ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Estimation of Toxic Heavy Metals in traditionally used Medicinal plant

Sudha Karayil, Veeraiah K, KRS Sambasiva Rao

Dept. of Biotechnology, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India

ABSTRACT

The traditional medicines cater about 85% of the world population for their health needs. It is essential to maintain safety, quality and efficacy of the plant and their products to avoid and serious health problems. Pharmacological evaluation of the medicinal plant and products has been recommended for the purity and quality of the drugs coming from the botanicals. Atomic absorption spectrophotometry is the technique enabling individual elements to be assayed. The aim of the study is to estimate the amount of toxic metals present in the selected medicinal plant, which is a traditionally used herb.

Key words: Heavy metals, medicinal plant, *Sarcostemma acidum,*

Corresponding author
E-mail: sudha.karayil@gmail.com

ISSN: 0975-8585

INTRODUCTION

The knowledge of drugs has accumulated over thousands of years. India is a home to a great variety of ethno medicinally important plant species. The basic resources of medicines come from nature and they are used as medicaments from ancient time to present day. People around the world possess unique knowledge of the natural resources on which they depend, including tremendous botanical expertise. The traditional medicines cater about 85% of the world population for their health needs. It is essential to maintain safety, quality and efficacy of the plant and their products to avoid and serious health problems. Pharmacological evaluation of the medicinal plant and products has been recommended for the purity and quality of the drugs coming from the botanicals [1]. Heavy metals like Cd, Ar, Pb, Cu, Hg, Zn etc are toxic metals cause health problems when the plants contaminated with heavy metals. So, to avoid harmful effects, monitoring the heavy metals in medicinal plants is therefore of great importance. Some metals acts as essential nutrients like Zinc, iron, copper cobalt, etc in trace amounts and they became toxic at high concentrations. The metals like mercury, lead, and cadmium have no beneficial effects and they are highly toxic to living organisms. Detection of toxic heavy metal contaminants like arsenic and cadmium has to be recommended for safety of the botanicals [2-4]. WHO in 1997, developed draft for guidelines for methodology on research and evaluation of traditional medicine.

The methods for determining the toxicity and heavy metal contamination in medicinal plants and their drugs by traditional methods is problematic. Atomic absorption spectrophotometry is the technique enabling individual elements to be assayed. The aim of the study is to estimate the amount of toxic metals present in the selected medicinal plant, which is a traditionally used herb. The plant is used to treat asthma. In Ayurvedic texts there were discriptions about the plant and its use in the treatment of different ailments.

MATERIALS AND METHODS

Preparation of sample: The plant was collected from the sahya mountain ranges and is shade dried and powdered the whole plant. The powder is taken as sample of the estimation of heavy metals.

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.

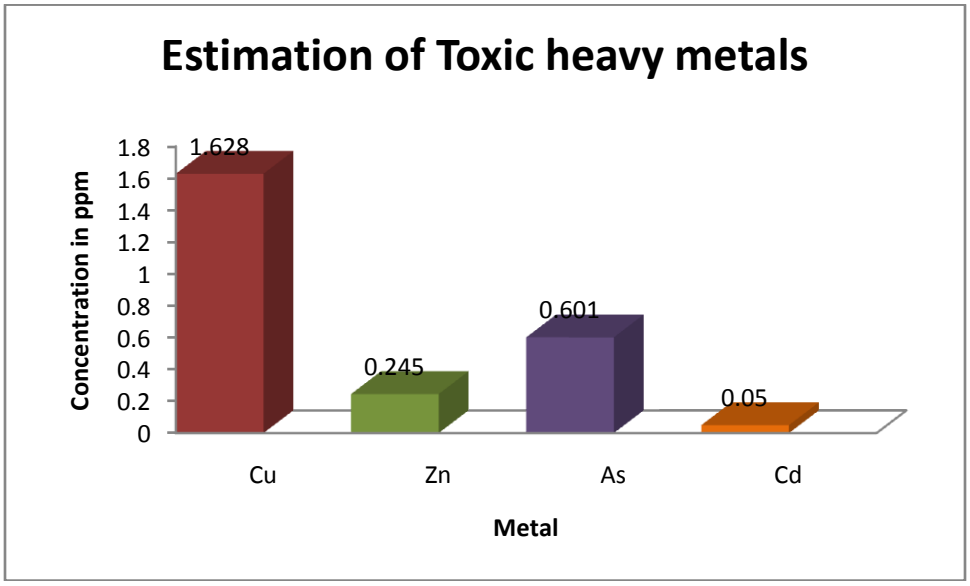
The dried powder of the plant was taken as sample and was subjected to Microwave digestion. H. M. Kingston (1988).10gms of sample powder was taken in 250ml beaker and added 100 ml of 0.3 M nitric acid and stirred gently for 30 minutes. The determination of

