocasia Esculenta	Taro (Shavi Palya)	Araceae	Leaves
Datura Stramonium	Thorn Apple (Daturi Gida)	Solanaceae	Root
Trigonella Foenum-Graecum	Methi (Menthi Palya)	Fabaceae	Leaves
Tinospors Cordifolia	Guduchi (Amruta Balli)	Meinispermaceae	Leaves
Aegle Marmelous	Bael (Bilva Patri)	Rutaceae	Leaves

3. INSTRUMENTATION:

The presently used spectrometer is iCE 3000 Series is completely automatic for identification of all elemental. It is computer controlled via a data station running through SOLAAR software under a Windows operating system. The above instrument is a flame absorption/emission systems can be extended to graphite furnace and vapor modes by the use of the appropriate accessory. In the present work another spectrometer is used C_2H_2 and $N_2OC_2H_2$ flame air of the Atomic Absorption Spectrophotometer analytical instrument, is based on the principle of atomic absorption spectroscopy and is very useful to detect the metal ion concentration present in all solution samples as show in figure 8. When a sample solution is aspirated into a flame then sample element is changed into atomic vapor of

that element, naturally flame contains atoms of element. The ground state atoms then absorb the radiation of specific wavelength produced by source i.e. hollow cathode lamp of that specific metal. Now, the wavelength of radiation given off by the source or lamp is similar as that of absorbed by the atoms in the flame, hence follows the Beer's law, which states that absorbance is directly proportional to concentration. The AAS instrument was calibrated each time using the standards for the elemental analysis. The appropriate solution of sample was used each time for the elemental analysis present in the samples. The proportional intensity gives the concentration of element in the sample. This procedure was adopted for the elemental analysis. Atomic absorption spectrophotometer is an integral assembly consisting of light source i.e. lamp, sample cell, monochromatic, detector and output device then a signal processor integrates the changes in wavelength absorbed, which appear in the readout as peaks of energy absorption at discrete wavelengths. The obtained concentrations values of the elements are shows in the Table 2.

4. RESULTS AND DISCUSSION

The obtained vlues of concentration of major and minor elements are shown in table 2. It shows that different medicinal plants contain elements like Mg, Al, Si, K, Ca, Ti, V, Cr, Mn, Fe, Cu, Zn, Mo and Cd in various proportions. The variation in elemental concentration is mainly attributed to the differences in botanical structure, as well as in the mineral composition of the soil in which the plants were cultivated. Other factors responsible for a variation in elemental content are preferential absorbability of the plant, use of fertilizers, irrigation water and climatologically conditions. From the results obtained, it is observed that the detected elements are Mg, Al, Si, K, Ca, Ti, V, Cr, Mn, Fe, Cu, Zn, Mo and Cd among these the elements like Ca, Fe , K, Al, and Mg have high concentration which are shown in figures 9 and 10 in the plants like Aegle Marmelous, Tinospors Cordifolia, Colocasia Esculenta, Tinospors Cordifolia, Carica papaya respectively and the elements like Si, Mo, Ti, Cd, and V have low concentration in almost all the 11 samples.

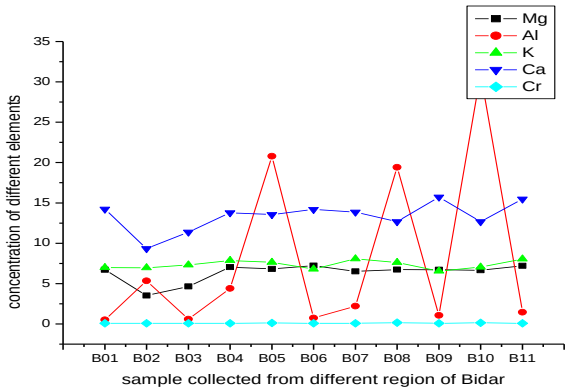

Fig 9 concentration of elements Mg, Al, K, Ca, Cr v/s samples collected from different regions of Bidar

In above figure 9 noticed that the correlations of calcium content in various medicinal plants analyzed has a high concentration in all the 11 samples with above all elements and hence it can be used for relieving tuberculosis, ulcers and digestive disorders. Calcium is essential for healthy bones. Hence, the depending the type disease arises due to deficient of micronutrients/minerals using the combination of the parts of plants/different plants may be used for medicinal treatment. Hence in the present cases some of the commonly arises cough, muscle pain, joint pain, etc., were used to prepare homemade medicines to cure and prevent them for further severe effects.

There is choice on how to use these medicinal herbs in a variety of ways, i.e., depending on the kind of herb that is to be used. Some herbs may be mixed with food. Some may be used while preparing a tea. Some homemade pills are made available in capsule or tablet form. For example Ginko (Ginko biloba) is good for circulatory disorders, but it also helps enhance memory. Castor plant is used most often to get castor-oil. This exercises a benefitting action on the teguments, both at the epidermis' level and at the derma level.

Castor-oil has a stimulating effect of the growth of eyelashes and eyebrows. Also, it helps in some cases of alopecia and strengthens the roots. The hair roots are massaged with castor-oil and may be applied before going to sleep. Hence in the present cases the home made medicines prepared by the nati Vaidya's are subjected to elemental analysis using AAS method.

Table 2 The concentrations of different elements (in mg/L) obtained in Different medicinal plants collected from Bidar region.

