ICP-OES ANALYSIS OF KAARALAVANA PARPAM

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Abstract- **Kaaralavana parpam (KLP) is a Siddha medicine evidenced in Siddha literature "Sikicha Rathinadeepam Volume – 2 Vaithiya Chinthamani by C. Kannusamy pillai. It is a salt-based medicine contains 3 ingredients namely Padikaaram, Venkaaram & Vediuppu. It is a best diuretic & is used for oedematous conditions. KLP is used along with an adjuvant tender coconut water for its action betterment. In this scientific world it is mandatory to prove the Siddha medicines Scientifically for global acceptance. So, KLP was evaluated for ICP-OES analysis which is a heavy metal analysis technique. From the study results, it indicates that elements like Aluminium, Boron, Potassium, Manganese, Sodium, Phosphorus & Sulphur are present in the drug. Also, KLP is devoid of heavy metals like Mercury, Lead & Arsenic. So, it is safe for use. Furthermore, toxicity studies & pharmacological studies are needed to evaluate their safety & efficacy.**

Keywords: **KLP, diuretic, ICP-OES, heavy metals, Siddha, Oedema.**

INTRODUCTION:

Siddha System of Medicine is an ancient system of medicine widely practised in Southern parts of India. In Siddha System herbs, metals, minerals & animal origins are used as a medicine after certain processes. **Kaaralavana parpam (KLP)** evidenced in Siddha literature "Sikicha Rathinadeepam Volume – 2 Vaithiya Chinthamani by C. Kannusamy pillai is a salt-based(mineral) medicine contains 3 ingredients namely Padikaaram, Venkaaram & Vediuppu. KLP is a diuretic which is used along with tender coconut water. It is used to treat oedema. It is in need of the hour to standardise the existing Siddha Medicines scientifically for global acceptance.

MATERIALS AND METHODS:

Table 1: Ingredients of KLP

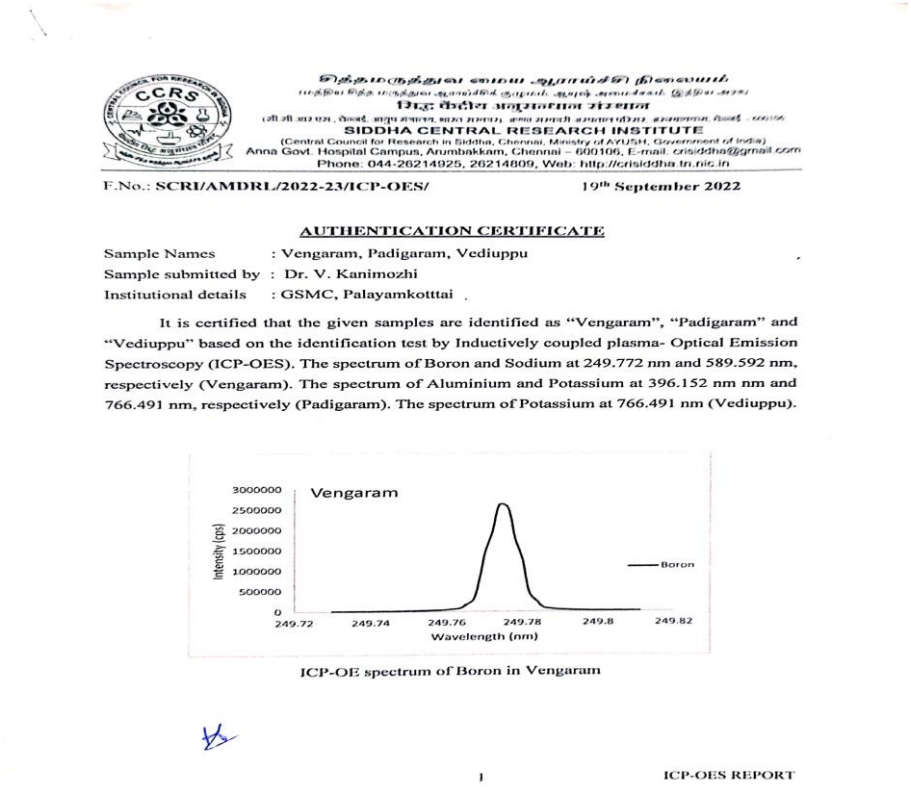
Ingredients	Chemical name	Quantity
Padikaaram	Alum	1part
Venkaaram	Borax	1part
Vediuppu	Potassium nitrate	1part

COLLECTION OF RAW DRUGS:

All the raw drug were procured from the raw drug shop in Nagercoil.

AUTHENTICATION OF RAW DRUGS:

All the drugs were got authenticated in CCRS, Chennai, Arumbakkam Campus.



