



RESEARCH ARTICLE

**A COMPARATIVE STUDY ON ANALYSIS OF ZINC CONCENTRATION CONDUCTED
ON FEW MEDICINAL PLANTS OF CHHATTISGARH****LETHIKA. D .NAIR¹, *SANTOSH K SAR¹, ARUN ARORA² AND DEEPAK MAHAPATRA²**¹Department of Applied Chemistry, Bhilai Institute of Technology, Durg (CG) 491001²Department of Mechanical Engineering, Bhilai Institute of Technology, Durg (CG) 491001

Corresponding Author: santoshsar@hotmail.com

Abstract

The medicinal plants have become important in the global context today as it offer solutions to the major concerns of human mankind. This study has been focussed to estimate the concentration of zinc metal ion in the medicinal plant leaves and seeds selected for analysis. These may act as therapeutic agents. Zinc plays a vital role in the human health. It is very much required for the brain development, protecting skin, growth, protection of immune system, digestion, reproduction etc. Concentration of zinc concentration in the leaves of *Ocimum sanctum* (Tulsi), *Azadirachta indica* (Neem), *Pongamia pinnata* (Karanj), and seeds of *Celastrus paniculatus*(Malkangni) and *Embelia ribes* (Vaivirang) were determined by using Atomic absorption spectrophotometer. This analysis of zinc concentration in the medicinal samples taken may prove to be useful in the exploration of medicinal values.

Keywords: Ocimum , Azadirachta, Pongamia, Celastrus, Embelia, zinc.

Introduction

Medicinal plants are a source of great economic value all over the world. Nature has bestowed on us a very rich botanical wealth and a large number of diverse types of plants grow in different parts of the country (Adelekan and Abegunde, 2011). WHO recognized that medicinal plants played an important role in the health care of about 80% of world population in developing countries and depend largely on traditional medicines. Information on traditional herbal practice is passed from one generation to other through oral tradition. Though ample literature on therapeutic application of medicinal plants is available but data on the proximate composition and constituents of medicinal plants is very scarce. The leaves, seeds, fruits, roots etc of the medicinal plants have effective phytoconstituents which is responsible for pharmacological activity of medicinal plants and

used for the development of medicines and industrial by products.

Ocimum sanctum (Tulsi) belongs to family Lamiaceae has antistress, antipyretic, carminative, diaphoretic, expectorant and vermifugal properties. Oil extracted from leaves is used as pest repellent, antibacterial and insecticide (Afzal Shah et al., 2013).

Azadirachta indica (Neem) belong to family Meliaceae is a safer and effective antiulcer drug. It is also used to treat viral diseases such as small pox, chicken pox. It protects the liver from damage which in turn helps to clean the blood. It shows hypoglycemic effect (Aorte, and Yeole, 2010).

Pongamia pinnata (Karanj) belong to family Fabaceae acts as a potential source of biodiesel. All

parts of this plant find use in the treatment of diseases like tumours, piles, skin diseases, itches, abscess, painful rheumatic joints, wound, ulcers, diarrhea etc (Bates, et al 1993, Bishnu Joshi et al 2011 and Hanbrudge and Walravens, 1982).

Celastrus paniculatus (Malkangni) belong to family Celastraceae has been used for sharpening the memory, increasing intellect and improving concentration. Seed oil is used for massage with great benefit especially in diseases like sciatica, lumbago, paralysis, arthritis, facial palsy and to hasten the healing in non healing wound and ulcer. *Embelia ribes* (Vaividang) belong to family Myrsinaceae is highly valuable medicinal plant with anti hermitic, carminative, antibacterial, antibiotic, and hypoglycemic and anti fertility properties. It is considered to be vulnerable due to excessive harvesting and because of its many uses (Meera et al., 2003)

Zinc plays a vital role in the biological system. About 2-3g of zinc is generally present in the human bone and muscle tissue. WHO recommended the limit of zinc in medicinal plant is 50mg/kg while its intake in food is 11mg/day. Zinc performs important biochemical functions and is very important for maintaining proper health throughout the life. Deficiency or excess of zinc can produce variety of biochemical changes and result in various chronic diseases. Zinc deficiency affects the epidermis, gastrointestinal, central nervous system, immune, skeletal and reproductive systems (Rathore and Upadhyay Mohit, 2013). Consuming more zinc can cause adverse effect on human body. It can cause nausea, vomiting, fever etc. At high level zinc is neurotoxin (Sazawal et al, 1996).