ISSN: 0975-8585

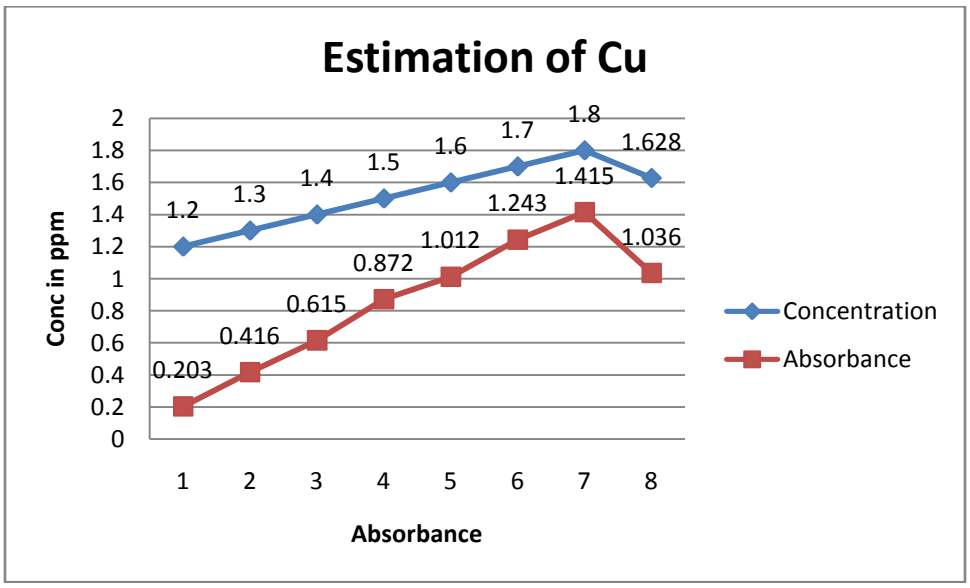
selected heavy metals was done using AAS. Estimation of Cu, Zn, Ar, and Cd were determined in the sample.

RESULTS

Four metals (Cu, Zn, Ar, Cd) were analyzed from the powdered medicinal plant and detected that copper and zinc were detected when compared to cadmium and Arsenic. The results were represented in graphs**.** Graph 1 represents the concentrations of selected metals in the plant sample. Graph 2-5 represents the different concentrations against different absorbance was recorded.