Coding	Mg	Al	K	Ca	Cr	Mn	Fe	Cu	Zn
B01	6.708	0.510	6.990	14.24	0.071	0.202	0.726	0.061	0.119
02	3.512	5.343	6.965	9.328	0.086	0.141	6.652	0.172	0.062
B03	4.642	0.596	7.302	11.39	0.084	0.057	0.631	0.413	0.104
B04	7.038	4.411	7.857	13.78	0.090	0.717	6.922	0.138	0.100
B05	6.815	20.78	7.634	13.54	0.114	0.534	17.42	0.328	0.120
B06	7.221	0.740	6.806	14.18	0.075	0.182	0.521	0.041	0.052
B07	6.512	2.210	8.062	13.86	0.086	1.047	2.931	0.229	0.134
B08	6.744	19.41	7.612	12.67	0.155	0.717	16.98	0.515	0.127
B09	6.718	1.062	6.552	15.73	0.081	0.134	1.206	0.071	0.055
B10	6.655	31.08	7.047	12.68	0.135	0.856	18.62	0.174	0.103
B11	7.214	1.460	8.045	15.47	0.089	0.411	2.458	0.325	0.148

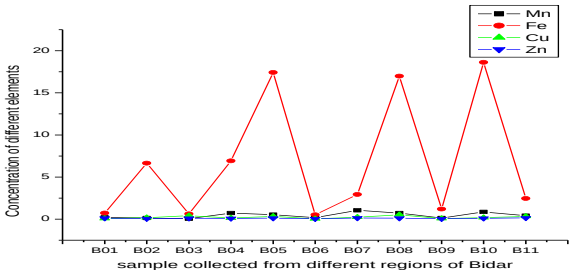

Fig 10 of concentration of elements Mn, Fe, Cu, Zn v/s samples collected from different regions of Bidar

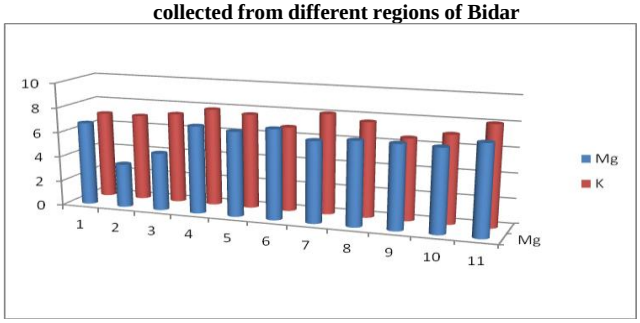

Fig 11 correlations of Mg and K

The above figure 10 shows major and minor elemental concentrations which is in different plants samples, Mg, Fe, Cu and Zn are the very useful for growth of neutrinos and anti-neutrinos

properties of plant and human biological system. Also fig11 gives the very compatibility correlation of Mg and K in all collected plants; the absorbed elements in medicinal plants are very preserved plant growth and to curie the different type of human diseases.

5. CONCLUSION:

The elemental analysis of some medicinal plants commonly consumed in the Bidar District are observed and 12 elements found viz., Mg, Al, Si, K, Ca, Ti, V, Cr, Mn, Fe, Cu, Zn, Mo and Cd. Elements like Ca, Al and Fe are the most detected abundant elements in the samples. These elements are found in the medicinal plants samples such as Ricinus Communis, Phyllanthus Emblica, Punicagrantum, Prickly Chaff Flower, Ficus Bengahalensis, Carica Papaya, Colocasia Esculenta, Datura Stramonium, Trigonella Foenum-Graecum, Tinospors Cordifolia, Aegle Marmelous. It is concluded from the above table 2 that such medicinal plants were oftenly used by naati vaidya's of this region which have high concentration Fe, Mg, Ca to overcome the anemia and diabetes. The present study reviles that all the plants selected for elemental study shows their elements presence but vary in concentration and their presence in also enteritis to cure many of the disease. It is therefore concluded that the plants under study are rich in there elements may also help in biodiversity function etc. The plants taken for the study may contains low concentration but it is not toxic and do not affect on physiological function of the body. This study indicates that some of these plants accumulate certain elements, and this property is exploited by the use of these plants for medicinal purposes in addition to their bioactive secondary metabolites constituents.

From the above studies of medicinal plants, the major and minor elements concentration were observed, conclude that the studied medicinal plant samples may be used to overcome the disease or illness like Anemia, Jaundice, Daria, Paralysis, Spew (Dehydration). The local medicinal expert (Naati Vaidya) have been using these medicinal plants along with fresh Goat milk apply to patient regularly in the early morning to overcome the disease or illness.

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6. REFERENCE:

1. B. L Lichterman, Aspirin: The Story of a Wonder Drug. British Medical Journal329 (7479): 1408. doi:10.1136/bmj.329.7479.1408 (2004).
2. IRACST – Engineering Science and Technology: An International Journal (ESTIJ), ISSN: 2250-3498, Vol.3, No.4, August (2013).
3. R. Lokhandeet al. / Natural Science 2 26-32(2010).
4. World Health Organization. Guidelines for the Assessment of Herbal Medicine Programme on Traditional Medicine.Doc. WHO/TRM/91.4.WHO, Geneva. (2003).
5. International Union for Conservation of Nature, IUCN, Red List of Flora, cited (1998), updated August, (2010).
6. A Baseline Survey of Minority Concentration Districts India Bidar (Karnataka) Retrieved 22 February (2015).
7. Karnataka Gazetteer, Govt. of Karnataka 1 January (1982).
8. Ground Water Information Booklet-Bidar District, Karnataka Ministry of Water Resources, Govt.of.India, July (2008).
9. Bidar District Official Website
10. Bidar Forests, Bidar District Official Website. Retrieved 14 March (2015).
11. Bidar Forests, Bidar District Official Website. Retrieved 14 March (2015).