Zinc ions play a valuable role in both enzyme catalysis and maintaining structure. Zinc is essential for growth and nucleic acid activity (Sharma et al 1996). Zinc atom has the exceptional ability to form bond with ligands with notable flexibility. This metals co-ordination geometry has proved to be extra ordinarily useful in biological systems (Shoba and Thomas, 2001). Zinc is basic component of large number of different enzymes and plays structural, regulatory and catalytic functions. It also has very important role in DNA synthesis, normal growth, brain development, bone formation, wound healing (Syed Asadulla, 2011). Malaria appears to be reduced by zinc supplementation (William, 1989).

Present study deals with the determination of zinc concentration and its comparison in the few medicinal plant samples selected for study.

Materials and Methods

Collection and preparation of plant material

Five medicinal plants *Ocimum sanctum* (Tulsi), *Azadirachta indica* (Neem), *Pongamia pinnata* (Karanj), *Celastrus paniculatus* (Malkangni) and *Embelia ribes* (Vaivirang) were collected from Bhilai region of Chhattisgarh, India. The leaves of *Ocimum sanctum*, *Azadirachta indica* and *Pongamia pinnata* and seeds of *Celastrus paniculatus* and *Embelia ribes* were collected from Bhilai region of Chhattisgarh and were taxonomically authenticated. A care was taken to select healthy plants and the plant parts for the study were collected fresh and dried for a week. The medicinal plant samples were then grounded in to powder and kept in air tight container and kept ready for digestion.

Digestion of the medicinal plant samples

Samples of medicinal plant taken were weighed accurately and digested in 3:2 ratio mixture of nitric acid and perchloric acid. Then add few drops of conc. HCl and the solution was heated gently and then filtered. The residue obtained was subjected to digestion and filtrate was collected. The entire filtrate was diluted with distilled deionized water and used for the analysis of Zinc concentration.

Determination of Zinc concentration

Concentration of zinc concentration in the sample of medicinal plants were determined by Atomic Absorption Spectrophotometer- Perkin Elmer 2380 model using suitable hollow cathode lamps and comparison is done.

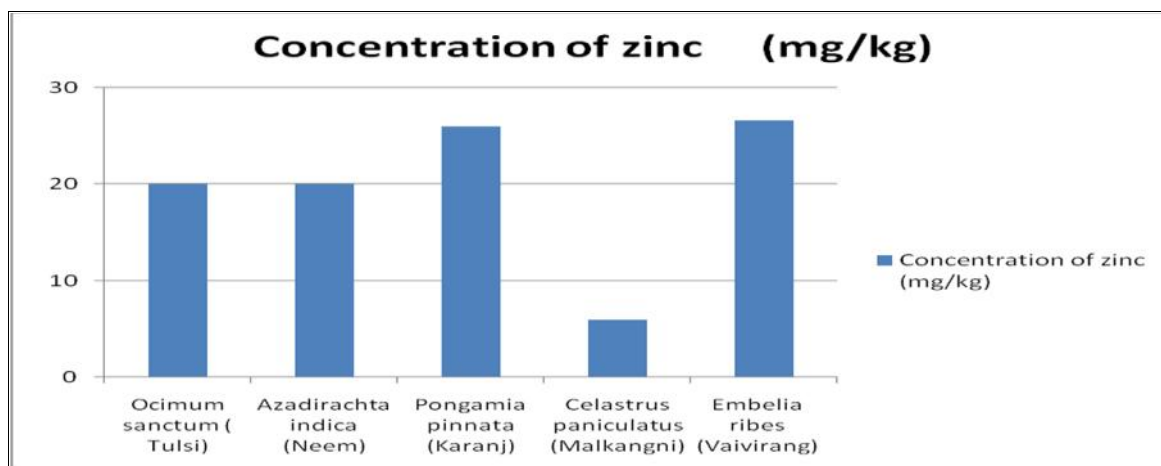
Results

Table -1 and Figure 1 shows the concentration of zinc in the leaves of *Ocimum sanctum*, *Azadirachta indica*, *Pongamia pinnata* and seeds of *Celastrus paniculatus* and *Embelia ribes* collected from the Bhilai region of Durg District of Chhattisgarh. The highest concentration of zinc were found in the leaves of *Pongamia pinnata* and in the seeds of *Embelia ribes* and lowest in leaves of *Ocimum sanctum* and *Azadirachta indica* and seeds of *Celastrus paniculatus*. The study reveals that the leaves of *Pongamia pinnata* is a good source of zinc and can be highly effective for zinc supplementation for its deficiency.

