Pak J Sci Ind Res 2001 44 (5) 291-293

DETERMINATION OF MAJOR AND TRACE ELEMENTS IN *ARTEMISIA ELEGANTISSIMA* AND *RHAZYA STRICTA* AND THEIR RELATIVE MEDICINAL USES

F A Kaneez*, M Qadiruddin, M A Kalhoro, S Khaula and Y Badar

PCSIR Laboratories Complex,Off University Road,Karachi-75280, Pakistan

(Received 25 June 1998; accepted 12 December 2000)

Artemisia elegantissima and *Rhazya stricta* have been explored to determine major and trace elements and their possible role in human health. Thirteen trace elements have been studied in both the plants which were found to be rich in Cu, Co, Fe, Mg, Mn and Zn. These trace elements are reputed being main constituents for human health and for curing some diseases. They are also found to be rich in nutrient elements which are best source for fodder.

Key words: Indigenous medicinal plants, Trace elements and human health, *Artemisia elegantissima, Rhazya stricta.*

Introduction

Trace elements play both curative and preventive role in combating diseases. The curative feature played by Fe in anaemia is a classic example. Fundamental aspects of life namely, conception and normal growth and the high specific metabolic acordermatitis enteropathica, represent the Spectrum of Zn as medicine, preventive and curative (Iyengar Gv 1987). However though much is known about the functional role of a number of other elements, but the nature of their metabolic lesions responsible for early pathological manifestation are unclear and therefore efforts to characterize the biologically potent forms of trace elements merit full attention. Simultaneously, it should be recognized that there is a vast scope to exploit the preventive medicinal aspects of various trace elements such as Cu, Cr etc. since the best foreseeable benefit for human health by mineral nutrition lies in obtaining the correct amount of supplementation in the right form at the right time. Medicinal plants play the most important and vital role in the traditional medicine. In most developing countries most of the flora remains virtually unexplored from point of view of the medicinal utilization though traditional eastern system of medicine strongly upholds the use of these elements for curing many diseases. For trace elements such information is widely reported in the scientific literature and even for a single element it may be possible to find all the information.

Greaves and Skillen (1970) and Salikhodzaev (1988) observed that trace elements are essential for all forms of life and having wide range of clinical applications play a key role in the treatment of various diseases. Thirteen trace elements were detected from both the indigenous medicinal plants. i.e. *Rhazya stricta* belonging to Apocynacea (Hoker 1882) and *Artemisia elegantissima* belonging to Compositae families (Stewat 1972).

*Author for correspondence

Materials and Methods

The determination of various elements in ash of plants have been carried out by Flame Atomic Absorption Spectrophotometer. These plants were collected in the month of June and indentified at the botany Department, University of Karachi. The Plants were oven, dried, powdered and ashed in a muffle furnace at 550°C.

Elemental analysis of samples. Digestion of the sample. One gram of the sample was digested with 10 ml concentrated nitric acid in acid washed pyrex tube till solution was clear and volume was reduced to about 1.0 ml (Syed and Qadiruddin 1993). The solution was made up to 10 ml with distilled water. A sample blank was also prepared similarly. Estimation was made using standard addition technique. The dilutions were made such as to keep the concentration of different elements within the linear range of absorbance. The standard solutions of different elements were prepared by diluting with 1% nitirc acid, 1000 mg l^{-1} stock standard solution from M/s E.Merck.

Instrument. Hitachi Z-8000 Atomic Absorbtion Spectrophotometer equipped with Zeeman background corrector and data processor was used for elemental analysis of the samples. All parameters were set and followed strictly according to the manufacturer's instructions using flame atomization technique.

Results and Discussion

Elemental studies of both the plants i.e. *Rhazya stricta* and *Artemisia elegantissima* revealed that both plants contain large amounts of nutrients and are rich in Al, Fe, Mg, Mn, Cu,

Sr and Zn. According to the literature Cr, Mn and Zn play an important role in the metabolism of cholesterol as well as in heart diseases (Salkhozdhayer and Shabilalov 1989; Kuhrts and Eric 1990; Pat 1992) Cu and Zn being chemical antagonists both have an important role in controlling blood lipid level. Cu concentration is reported to increase with atherosclerosis, hypertension and myocardial infarction as compared to healthy control (Aronov 1973). Zn is also reported to have beneficial effects in atherosclerosis (Hazel *et al* 1971). Zn and Cu have gained importance and drawn great attention in cancer research during the last few decades; both of these elements are required for the growth and proliferation of normal cells. In cancer tissues the concentrations of Zn and Cu are exceptionally high (Mathur 1978). In plasma, Zn concentration are usually low in cancer patients, whereas copper concentrations are very high. Only a few studies have been performed to investigate the role of Zn and Cu in experimental and human carcinogenesis. A high Zinc intake has been reported to reduce the incidence of certain malignant tumours in humans (Mathur 1978). On the other hand low dietary Zn has been found to inhibit the growth of walker-256 carcinosarcoma and lewis lung carcinoma in experimental animals (De wys *et al* 1970; De wys and Pories 1972). All living cells required both of these elements for optimal growth as part of metalloproteins and enzymes. At present according to (RDA) levels i.e. recommended dietary allowance published by the food and nutrition board (USA), a normal adult should receive 15 mg of Zn and 2.5 mg of Copper a day. Since both the plants under elemental studies show richness in Copper and Zinc the antitumour property of *Rhazya stricta* (Siddiqui *et al* 1972) and cholesterol lowering property of *Artemisia elegantissima* (Kalhoro *et al* 1997), may be correlated with the presence of these two elements, though the mechanism of action of trace elements is not exactly known. *Rhazya stricta* plant contains anticancer indol alkaloids (Mukhopadhyay *et al* 1981) and has been used in unani system of medicine as antitumour agent. The presence of Cr and Mn in both plants may, too be correlated with therapeutic properties i.e. antidiabetic and cardiovascular diseases (Perry 1972), Fe (iron) dificiency is associated with mycardial infarction. Mg in the plants lowers the cholesterol but also alleviates heart disease (Yahya 1983). Mn present in both the plants may prevent the development of experimental atherosclerosis in laboratory animals and has beneficial effect on lipids and carbohydrate patients (Sakharchuk *et al* 1972). The plant *Euphorbia prostrala* (Dodhi) is rich in Mn content and has the significant antidiabetic effect. *Alfa alfa* and *Artriple helimus,* which have high Mn content exert a significant hypoglycemic effect (Shoaib and Irfan 1983). It is concluded from the above study that trace element contents in both the plants may play important role in human health. Elements which have equality of their protective value need to be subjected to further detailed investigations. Recently it is observed that *Artemisia elegantissima* reduces the serum cholesterol level. Survey of plants and their mineral constituents is necessary to discover those with high concentration of protective elements.