சித்தமருத்துவ மைய ஆராய்ச்சி நிலையம்
மத்திய சித்த மருத்துவ ஆராய்ச்சி குழும், ஆயுஷ் அமைச்சகம், இந்திய அரசு
सिद्ध केंद्रीय अनुसंधान संस्थान
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F.No.: SCRI/AMDRL/2022-23/ICP-OES/ 19th September 2022

AUTHENTICATION CERTIFICATE

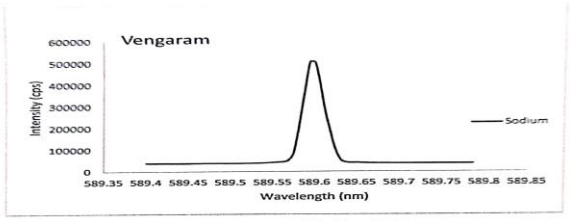
Sample Names : Vengaram, Padigaram, Vediuppu
Sample submitted by : Dr. V. Kanimozhi
Institutional details : GSMC, Palayamkotttai

It is certified that the given samples are identified as "Vengaram", "Padigaram" and "Vediuppu" based on the identification test by Inductively coupled plasma- Optical Emission Spectroscopy (ICP-OES). The spectrum of Boron and Sodium at 249.772 nm and 589.592 nm, respectively (Vengaram). The spectrum of Aluminium and Potassium at 396.152 nm nm and 766.491 nm, respectively (Padigaram). The spectrum of Potassium at 766.491 nm (Vediuppu).

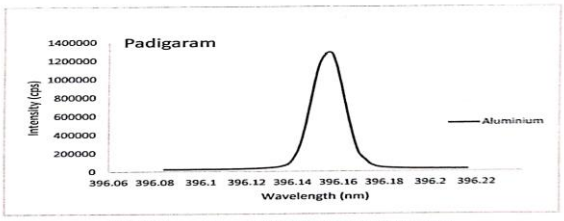
ICP-OE spectrum of Boron in Vengaram

1 ICP-OES REPORT

Fig. 1: Authentication of purified Venkaaram by ICP-OES



ICP-OE spectrum of Sodium in Vengaram



ICP-OE spectrum of Aluminium in Padigaram

2 ICP-OES REPORT

Fig. 2: Authentication of purified Venkaaram & Padikaram by ICP-OES

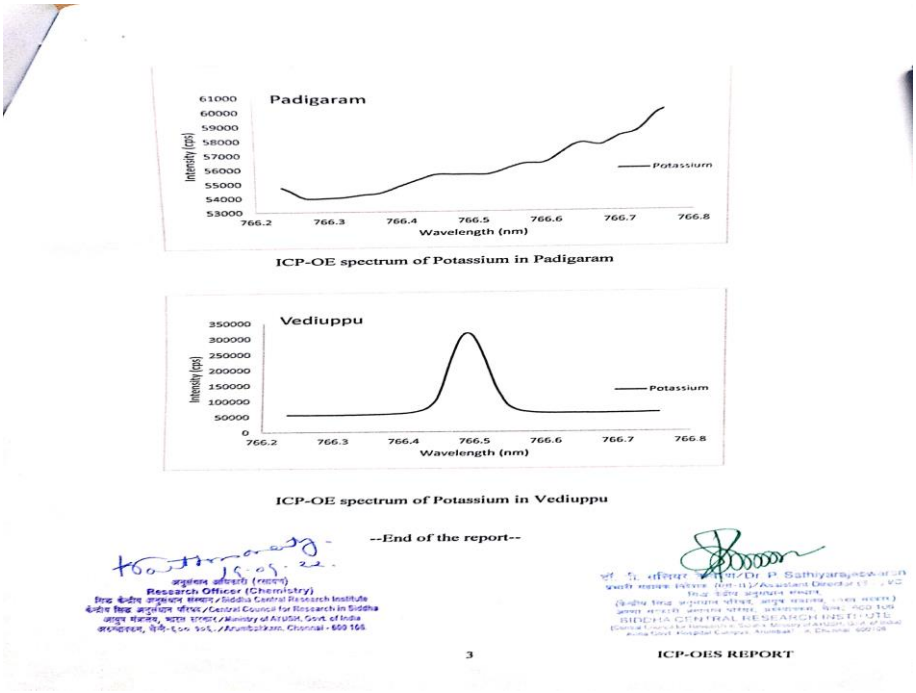


Fig. 3: Authentication of purified Padikaram & Vediuppu by ICP-OES

PURIFICATION OF RAW DRUGS:

(i) Padikaaram is dissolved in water & filtered then boiled well & let it cool for some time. Now, Padikaaram is purified.

(ii) Venkaaram is purified by means of frying until its water content gets evaporated.

(iii) 1 part of Vediuppu & 4 parts of water is added & boiled with low flame. Then add 4 egg white yolk into it. The dirt floats up remove that. Then filter the sediment by using a cloth & kept aside in an air free space. The very next day filter the water content in the sediment & dry under the sunlight. This is one of the purification processes of Vediuppu.

All the 3 drugs were got purified according to the text "Gunapadam Thaathu - Seeva Vaguppu".

