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ASSESSMENT OF HEAVY METALS LIKE LEAD, CADMIUM AND COPPER IN MEDICINAL PLANTS COLLECTED FROM MARKET OF NASERIYA CITY, IRAQ

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Abstract

The medicinal plants have played a key role in world health and represent the primary sources of health care for the majority of the world population. Heavy metals introduced into medicinal plants through contamination agriculture resources, anthropogenic activity and as a results of change in environmental conditions. Thus, the study aim was determined the level of Pb, Cd and Cu concentration in four medicinal plants such as *Zingiber officinale*, *Cinnamumum cuminum* and *Curcuma longa* in Naseriya city by atomic absorption spectrophotometry. Result showed that the concentration of the metals studied was:(1.712-0.846) $mgKg^{-1}$, Pb, (0.103-0.04) $mgKg^{-1}$ Cd and (9.540-1.494) $mgKg^{-1}$Cu.the concentration of the studied metals was lowest than the WHO permissible limit in medicinal plants.
Keywords : Medicinal plants, lead, cadmium and copper, Naseriya city.

Introduction

Medicinal Plants are traditionally used in many countries. In the last few decades inters in natural therapies has increased among of population of developed countries as well. The WHO has estimated that (80%) of the world population relies of non-conventional medicines and especially herbs, for both prophylactic and curative therapies (Kerele, 1998). In the recent years, human activities, such as agriculture promote heavy metals release into the environment. Thus, the analytical determination of heavy medicinal plants has become a part of quality control in order to establish their purity, safety and efficacy (Baranowska *et al*., 2002). Medicinal Plants may be used directly as therapeutic agent or as precursor material for the synthesis of new drugs. The complexity of such plants and the variability of their chemical composition depends on environmental factors, suitability of storage conditions and manipulation procedures, toxicological, clinical and pharmacological systematic studies are indispensable in their characterization (Johanson, 1997). Medicinal Plants have been shown a rich sources of essential metal ions and a potentially dangerous source of non-essential metals (Nareudhirannun *et al*., 2005). The toxic effects of heavy metals are due to their hindrance with the regular body biochemistry in normal metabolic process (Duruibe *et al*., 2007). The WHO (1998) recommends maximum permissible levels in raw materials for Cd and Pb which amount to 0.3 and 10 $mg.kg^{-1}$,respectively even though certain essential element can be toxic at high levels (WHO 1998). Copper becomes toxic at high concentration .If its concentration in dry plant material is higher than 20-100 mg /kg, it becomes phytotoxic (Khan *et al.,* 2008).

Material and Methods

Analyses of the Medicinal Plants

Four medicinal plants *Zingiber officinale*, *Cinnamumum cuminum, Cyminum cuminum* and *Curcuma longa*. Collected from Naseriya city market. The samples were washed with deionized water and allowed to dry in over for 72 hours at a temperature of 65ºC.The samples were then ground and sieved through 0.5 mm sieve. The powder samples subjected to the acid digestion using HNO_3 and $HClO_4$ (Ogunwande Ia *et al*., 2006).

Chemicals and Reagents

All chemicals and reagents were analytical grade, Nitric acid and Perchloric acid (Merck, Germany). A standard stock solution of lead, cadmium and copper salts containing (1000 mg/L) were prepared.

Spectrophotometric assays

after the digestion of the sample with HNO_3 /$HClO_4$, followed the analysis by spectrophotometer (AAS) Flame Atomic Absorption Spectrophotometric (AA-500 AFG PG instruments, Japan).The AAS in corporate an air /acetylene fame system and it was performed calibration Curves with Pb, Cd and Cu standards.

Results and Discussion

A total of three elements (Pb, Cd and Cu) were determined in four medicinal plants in Nasiriya city all samples were analysis three times by using Atomics spectrophotometer. All results were calculated on a dry weight basis ($mg.Kg^{-1}$ dry weight). The results of analysis are shown in table 1. The pb concentration varies between (0.846 – 1.712 mg/kg).The *Cuminum cyminum* had the lowest level and *Cinnamumum* had the highest. The WHO maximum limit of Lead prescribed in herbal medicines and products' is(10 mg/kg) While the dietary intake limit for Pb is 3 mg/week (WHO 1989). Lead is known to cause neurological disorders, anemia, kidney damage, miscarriage, lower sperm count and hepatoxicity in higher concentration (ATSDR 2007). For the Cd concentration was found varies between (0.041 – 0.103 mg/kg^{-1}). *Zingiber officinale* contains the highest level of Cd and *Cinnamumum* contains the lowest. The WHO prescribed limit for Cd contains in medicinal plants is 0.3 mg/kg and the maximum acceptable concentration for food stuff is around 1 ppm (WHO 1989). Cd is known to cause in toxication to kidney, bone and pulmonary damage (Godt *et al*., 2006). and for the Cu concentration was varied between (1.495 – 9.581 mg/kg). *Cuminum cyminum* had the highest level and *Curcuma longa* had the lowest. There is no permissible limit prescribed by WHO, but WHO (1996) has recommended the lower limit of

the acceptable range of Cu as Cd, and Cu in ($mg.kg^{-1}$ dried plants) in four medicinal plants, *Zingiber officinale*, *Cinnamomum*, *Cuminum cyminum* and *Curcuma longa* in Nassiriya city – Iraq.

Medicinal plants	Pd	Cd	Cu
Zingiber officinale	1.521 ± 0.21	0.103 ± 0.05	7.962 ± 0.90
Cinnamomum	1.712 ± 0.31	0.079 ± 0.06	7.231 ± 0.89
Cuminum cyminum	0.846 ± 0.28	0.042 ± 0.11	9.581 ± 1.1
Curcuma Longa	0.925 ± 0.37	0.071 ± 0.04	1.495 ± 0.35

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