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DETERMINATION OF TOXIC HEAVY METALS LEAD AND MERCURY IN TRADITIONALLY USED HERB

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ABSTRACT

During the last few decades much work in the field of natural products of Pharmaceutical significance has been done throughout the world. The development of science of pharmaceuticals and the hopes for remedies in chronic diseases generated new enthusiasm in the research workers to develop herbal medicines. Use of indigenous drugs from plant origin forms a major part of complimentary or traditional medicine. These natural products had been indispensably used by many cultures and traditions folklore medicines for thousands of years. They are intensively explored for their bioactive pharmacophores by modern pharmaceutical companies. The products of the plants and the drugs contains some toxic heavy metals which causes serious illness in the living beings. In order to evaluate the toxic metals in the medicinal plants an attempt has been made to demonstrate the presence of Lead and Mercury in the selected medicinal plant, a rare herb Sarcostemma acidum. Monitering the plants for metals is of great importance for the prevention adverse affects on health.

Key words: Heavy metals, Sarcostemma acidum, Lead and Mercury, Tocixity

INTRODUCTION

Plants have been used by man since the beginning of human culture for great variety of purposes and produce a highly individual range of natural products and these plants are the sources of direct therapeutic agents. Medicinally potential Plants serve as a model for new pharmacologically active compounds in the field of drug synthesis. Ayurvedic drugs are called the elixirs of life and played important role in health and treatment from ancient time and to this modern time.

Indigenous medicinal plants are an important component of traditional knowledge. In India, the use of medicinal plants as crude drugs dates back to Vedic era. The collection and utilization of drugs by the aboriginal tribes is being practiced since Vedic period. These natural products had been indispensably used by many cultures and traditions in folklore medicines for thousands of years. The use of plants as medicine by traditional people paved the way for the discovery of modern medicines. Ethnopharmacological surveys provide the rationale for selection and scientific investigation of medicinal plants. Today the plant derived compounds play an important role in modern drug discovery (Cragg etal., 1997) estimated that appeocimately 60-70% of antitumor and anti-infective agents that are available are of natural origin. According to WHO 80% of the world population relies on herbs and on traditional healing system for both prophylactic and curative therapies (Akerele, 1993). In addition with the life saving components in the plant, the plants also carries traces of toxic heavy metals which causes serious ailments in living organisms because of their cumulative effect. Contamination with heavy metal is one of the main problems and evaluation of natural products has a primary goal of the assurance of safety and efficacy (Bauer, 1998), (Ernst, 2002).

In the present study, a rare herb called *Sarcostemma acidum* also called moon plant with its characteristic features and is used traditionally from the past by traditional healers and Ayurvedic physicians for curing different ailments like TB, acts as aphrodisiacs, stimulant and is used in psychic disorders is selected and analyzed for heavy metal toxins in the plant material. The plant is known from the Vedic age and is described in Ayurvedic compendiums like Susrutha and Charaka Samhitas. The plant is collected from the Sahya mountain ranges with the help of local tribal people of Kollengode, Palakkad district, Kerala, India. The present paper reveals the estimation of heavy metal lead and mercury concentration in the plant. There are studies carried out for heavy metal toxicity in different medicinal plants. Within my knowledge in this plant there are no findings on heavy metal concentration. I have taken the literature from electronic journals, books and standard journals for references.

Materials and Methods:

Preparation of sample: The plant was collected from the mountain ranges and is shade dried and gets the powder of the whole plant.

Instrumental analysis was carried out by Flame AAS nov AA350 (Atomic Absorbance Spectroscopy) with Hollow-Cathode and Deuterium Lamp, AA280FS Atomic Absorption Spectrometer

Chemicals used:

Nitric acid.

The dried powder of the plant was taken as sample and was subjected to Microwave digestion. H. M. Kingston (1988).10gms of sample powder was taken in 250ml beaker and added 100 ml of 0.3 M nitric acid and stirred gently for 30 minutes. The determination of selected heavy metals was done using AAS. Estimation of Lead and Mercury was determined in the sample.

Results:

Concentration of selected metal Lead:

Estimation of Pb

Different concentration was taken and analyzed the absorbance

S.NO	CONC in (ppm)	ABS
1	0.001	2.204
2	0.002	2.316
3	0.003	2.429
4	0.004	2.513
5	0.005	2.608
6	0.006	2.724
7	0.007	2.815
SAMPLE	0.002	2.319

Table: 1

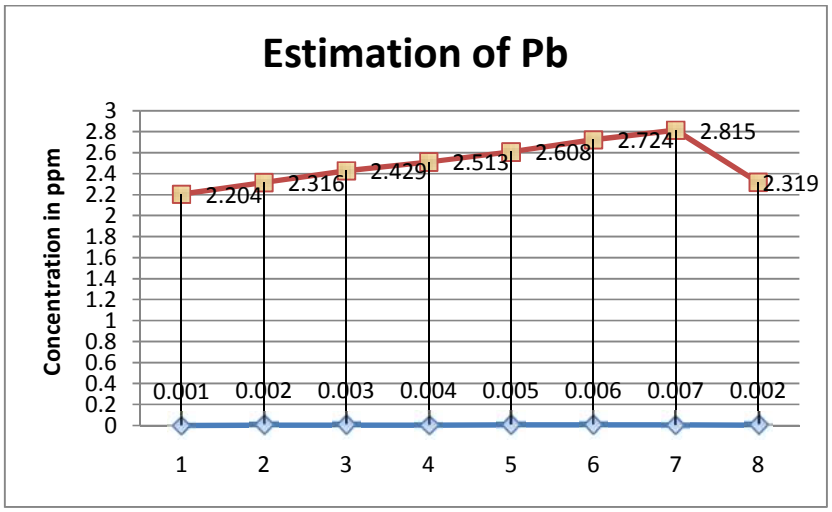

Figure: 1

The concentration of the selected toxic heavy metal Lead found in the plant sample is 0.002mg/g