Table 1

Concentration of different elements in $\mu g\ g^{-1}$ in *Artemisia elegantissima* and *Rhazya stricta* ashes

S.No.	Element	*A. elegantissima*	*R.stricta*
1	Al	20514.10	19206.50
2	Ag	9.30	7.55
3	Co	5.34	6.53
4	Cr	29.59	33.63
5	Cu	754.35	669.20
6	Fe	30271.00	24550.35
7	Mg	34145.16	30614.75
8	Mn	2144.66	2477.45
9	Ni	29.00	24.28
10	Pb	20.00	24.86
11	Sr	615.25	573.50
12	Ti	335.05	230.85
13	Zn	639.99	530.00

References

Aronov A V 1973 certain micro elements in experimental myocardial infarction in the presence of hypertension and arterio sclerosis. *Kardiologiya* **13** (7) 43.

Azhar M S, Qadiruddin M 1993 Detection and estimation of trace elements in tea (Theasinensia) by ICPAEs and FAAs methods. *Pak J Sci Ind Res* **36**(6) 325-7.

De way W I, Pories W J 1972 Inhibition of a spectrum of tumours by dietary Zinc deficinecy. *J Natl Cancer Inst* **48** 375-381.

De ways W I, Pories W J, Riehter M C 1970 Inhibition of Walker-256 carcinosarcoma by dietary Zinc. *Proceeding. Soc Exp Biol Med* **135** 17-22.

Greaves M W, Skillen A W 1970 Effects of long continued ingestion of zinc sulphate in patients with venous leg ulceration *Lancent* **1** 889.

Hazel J H 1971 Efficacy of Zn medication as a therapeutic modality in ather osclerosis. (D D Hemphill, ed.) *Trace Subst Envir Health* **4** 336.

Hooker J D 1982 *Flora of British India* Vol. 3, 640. Reeve and Co., London.

Iyengar Gv 1987 Chemical elements, human health and disease. *Proc. first Int. Conf.* On *Elements in Health & Disease, Karachi,* Feb 13-15. Hamdard Foundation,

Pakistan pp 52-55.

Kalhoro M A 1997 Comprative study of hypocholestrolenic activity in *Artemisia Elegantica Pak J Med Res* **36**(1) 1997.

Kuhrts, Eric H U S 1990 *Cholesterol lowering combination composition of magnesium salt and niacin* U S Patent **4** 911-917.

Mathur A 1978 The role of Zn, in experimental and human cancer. Ph D thesis, University Lund, Department of Odontology.

Mohammad A 1983 The role of zinc and copper in neoplasia. In: *Proceedings of the 1st International Conference on Elements in Health and Disease*, Karachi pp 197.

Mukhopadhyay S, Handy G A, Furayama S, Cordell G A 1981 Anticancer indole alkaloids of *Rhazya stricta. J Nat Prod* **44** (6) 696.

Pat specif (Aust) 1992 *Cure for diabetes, bronchitis, arthritis and areteriosclerosis, carantinous spyros.* US Patent 629, 520.

Perry H M 1972 *Hypertension and True Geochemical Environments in Relation to Health and Diseases.* New York, Acad Sci 199, 202.

Sallknodzhaev Z A 1988 Hypolipidemic activity of inorganic and co-ordination compounds of several trace elements. *Med Zh Uzb* (5) 80-83.

Sallkhozdhayer Z, Shabilalov A A 1989 Coordination compounds of Zinc, synthesis structure and hypolipidemic activity. *Khim Pharm Zh* **23** 3 296-9.

Shoaib A, Irfan M 1983 Possible role of manganese and zinc. The hypoglycemic effect of *Euphorbia prostrata* A&T. (Dodhi) plant. *Proceedings of the 1st International Conference on Elements in Health and Diseases,* Karachi. Feb 13-15.

Skharchuk V M, Latsula G S, Pakistan Kara N V 1972 Clinico experimental study of levels of several micro elements in areteriosclerosis. *Kardiologiya* **12**(1) 131.

Stewat R R A 1972 *Catalogue of the Vernacular Plants of Pakistan and Kashmir.* Fakhri Printing Press, Karachi, pp 714.

Yahya A B 1983 Trace Elements with special refrence to the role of magnesium (Mg) in digitalis intoxication and cardiac arrythmias. *Proceedings of the 1st International Conference on Elements in Health and Disease*,Karachi, Feb. 13-15, p 159.