International Journal Of

Recent Scientific Research

ISSN: 0976-3031

Volume: 7(4) April -2016

ATOMIC ABSORPTION SPECTRAL ANALYSIS &PHARMACOLOGICAL PROPERTIES OF MULTI-METALS ISOLATED FROM THESTEM BARK OF SYZYGIUM SAMARANGENSE (MYRTACEAE FAMILY)

Kesava Rao B., Asha Bhanu P and Usha Rani G

THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com/ recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 4, pp. 10633-10635, April, 2016

International Journal of Recent Scientific Research

Research Article

ATOMIC ABSORPTION SPECTRAL ANALYSIS &PHARMACOLOGICAL PROPERTIES OF MULTI-METALS ISOLATED FROM THESTEM BARK OF SYZYGIUM SAMARANGENSE (MYRTACEAE FAMILY)

Kesava Rao B*., Asha Bhanu P and Usha Rani G

Department of Chemistry, University College of Sciences, Acharya Nagarjuna University, Nagarjunanagar-522510, Guntur Dt., Andhra Pradesh, India

ARTICLE INFO

Article History:

Received 11thJanuary, 2016
Received in revised form
14thFebruary, 2016
Accepted 18thMarch, 2016
Published online 28th
April, 2016

Keywords:

Metals, *Syzygiumsamarangense*, Myrtaceae, AAS, digestion method.

ABSTRACT

Atomic Absorption Spectroscopy is an analytical technique used for the qualitative and quantitative determination of the elements present in the plant extracts. ***Syzygiumsamarangense***(Blume) Merr. & L.M. Perry is a famous deciduous tree belongs to **Myrtaceae** family, which is being cultivated in India mainly for their edible fruits. It is also well known as java apple and water apple. Multi-metal analysis was carried out on the stem bark of ***Syzygiumsamarangense*****,** 11 elements were found i.e. B, Ca, Mg, Na, K, Mn, Zn, As, Pb, Cd, Hg were screened and found by using AAS technique (digestion method). Stem bark was also found to contain Magnesium (Mg), Sodium (Na) and Potassium (K) at greater concentrations, when compared with the other elements. The present paper deals with the presence of multi metallic constituents and their pharmacological properties by using AAS (Atomic Absorption Spectrometer) and it is a first time report on this plant species.

INTRODUCTION

Syzygiumsamarangense (Blume) Merr. & L.M. Perry is a famous evergreen tree belongs to family Myrtaceae. The tree can be grown ornamentally in Asian countries and attains a height 5-15 m and its trunk is pinkish-grey and flaky bark (Morton *et al*, 1987). The opposite leaves are yellowish to dark bluish-green color and very aromatic when crushed. Flowers are fragrant yellowish-white in color (Pullaiah *et al*, 1997). The fruit is waxy pear shaped, with colors ranging from white, pale green, red, and purple, pink. Fruit flesh is white spongy, juicy, and aromatic, mildly sweet and crispy with one or two seeds or seedless. The flowers and resulting fruit are not limited to the axils of the leaves and can appear on nearly any point on the surface of the trunk and branches (Peter *et al*, 2011). It is also well known as java apple, water apple (Lim, 2012). The previous work revealed the presence of Antihyperglycaemicflavonoids (Hanshella *et al*, 2005), triterpenoids and chalcones (Srivastava *et al*, 1995), tannins (Nonaka *et al*, 1992). Many metals are essential micronutrients that play a crucial role in certain enzymes used for proper functioning of the body. The lack of proper micronutrients causes many health problems. Each element has its individual impact in the structural and functional integrity of the living cells and organisms. In pollution studies, the determination of trace elements, particularly the heavy metal ions has received an increasing attention. Heavy metals are extensively used in several industrial applications. At permissible levels, the natural levels of these elements are usually harmless to the organisms. However, at higher concentration, they are toxic due to increasing anthropogenic activities (Reenasingh *et al*, 2011).

MATERIALS AND METHODS

Plant Material Collection

The fully mature stem bark of ***Syzygiumsamarangense***(Fig.1) was collected by us from Tirumala Hills in Tirupathi, Chittor District, and Andhra Pradesh. The plant was authenticated by Dr.G.V.S. Murthy and voucher specimen was kept in Madras Herbarium (MH) in Botanical Survey of India (BSI) Coimbatore, India with authentication number 177157.The stem bark was dried at room temperature and made into fine powder with an electrical blender.

Corresponding author:* ***Kesava Rao B*
Department of Chemistry, University College of Sciences, Acharya Nagarjuna University, Nagarjunanagar-522510, Guntur Dt., Andhra Pradesh, India

Fig.1 Pho *nse*at Tirumala Hills, Tirupathi, A.P.

Digestion Process of Stem Bark of Syzygiumsamarangense

2g of dried stem bark powder was taken in a 100 ml beaker and 10 ml of nitric acid was added and heated on a hot plate for 15 min. The sample was cooled and 2 ml of water and 3 ml of 30% hydrogen peroxide was added and heated. The process is repeated by adding 1ml increments of 30% hydrogen peroxide followed by gentle heating until the effervescence subsides. 5 ml of concentrated hydrochloric acid and 10 ml of water was added and the sample was heated for additional 15 min without boiling.