Estimation of Hg:

Concentration of selected metal Mercury:

Different concentration was taken and analyzed the absorbance

S.NO	CONC in (ppm)	ABS
1	1.0	0.123
2	2.0	0.298
3	3.0	0.361
4	4.0	0.474
5	5.0	0.582
6	6.0	0.636
7	7.0	0.714
SAMPLE	0.0	0.0

Table: 2

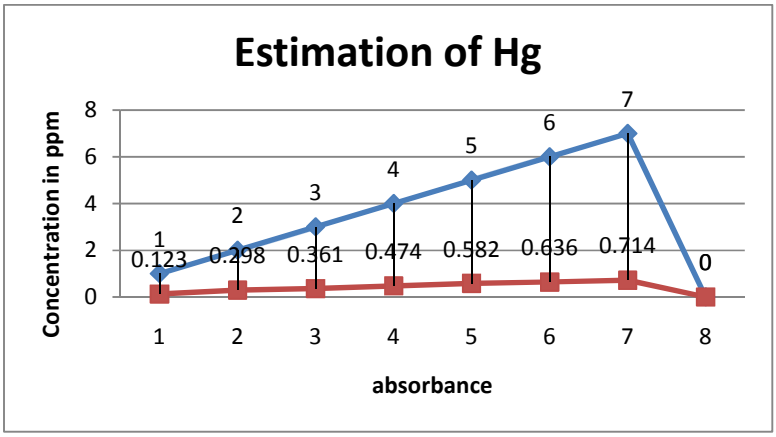

Figure: 2

The concentration of the selected toxic heavy metal Mercury found in the plant sample is 0.0 Nill. There are no traces of heavy toxic metal mercury found in the plant material.

Discussion:

Indigenous medicinal plants are an important component of traditional knowledge. India is an exquisite example of biodiversity. Many tribes and herbalists had a deeper knowledge of herbs and their medicinal uses than other people. Even the most primitive tribes possessed the knowledge of drugs and used some medicinal plants. Many effective drugs were used in primitive and folklore medicine such as opium, coca, cinchona ephedrine caffeine, digitalis polyphyllus and squill. Drugs were used as decoctions, infusions of leaves, bark, roots or flowers also mixing powdered drugs in oils or fats or burning the drugs and inhaling the fumes was the practice

Even the prehistoric man used herbs to cure common maladies and he virtually adored the plants which provided him with vigor, vitality and wisdom. In our country, medicinal plants are an integral part of the indigenous system of medicine. The rapid development of phytochemistry and pharmacological testing methods in recent years, new plant drugs are finding their way into medicine as purified phytochemicals, rather in the form of traditional galenical preparations.

Toxicity:

Evaluation of toxic metals in plants employed for the development of drugs is essential to avoid hazardous health effects and also minimizes the consumption of medicinal plants contaminated with heavy metals. There are minerals which are essential for human health and can be taken as supplements. But the toxic element consumption results deleterious effect on health in living organisms. They interfere in body's functioning and metabolism. They cause tissue damage. Methymercury is very toxic to humans and cause brain damage. There are different sources for the contamination of toxic heavy metals in the plant. They may be environment, food, water, Industrial sites, agricultural sites, soils etc. Presence of mercury in the food and drug leads to autoimmune disorders. Lead is one of the toxic elements that cause hazardous effect on health. Lead shows deleterious effect on central nervous system, kidneys, bones etc. Lead intoxication leads to nausea, constipation fatigue, headache, and muscle aches anemia etc. The frequency and severity of medical symptoms increases with the concentration of lead in the blood. Determination of toxic heavy metals in plants with potentially medicinal properties has not received the same research effort and importance as the like the isolation and standardization of photochemical in plants (Branter and Males, 1999).

There were reports on heavy metal testing in different medicinal plants showed lead, zinc, cadmium, arsenic, etc showed different concentration levels (Abou-Arab et al., 1999). The metal concentration in the tested plant was lower than the permitted values. Studies of Ajasa et al., (2004), showed the analysis of 10 medicinal plants and one of the plants Azadirachta indica presented the highest mean concentration of lead at 0.49μg/g.

Caldas and Machado (2004) employed AAS analytical technique for metal analysis to obtain the contents of Cadmium, lead and mercury in some medicinal plants.

In the present study the plant selected for determination of heavy metal contamination shows that Mercury is not found in the plant as can say that the medicinal plant is Mercury free plant. It is an important factor that the plant is safe for the development of new drugs by adopting biotechnological and molecular techniques. The concentration of lead found in the plants is 0.002 μg/g. The *Sarcostemma acidum*, whole plant sample shows no mercury in the plant and the concentration of lead is 0.002 μg/g, very minute traces. Other qualitative and quantative test has to be done for further studies. The plant can be assessed for drug development through the analysis of phytochemical studies and biological activities. Low concentrations of heavy metals increase the scope for the development new naturally active biocomponents which can be used as food supplements and natural drugs. It correlates with the articles published previously. Contamination of medicinal plants with toxic heavy metals is an issue that must concern all.

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