PREPARATION OF THE KAARALAVANA PARPAM:

All the 3 purified drugs were put in the pot by layers & heat it. Then pulverized well.

DOSAGE:

½ - ¾ varaakan edai (2.1g to 3.15g)

ADJUVANT:

Tender coconut water (Cocos nucifera)

ICP-OES ANALYSIS:

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 ray's 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 center 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 monochromator, 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.

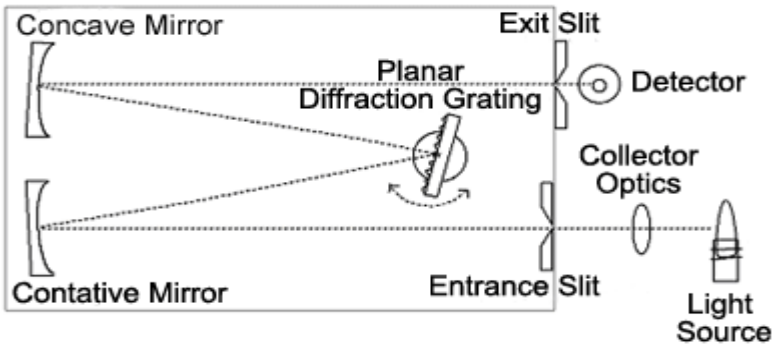


Figure 1: Sequential Type ICP-OES

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.

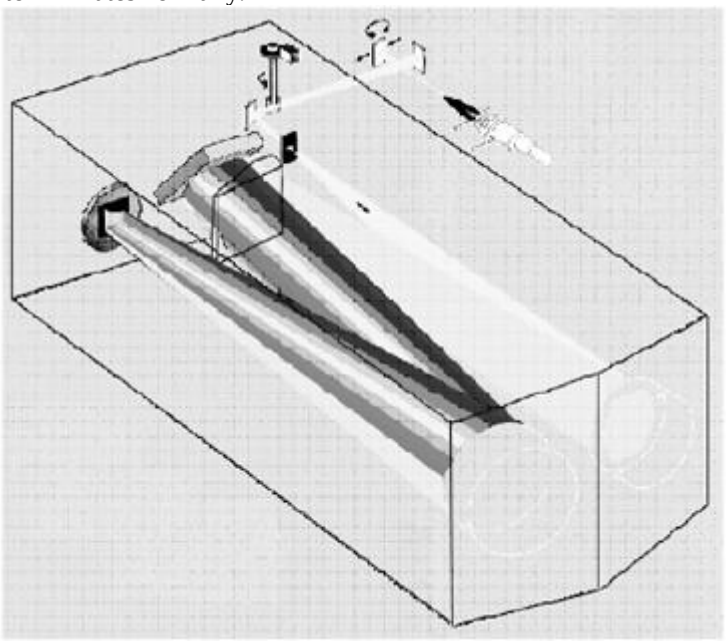


Figure 2: Simultaneous ICP-OES

Application:

Siddha drug analysis

KLP drug has attracted attention because it is thought to contain a person's health history on some level and is thought to act as an excretory organ for heavy metal in the body. However, there are problems because there are few usable samples and knowledge about multiple elements is required. With simultaneous analysis equipment, we can collect useful information with a small amount of sample.

Equipment: Simultaneous ICP-OES, **PERKIN ELMER OPTIMA 5300 DV**

SAMPLE PREPARATION:

Sample: 0.5g of KLP drug is measured, and then dissolved in a decomposition vessel with nitric acid into 10ml solution.

RESULT:

Table 2: Result of ICP-OES of KLP

Sample	Element symbol Wavelength (nm)	Concentration
KLP	Al 396.152	400.456 mg/L
	As 188.979	BDL

	B 249.677	178.980 mg/L
	Hg 253.652	BDL
	K 766.491	266.400 mg/L
	Mg 285.213	01.983 mg/L
	Mn 257.610	BDL
	Na 589.592	301.320 mg/L
	Pb 220.353	BDL
	P 213.617	56.341 mg/L
	S 180.731	178.250 mg/L

DISCUSSION:

Heavy metals like Mercury (Hg), Arsenic (As), Manganese (Mn) & lead (Pb) are in below detection level. Elements like Aluminium, Boron, Potassium, Manganese, Sodium, Phosphorus & Sulphur is present in the drug. It seems that **Magnesium & Phosphorus** are added to the drug after the preparation process which is not present in the purified raw drugs as shown in fig:1 to 3. Magnesium is a diuretic. Increasing your Magnesium intake may help reduce water retention. Magnesium is one of the essential electrolytes needed for efficient hydration. Phosphorus is an essential electrolyte for numerous functions within the body. Thus, KLP is devoid of heavy metals.

CONCLUSION:

It is concluded that Kaaralavana parpam is free from heavy metals as they are in below detection limits. Hence, it's safety profile is proved. Since KLP is a diuretic, it has Magnesium & phosphorus to maintain the electrolytes. Furthermore, safety profiles are also needed to study their toxicity & efficacy of KLP.

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