The sample was cooled and filtered through a Whatman No. 42 filter paper and diluted to 50 ml with water. The sample was analyzed with Atomic absorption spectrophotometer (AAS) (Munishgang *et al*, 1992).

The instrumental parameters and operating conditions for Atomic Absorption Spectrophotometer (AAS)

Instrument: Atomic absorption spectrophotometer; Make: Buck accusys; Model number: 240; Lamp: Deuterium and Hallow cathode lamp; Wave length: 193.7 nm – 852 nm; Fuel gas: Air; Support gas: Nitrous oxide; Slit Band Width: 2A; 7A & 20A;L.O.D: 0.05 PPB; Air compressors: BS303-0313;Sample volume: 20µl.

RESULT AND DISCUSSION

The elements present in the medicinal plants will play a significant role in the formation of active constituents responsible for the various biological properties and these elements are also very important for human body. The metal analysis of this plant shows the presence of both light metals and heavy metals which are having different medicinal value. Totally, 11 metals were analyzed i.e. B, Ca, Mg, Na, K, Mn, Zn, As, Pb, Cd, Hg. Out of these Mg, Na & K were present in higher concentration when compared to other elements. Heavy metals i.e. as and Hg were also detected but their presence was within the permissible limits which were shown in Table 1 and they were graphically represented systematically in Figure 2.

Graphical presentation of different metals from Syzygiumsamarangense

A graph is drawn between different metals on X- axis and their concetration on Y- axis (Fig.2).

Table 1 Multi-metal concentrations and medicinal uses of stem bark of Syzygiumsamarangense by Atomic Absorption Spectrophotometer (AAS)

Metal atom	Concentration in PPM	Medicinal uses
B	0.02	Used for the treatment of arthritis (John emsley *et al*, 2011).
Ca	0.24	Its mostimportant function is formation of bones and teeth. It is necessary for the coagulation of blood, and proper functioning of the heart, nervous system and alsoon normal contraction of muscles (Berridge *et al*, 1998).
Mg	1.8	It plays an important role in regulating the muscular activity of heart rhythm and it is also an important cofactor of converting the blood glucose into energy (Bahadur *et al*, 2011).
Na	0.65	Important for many different functions of the human body. It helps cells to transmit nerve signals and regulate water levels in tissues and blood (Kolata *et al*, 1982).
K	0.42	Important for maintaining fluid and electrolyte balanceand it is necessary for the function of all living cells. It helps nerves and muscles communication (Annalakshmi *et al*, 2012).
Mn	0.05	It is an antioxidant nutrient and is essential for the breakdown of fats & cholesterol and also helps in the nourishment of the nerves and brain. It helps to neutralize the free radicals (Chaturvedi *et al*, 2004).
Zn	0.03	Plays an important role in various cell processes including normal growth, brain development, bone formation and wound healing. Zinc deficient diabetics fail to improve their power of perception and also causes loss of sense of touch and smell (Hunt *et al*, 1994).
As	BDL	It is used for the functioning of nervous system and growth (Inam *et al*, 2011).
Pb	0.07	Lead is the non essential trace element and it has no biochemical or physiological importance. It is considered as toxic pollutant. It causes high blood pressure, kidney damage, subtle abortion, brain damage, decline fertility of men through sperm damage, it can cause serious damage to the nervous system and the brains of unborn children (Kiran yasim khan *et al*, 2011).
Cd	0.21	Cadmium causes both acute and chronic poisoning, and adverse effect on kidney, liver, vascular and immune system (Jabeen *et al*, 2010).
Hg	BDL	Allopathic medical practitioners are skeptical about the use of mercury for therapy, a perception not supported by traditional medicine practitioners (Kamath *et al*, 2012).

BDL:- Below Detecting limits

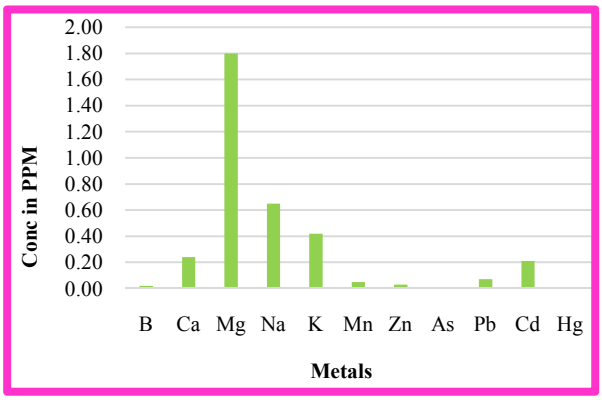

Figure 2. Concentration of different metals from the stem bark of *Syzygiumsamarangense*

CONCLUSION

The present study on this plant *Syzygiumsamarangense* reveals that itis safe to utilize as herbal drug, since the concentration of heavymetals is present within the limits and the minerals required for our body were present in higher concentrations. These metals play a very important role in the formation of the active chemical constituents and are responsible for their medicinal as well as toxic properties. The present study is a first time report on this plant species which gives worthy information for validation of this medicinally useful plant. Further, study on this plant like Anti-diabetic, Anti-cancer and Anti-viral activities are under process.

