ICP-OES ANALYSIS OF SIDDHA DRUG *KARIVEPPILAI VADAGAM*

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***Abstract- Kariveppilai Vadagam* (KV) is one of the effective herbal origin siddha formulations, which is used to *treat Vayilaippu* (nausea), *Pasi inmai* (loss of appetite), *Kazhichal* (diarrhoea), *Seranapinigal* (Indigestion) [2]. In siddha system most of the medicines are effective but the lack of standardization, so there is a need to develop standardization technique. This study is aims to detect heavy metals (lead, cadmium, mercury, arsenic) and other elements within the permissible limits as per WHO guidelines present in the siddha drug KV with the help of simultaneous ICP- OES analysis equipment (PERKIN ELMER OPTIMA 5300 DV). This paper revealed the therapeutic safer level of elements {As, Ca, Cu, Cd, Fe, Hg, K, Mg, Na, P, Pb, P, S, Zn} present in *Kariveppilai Vadagam* with scientific documentation.**

Keywords: ***Kariveppilai Vadagam*, Siddha medicine, ICP-OES, Elements**.

INTRODUCTION

Awareness towards the traditional medical systems like Siddha, Ayurveda and Unani (ASU) is increasing day by day throughout the world. This awareness is increasing not only among educated population, also among the common public. Thus, all the traditional system of medicine are primarily in plant, animal, metal, mineral sources. In Siddha system there are used in the form of *Kudineer, Chooranam, Vadagam,* Mathirai, *Parpam, Chendhooram,* ect., One such valuable Siddha medicine is ***KARIVEPPILAI VADAGAM*** from siddha literature "Siddha vaithiya thirattu" can be used to treat *Vayilaippu* (nausea), *Pasi inmai* (loss of appetite), *Kazhichal* (diarrhoea), *Seranapinigal* (Indigestion). *Kariveppilai Vadagam* is a simple & cost-effective herbo-mineral formulation but so far, no scientific evaluations were came out. Even though poly herbal, herbo-mineral, herbo -metal and any formulation of Siddha medicines are safe and having the history of prolonged usages, it is our responsibility to clarify the safety measures of these medicines by using modern scientific parameters. ICP-OES (Inductively coupled plasma - optical emission spectrometry) is a technique in which the composition of elements in samples can be determined using plasma and a spectrometer. This study is aims to detect heavy metals (lead, cadmium, mercury, arsenic) and other elements within the permissible limits as per WHO guidelines present in the siddha drug KV with the help of simultaneous ICP- OES analysis equipment (PERKIN ELMER OPTIMA 5300 DV). In present scenario standardization is need to prove the safety level of any medicine. This may help the acceptance of medicine worldwide.

OBJECTIVE

The objective of the present study is to detect heavy metals (lead, cadmium, mercury, arsenic) and other elements within the permissible limits as per WHO guidelines present in the siddha drug KV.

MATERIALS AND METHODS

Table 1: Ingredients of trial drug KV

S. No	Tamil name	English name	Family	Chemical name / Botanical name / Zoological name	Parts used	Quantity
1	*Karuveppilai*	Curry leaf	Rutaceae	*Murraya koenigii*	Leaf	70 g
2	*Koththumalli*	Coriander	Apiaceae	*Coriandrum sativum*	Seed	70 g
3	*Milagu*	Black pepper	Piperaceae	*Piper nigrum*	Fruit	70 g
4	*Saathipaththiri*	Mace	Myristicaceae	*Myristica fragrans*	Arillus of the nut	70 g
5	*Kichchilikkizhangu*	Round white Zedoary	Zingiberaceae	*Kaempferia galanga*	Dried rhizome	70 g

6	*Uppu*	Common Salt	-	Sodium Chloride	Salt	70 g

Collection of raw drugs
All the above ingredients were purchased from a well reputed Siddha drug store at Tirunelveli.
Authentication of raw drugs
All the above drugs are Authenticated by Dr. A. Kingsly M.D(S)., Reader & HOD, Department of PG Gunapadam, Government Siddha Medial College and Hospital, Palayamkottai.
Purification of raw drug
The drugs were purified as per the evidence mentioned in the chikitsarathnadeepam part II. All the ingredients have been completely purified as per the Siddha literature in the presence knowledge of Guide / Faculty members.
Methods of preparation
The purified drugs are dried and made into powered form. Then the powder has to be grinded well with water and make it into pills (*Elanthai Vithai Alavu-790mg*) and dried well.