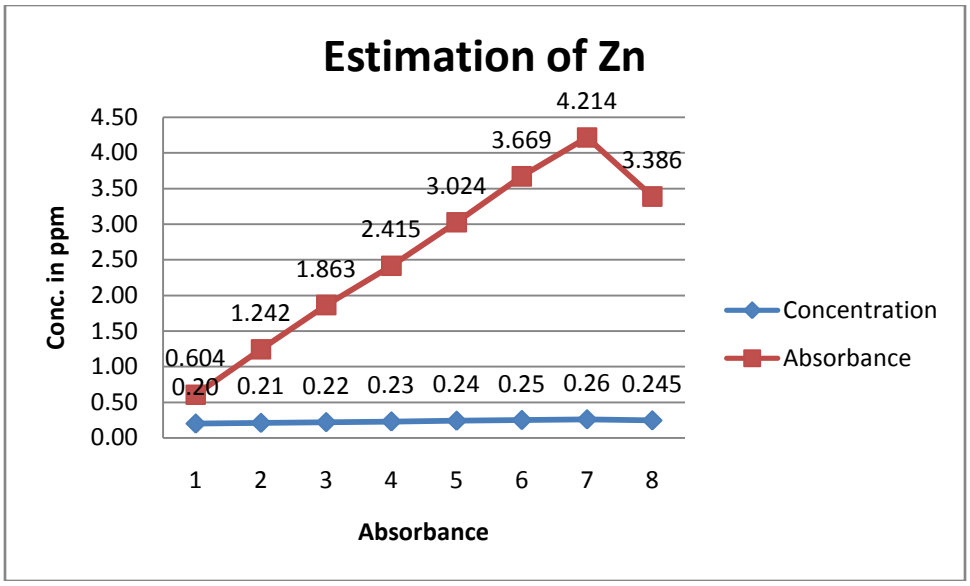


Graph 1

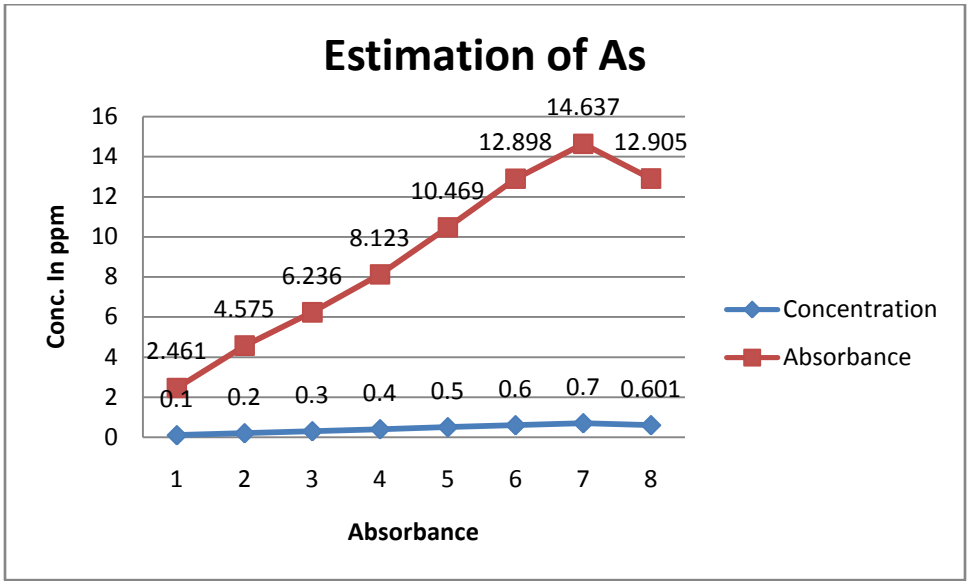


Graph 2

ISSN: 0975-8585

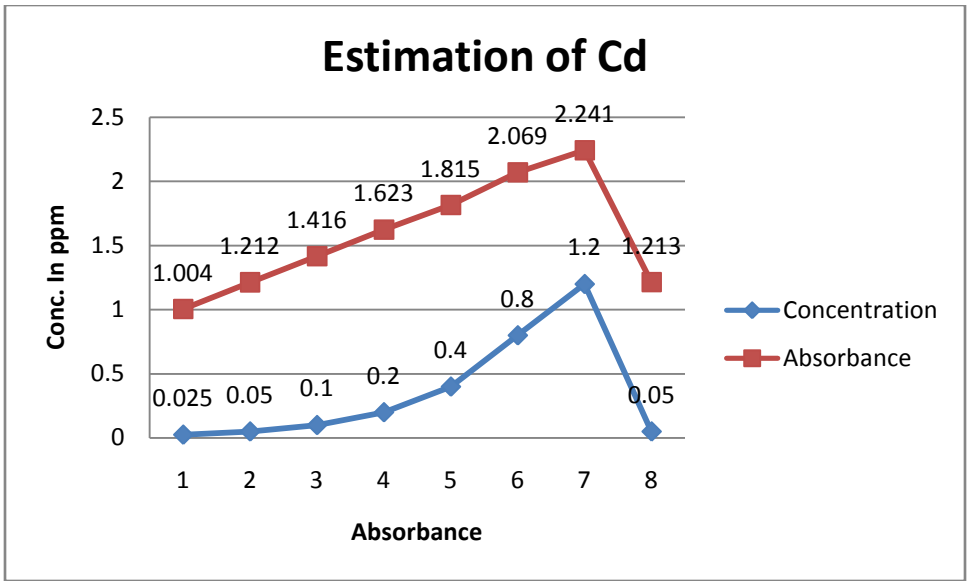


Graph 3



Graph 4

ISSN: 0975-8585



Graph 5

DISCUSSION

Over the centuries, drugs from the natural plants have been used and gaining importance and increasing the demand for the traditionally used drugs. Detection of pesticidal residuesand Ions of heavy metals such as znic, copper, cadmium, arsenic etc are present in medicinal plants and acts as nutritional supplements in trace amounts. They play as essential micronutrients that are involved in functional activities of large number of proteins and other metabolic functions [5]. Some are toxic and causes serious health problems when the plant and their products contaminated with these heavy metals. In the present study a rare herb which is used traditionally from centuries known as (Sarcostemma acidum) Somalata or Moon plant, and the taxonomical classification of this particular plant is still in ambiguous state is taken for the estimation of heavy metals. In the present study Copper and Zinc which are essential micronutrients up to certain concentration is determined in the whole plant dried sample powder. Copper plays a role in the oxidative defence system but the high levels of copper leads to severe poisoning. Atomic absorption spectrophotometric analysis reveals the concentration of the copper level in the plant is 1.628 g/g and is under WHO limit (40mg/kg). The concentration of Zinc is 0.245g/g and below the recommended level by WHO (60mg/kg). Zinc is co-factor of over 200 enzymes and involved in metabolic pathways. If it exceeds the limits leads to toxic to the body. It interferes with copper metabolism. This shows similarities with previous studies [6]. The plant can be used as nutrient supplement as it shows copper and Zinc. Zinc and Copper are the essential trace elements and is