Table 1. Concentration of zinc in sample of medicinal plants

S.No.	Sample	Part used	Concentration of zinc (mg/kg)
1.	<i>Ocimum sanctum</i> (Tulsi)	leaves	20.0
2.	<i>Azadirachta indica</i> (Neem)	leaves	20.0
3.	<i>Pongamia pinnata</i> (Karanj)	leaves	26.0
4.	<i>Celastrus paniculatus</i> (Malkangni)	seeds	6.0
5.	<i>Embelia ribes</i> (Vaivirang)	seeds	26.6

Figure 1. Concentration of zinc in sample of medicinal plants



Discussion

The present study may be useful to supplement information on the concentration of zinc in leaves of *Ocimum sanctum*, *Azadirachta indica*, *Pongamia pinnata* and seeds of *Celastrus paniculatus* and *Embelia ribes*. The study showed that the leaves of *Pongamia pinnata* (Karanj) and seeds of *Embelia ribes* contain maximum concentration of zinc. This study reveals that it is very effective antioxidant, increases the immune system in human body and improves the brain development in young children. Zinc is a cofactor in about 300 metalloid enzymes including Cu,Zn superoxide dismutase, a critical cytoplasm antioxidant enzyme. It may stimulate immune system through its antioxidant properties and protect sulfhydryl groups from oxidation (Winin Pereira 1993) .There were evidence of improved brain development due to the improved Zinc status which were supported by studies done on activity levels in young children in India (Zorica Hod Zic 2013).

Conclusion

The studies support that zinc complexes have antiulcer activity, anti inflammatory, antioxidant, wound healing power, supports healthy growth and development so Karanj leaves and Vaivirang seeds

can be used for the same purpose and these can be implemented for therapeutic action and can be made useful for the preparation of herbal formulations.

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References

- Adelekan B. A. and Abegunde K.D, Heavy metals contamination of soil and ground water at automobile mechanic villages in Ibadan , Nigeria, International Journal of Physical Science, Vol 6, no. 5, pp.1045-1058,2011.
- Afzal Shah, Abdul Niaz, Nazeef Ullah, Ali Rehman, Mohammad Akhlaq, Muhammad Zakir & Muhammad Suleman Khan, Comparative study of heavy metals in soil and selected medicinal

- plants, Journal of Chemistry, Volume 2013, Article ID,621265, 5 pages.
- Aorte, S .R and P.G .Yeole, 2010 , Pongamia pinnata L : A Comprehensive Review, International Journal of PharmTech Research , Vol 2, No.4,pp 2283-2290.
- Bates, C.J, Evans, P.H and Dardenne, M (1993), A trial of Zinc supplementation in young rural Gambian children, Br.J.Nutr..69: 243-255.
- Bishnu Joshi, Govind Prasad Sah, Buddha Bahadur Basnet, Megh raj Bhatt, Dinita Sharma, Krishna Subedi,Janardhan Pandey and Rajani Malla, Phytochemical extraction and antimicrobial properties of different medicinal plants: Ocimum sanctum (Tulsi), Eugenia caryophyllata (Clove), Achyranthes bidentata(Datiwan) and Azadirachta indica(Neem). Journal of Microbiology and Antimicrobials Vol.3 (1),pp.1-7,January2011.
- Hanbrudge, K.M & Walravens P A, Disorders of mineral metabolism, Clin. Gastroenterol, 11:87-118, 1982.
- Meera B., Kumar S., Kalidhar S, B. (2003) A review of the chemistry and biological activity of Pongamia pinnata , J Medicinal Aromatic Plant Sci -25,441-65.
- Rathore J.S and Upadhyay Mohit, Investigation of Zinc concentration in some medicinal plant leaves, Research Journal of Pharmaceutical Sciences, Vol. 2(1), 15-17, January 2013.
- Sazawal, S. Bentley, M, Black, R.E.Dhingra, P.,George,S & Bhan,M.K(1996), Effect of Zinc supplementation on observed activity in low socio economic Indian preschool children, PEDS,98; 1132-1137.
- Sharma Pankaj,Tomar Lokeshwar, Bachwani Mukesh, Bansal Vishnu, Review on Neem (Azadirachta indica):Thousand problems one solution IRJP,2(12),97-102,2011.
- Shoba G F and Thomas M., 2001, Study of anti diarrhoeal activity of four medicinal plants in castor –oil induced diarrhea, J Ethnopharmacol 76(1), 73-6.
- Syed Asadulla, Ramandang and Rajasekhar, 2011, Pharmacognosy of Embelia ribes burm F, IJRPC, 1 (4).
- William R.J.P , an introduction to the biochemistry of Zinc, Mills, C.F eds. Zinc in Human Biology ; 15-31 springer-Verlag Berlin, Germany, 1989.
- Winin Pereira, Tending the earth, Traditional, sustainable agriculturein India,Earthcare Books,Bombay,1993,pp,98,218-219.
- Zorica Hod Zic, Aida Crukic, Aldina Kesic, Mirzeta Saletovic, Zinc/ Copper ratio in the medicinal plants, Trends in the development of machinery and Associated Technology, TMT 2013, Istanbul, Turkey, 10-11, Sept.2013.