ICP-OES STUDY OF *KARIVEPPILAI VADAGAM*:

ICP Optical Emission Spectrometry Principle
ICP, abbreviation for Inductively Coupled Plasma, is one method of optical emission spectrometry. When plasma energy is given to an analysis sample from outside, the component elements (atoms) are excited. When the excited atoms return to low energy position, emission rays (spectrum rays) are released and the emission rays that correspond to the photon wavelength are measured. The element type is determined based on the position of the photon rays, and the content of each element is determined based on the rays' intensity.
To generate plasma, first, argon gas is supplied to torch coil, and high frequency electric current is applied to the work coil at the tip of the torch tube. Using the electromagnetic field created in the torch tube by the high frequency current, argon gas is ionized and plasma is generated. This plasma has high electron density and temperature (10000K) and this energy is used in the excitation-emission of the sample. Solution samples are introduced into the plasma in an atomized state through the narrow tube in the centre of the torch tube.
Equipment
Equipment for ICP optical emission spectrometry consists of a light source unit, a spectrophotometer, a detector and a data processing unit. There are several types of equipment based on differences in the Spectrophotometer and the detector. The most common type is shown in Figure 1.
1) Sequential type
A spectrophotometer with a Czerny-Turner monochrometor, and a detector with a photomultiplier is most common for this type. With this equipment, programmed wavelength of the spectrophotometer is consecutively varied to measure multiple elements. This causes rather long measuring time, however, with its high-resolution spectrophotometers, it is favourable for measurement of high-matrix samples.

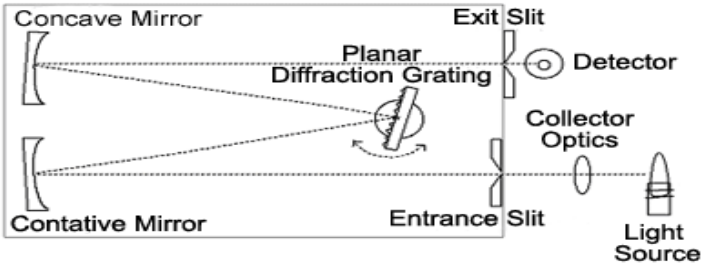

Figure 1: Sequential Type ICP-OES

2) Simultaneous Type
This type typically uses an echelle cross disperser in spectrophotometers and semi-conductor detector such as CCD for the detector. Echelle cross disperser disperses light of measurable wavelength range two-dimensionally by combining prism and echelle diffraction grating. Combination of echelle cross disperser and a CCD detector enables multi-element measurement at any wavelength. The most notable feature of this equipment is the high-speed measurement, providing information on all 72 measurable elements in measurements of 1 to 2 minutes normally.

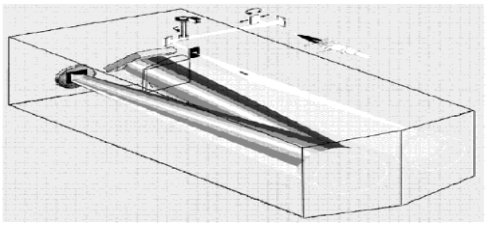

Figure 2: Simultaneous ICP-OES

Sample preparation: 0.5g of KV drug is measured, and then dissolved in a decomposition vessel with nitric acid into 10ml solution. Partial spectral profile and analysis results shown below.

RESULT

Kariveppilai Vadagam ----------**Wt. (0.4**100710g)

Table 2: Elements of the Kariveppilai Vadagam

S.NO	ELEMENTS	LEVEL
1	C 193.030	225.220 mg/L
2	As 188.979	BDL
3	Ca 315.807	011.212 mg/L
4	Cd 228.802	BDL
5	Cu 327.393	BDL
6	Fe 238.204	001.200 mg/L
7	Hg 253.652	BDL
8	K 766.491	30.110 mg/L
9	Mg 285.213	01.100 mg/L
10	Na 589.592	11.310 mg/L
11	Pb 220.353	BDL
12	P 213.617	101.140 mg/L
13	S 180.731	01.101 mg/L
14	Zn 206.200	01.203 mg/L

****BDL – Below Detection Limit***

DISCUSSION

Heavy metal Viz. **lead (Pb), cadmium (Cd), mercury (Hg), arsenic (As)** and the other elements **(Ca, Fe, Zn, Na, K, Mg, P, S, C)** of *Kariveppilai Vadagam* on table 2 was found to be within the permissible limits as per WHO guidelines.

CONCLUSION

The *Kariveppilai Vadagam* was free from toxicity there by proving the safety of its utilization in siddha system. It is concluded that documentation of ICP-OES analysis of *Kariveppilai Vadagam*. So, this study is a step forward to scientific validation of *Kariveppilai Vadagam.*

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