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Studies of trace elements and heavy metals in the leaves of *Murraya koenigii* Linn. (Curry leaves) Plant

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Abstract

Dry leaves of *Murraya koenigii* Linn. were digested with HNO₃, and HClO₄, and the contents of the trace elements such as Fe, Ca, Zn, P, Mg, Cu, Mn, Cr, Pb, Cd, As, Hg were determined by atomic absorption spectroscopy. These elements were found to be within the permissible limits.

Keywords: *Murraya koenigii* Linn. trace elements, heavy metals, atomic absorption spectroscopy.

Introduction

Murraya koenigii Linn. Plant belongs to the family Rutaceae and this is popularly known as curry leaf. It is used as an item of daily food for its characteristic flavour. This is found as herbs in India and Sri Lanka. In the recent years, research of trace elements in medicinal plants has got emphasis ^[1,2] Trace elements are essential for human health because their presence increase the immune system of body and prevents from several diseases. These trace elements can be detected by Atomic Absorption Spectroscopy method ^[3, 4], atomic fluorescent spectroscopy ^[5] and electromagnetic coupling plasma method ^[6].

Curry leaves have a strong fragrant flavour similar to the lemongrass. It is used as an herb and leaves pack a much subtler flavour than curry powder by landing a complex depth of flavour of any dish. Barkes and roots are used externally to cure the bites of poisonous animals. The green leaves were eaten raw as a cure for dysentery and diarrhea. It is also used as blood purifier, tonic and care for stomach and flavouring agents in curries chutneys.

Materials and Methods

Leaves of *Murraya koenigii* Linn. Were picked up, dried in air under shade for ten days and then powdered with the help of mixture grinder. About 5 gm of dried leaves powder was digested with 3 ml of conc. HNO₃, and 50 ml of double distilled water. Mixture was heated on a hot plate till the evolution of brown fume stops. This content was cooled and 20 ml of 70% HClO₄, was added and heated slowly till the solution becomes colorless. Now double distilled water is added and heated to reduce half of its volume. Now it is filtered using Whitman filter paper and then trace element and heavy metal were analyses in *Murraya koenigii* Linn. Leaves are shown in Table - 1by using atomic absorption spectroscopy (Perkin Elmer).

Table 1: Trace element and Heavy metals in leaves of *Murraya koenigii* Linn. (Curry leaves)

Trace elements in <i>Murraya koenigii</i> Linn. leaves						
Elements	Fe	Zn	Ca	P	Mg	Mn
Amounts	50.01 ppm	8.42 ppm	40.5 ppm	41.62 ppm	35.62 ppm	42.21 ppm
Heavy metals in <i>Murraya koenigii</i> Linn. leaves						
Elements	Cr	Cu	Cd	Pb	As	Hg
Amounts	0.35 ppm	2.56 ppm	0.004 ppm	2.11 ppm	0.038 ppm	0.002 ppm

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Results and Discussion

Trace Elements

The concentration of Iron obtained is 50.01 ppm. Iron is necessary for formation of hemoglobin which is used in the transportation of oxygen^[7]. Iron deficiency is very common among middle and lower middle class people specially in women^[8].

The concentration of Zinc obtained is 8.42 ppm. It acts as necessary co-factor for many enzymes. It helps in the synthesis of DNA, bone marrow and healing of cuts and wounds^[9].

The concentration of Calcium obtained is 40.51 ppm. This is necessary for formation of bone and teeth.

The concentration of Phosphorus obtained is 40.51 ppm. This is necessary for formation of bone and teeth.

The concentration of Magnesium obtained is 35.62 ppm. It is essential element for human body. It regulates muscle and nerve activity. But higher level causes laxative effect, also it acts as diuretics.

The concentration of manganese obtained is 42.21 ppm. It is micro-nutrient. It causes respiratory disease and psychiatric disorder like Parkinson disease.

Heavy Metals

Heavy metals are real toxicants. Any metallic element that has relatively higher density and is toxic at low concentration is called heavy metal. They enter our body through air, water and food. These heavy metals initiate generation of free radicals called as reactive oxygen species. These free radicals result in oxidative damages which leads to neuro-disorder, anaemia, kidney failure and disorders related to liver, heart and reproductive organs^[10].

The concentration of Chromium obtained is 0.35 ppm. Cr (III) is necessary for normal metabolism of fat and cholesterol^[11]. Chromium contamination is obtained from steel industries, fly ashes, sewage disposal and tanneries etc.

The concentration of Copper obtained is 2.56 ppm. It acts as necessary co-factor for many enzymes. Excess of copper causes hair and skin decoloration.

The concentration of Cadmium obtained is 0.004 ppm. It is non-essential trace element for human body. Cigarette smoking is the biggest source of Cd toxicity, which affects kidney, bones and immune system. Cd binds to protein of cells and interferes with enzymes requiring Zn because its structure and function is similar to zinc and may replace zinc in physiological and enzymatic function. Zinc-Cadmium ratio influence cadmium toxicity^[12].

The concentration of Lead obtained is 2.11 ppm. It has no beneficial effect on human body. Air is the main source of lead pollution. It causes the damage of central nervous system and brings muscular weakness. Chronic over exposure results in renal failure, impotency^[13]. Lead inhibits the activity of heme synthesizing enzymes and hence inhibits heme synthesis

The concentration of Arsenic obtained is 0.038 ppm. It has no beneficial effect on human body. Arsenic contamination in drinking water is main cause of arsenic toxicity around the world. Its toxicity produces dry burning sensation in mouth and throat, followed by abdominal pain cramping, diarrhea and vomiting. It can cause eczematous dermatitis.

The concentration of Mercury obtained is 0.002 ppm. Hg has no beneficial of human body.

It has been found from research that the phyto-components present in the extract of *Murraya koenigii* Linn. protects

against the lead toxicity^[14] and also toxicity generated from other heavy metals^[15,16].

All the heavy metals and trace elements are found within the permissible limits as prescribed by WHO. Thus *Murraya koenigii* Linn. Leaves is a safe herb to be used in our food items.

Conclusion

The studies of the trace elements and heavy metals were isolated from *Murraya koenigii* Linn. Leaves (curry leaves). The trace element on heavy metals determined by Atomic Absorption Spectroscopy. Arsenic contamination in drinking water is main cause of arsenic toxicity around the world. Trace elements are essential for human health for increase the immune system of body and prevents human disease.

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