Acknowledgements

We are very much thankful to all the faculty members of Department of Chemistry and to the administrative members of Acharya Nagarjuna University, for their constant encouragement. P. Asha Bhanu is very much thankful to University Grants Commission for sanctioning her Rajiv Gandhi National Fellowship for the year 2015-17&G.Usha Rani for BSR Fellowship during the year 2014-16.

References

Annalakshmi R, Uma R, SubashchandranG, SahayamCS, Charles A, (2012). Evaluation of elemental content of leaves of Madhucalongifolia by X-ray fluorescence spectroscopy (XRF). J Nat Prod Plant Resour, 2 (4): 490-493.

Bahadur A, Chaudhry Z, Jan G, Danish M, Rehman A, Ahmad R, Khan A, Khalid S, Ullah I, Shah Z, Alif, Mushtaq T, Janf G, (2011). Nutritional & elemental analyses of some selected fodder species used in traditional medicine. Afr J Pharm Pharmacol, 5: 1157-1161.

Berridge MJ, Bootman MD, Lipp P, (1998). Calcium - a life and death signal. Nature, 395: 645-648.

Chaturvedi UC, RishaShrivastava and Upreti RK, (2004).Viral infections and trace elements: A complex interaction. CurrSci, 87: 1536.

Hanshella C, Resurreccion-Magno, Irene MVillaseñor, Nobuyuki Harada, Kenji Monde, (2005).Antihyperglycaemic flavonoids from *Syzygium samarangense* (Blume) Merr. and Perry. Phytother Res, 19(3): 246–251.

Hunt JR, (1994). Bioavailability of Fe, Zn and other Trace Minerals for Vegetarian Diets. Am J ClinNutr, 78: 633-39.

Inam F, DeoS, MahashabdeR, Kadam N, Chopra G, (2011). Comparative account of heavy metal analysis of selected plant species by XRF scanning. Jl of Mat Sci and Engg A1: 658-661.

Jabeen S, Shah MT, Khan S and Hayat MQ, (2010). Determination of major and trace elements in ten important folk therapeutic plants of Haripur basin. Pakistan J Med Plants Res, 4(7): 559-566.

John Emsley, Nature's building blocks: an A-Z guide to the elements. New ed. Oxford, UK, Oxford University Press: (2011).

Kamath S, Pemiah B, Sekar R, Krishnaswamy S, Sethuraman S, Krishnan U, (2012). Mercury-based traditional herbo-metallic preparations: a toxicological perspective. Arch Toxicol, 86(6): 831.

Kiran Yasmin Khan *et al*, (2011). Element content analysis of plants of genus Ficususing atomic absorption spectrometer. Afrjlof Pharm and Pharmacol, 5(3): 317-321.

KolataG, (1982).Value of low-sodium diets questioned. Science, 216(4541): 38-39.

Lim TK, Edible medicinal and non-medicinal plants. Volume 3 fruits, Springer Netherlands: 778-786, (2012).

MunishGarg and Jaspreet Singh, (2012). Quantitative AAS estimationof heavy metals and trace elements in marketed ayurvedicchurna preparations in India. IntJl Pharm SciRes, 3(5):1331-1336.

Morton J&Miami FL. Java Apple, Fruits of warm climates. JF Morton publisher: 381, (1987).

Nonaka G, Aiko Y, Aritake K, Nishioka I, (1992).Tannins and related compounds: CXIX. Samarangenins A and B, novel proanthocyanidins with doubly bonded structures, from Syzygium samarangense and Syzygium aqueum. Chem Pharm Bull, 40(10): 2671-2673.

Peter T, PadmavathiD, Sajini RS, SaralaA, (2011). Syzygium samarangense a review on morphology, phytochemistry& pharmacological aspects. Asian Jl of Biochem&PharmaRes,4(1): 155-163.

Pullaiah E, Chennaiah. Flora of Andhra Pradesh. (India), scientific publishers Jodhpur: 1, 384, (1997).

Reena Singh, NeetuGautam, AnuragMishra, and RajivGupta, (2011). Heavy metals and living systems an overview. Indian J Pharmacol, 43(3): 246–253.

Srivastava R, Shaw Arun K, Kulshreshtha Dinesh K, (1995). Triterpenoids and chalcone from Syzygium samarangense. Phyto, Chem, 38 (3): 687–689.

****

How to cite this article:

Kesava Rao B., Asha Bhanu P and Usha Rani G.2016, Atomic Absorption Spectral Analysis &Pharmacological Properties of Multi-Metals Isolated From Thestem Bark of Syzygium Samarangense (Myrtaceae Family). *Int J Recent Sci Res.* 7(4), pp. 10633-10635.

TSSN 0976-3031