required for bodies' major metabolic functions. Adequate traces of copper are required for the growth of new blood vessels, and in wound healing property [5]. Zinc enhances immune system. Heavy metals like Arsenic and Cadmium also determined in the present study. Components of cadmium are classified as human carcinogen [7]. In the present analysis the cadmium was found in traces 0.05 g/g in the plant sample and it is within the limits recommended by WHO as 0.3mg/kg. The Arsenic content was recorded as 0.601 g/g in the plant sample. Arsenic and Cadmium are both potential threats for

human health [8-10]. These values are within the limits and show similarities with the previous findings. The selected plant can be used for the development of drug and herbal products it contains no heavy metals concentrations beyond the recommended limit.

REFERENCES

[1] Peter AGM & De Smet, Herba remedies, New Eng J Med, 347 (2002) 2046-2056.

[2] WHO, 1993. Evaluation of certain food additives and contaminants-41st Report of Joint FAO/WHO Committee on Food Additives, Geneva, Switzerland.

[3] WHO, General guidelines for methodologies on research and evaluation of traditional medicine, (World Health Organization, Geneva), 2000, pp1-73.

[4] WHO Quality Control Guidelines for Medicinal plant materials (World Health Organization, Geneva), 1998, pp 1-111.

[5] Ksenija Gasic and Schaylers Korban. Physiology and Molecular Biology of Stress tolerance in plants. 2006, 219-254.

[6] Fatima. N, Z.T. Maqsood and B. Khan. Saientia Iranica 2005; 12 (3): 269-273.

[7] Nawrot, T, Plusquin M, Hogervorst J, Roels H, Celis H, Thijs L, Vangronsvel J, Van Hecke E, Staessen. Lancet Oncol 2006; 7: 119-126.

[8] Zhao FJ, Ma JF, Meharg AA, Mc Grath, SP. New Phytol 2009; 181(4): 777-794.

[9] Joanna Declirt. Bro Metals 2005; 18: 475-481.

[10] Lukasi HC. Vitamin and mineral status: Effects on physical performance. Nutrition 2004; 20: 632-644.