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ICPOES Analysis of Kalappai Kilangu

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***Abstract*: *Background:* The root of *kalappai kilangu* is mainly used in the Siddha and Ayurveda medicine. The roots and leaves used in snake bite. In this plant is tuber is used to cure Arthritis, Gout, Rheumatism, snake bite etc. *Objective:* The objective of present study is to detect heavy metal analysis (arsenic, lead, mercury) and other elements with the permissible limit as per WHO guidelines present in the Siddha drug *kalappai kilangu* which is in Purified form. *Materials and Methods:* The ingredient is collected, purified and prepared as per siddha literature "Padhartha Guna Vilakkam (Moola Varkam). pg. no. 198. Here the drug was subjected to standardisation by simultaneous method. (ICPO_ES Analysis equipment). (Perkin Elmer Optima 5300 DV). *Results:* This paper revealed the therapeutic safer level of heavy metals and other elements present in purified *kalappai kilangu* as per WHO guidelines with the help of simultaneous ICP OS analysis equipment (Perkins Elmer Optima 5300 DV). *Conclusion:* From this study the ICPO_ES analysis of purified *Kalappai kilangu* is free from toxicity nearby proving the safety of its utilisation in siddha system. The study forms the base for the pharmaceutical analysis of *kalappai kilangu* will be followed by the studies later.**

***Keywords*: Purified *Kalappai kilangu*, siddha drug, ICPO_ES, siddha literature.**

1. Introduction

Siddha generally refers to Attama siddhi that is eight supernatural powers. There are 18 important siddhars in olden days and they develop this system of medicine. The nearest use of medicinal plants is mentioned and found in Thirumoolar Thirumanthiram, Tholkappiam and ancient Tamil words of Sangam literature which are believed to have been written thousands of years before the Christian era. There are many kinds of medicinal plants commonly used in India traditional siddha medicine and now 242 kinds of crude drugs are used as the source of siddha medicine.

As the flower of *kalappai kilangu* (Gloriosa superba) being our state flower, we all must know the medicinal properties in the plant. In early days the tuber is used to prepare large number of medicines in siddha system. But nowadays the usage of medicinal preparations from this tuber is very much limited. But in foreign countries, so much researches are going on regarding this tuber. In addition, Italy is one of the leading natural drug producing pharmaceutical company from Gloriosa Superba in commercial scale. The raw drugs needed for this company are exported from India.

The plant has been proved to possess various pharmacological activities such as anti-bacterial, immune-modulating activity, anti-carcinogenic and anti-mutagenic activity. The tuber of this plant has got that the curative value in leprosy. Arthritis, skin disease, piles, chronic ulcers, poisonous snake bite, scorpion sting, etc.

For the development of a new drug the standardization of the traditional siddha drug is much more important. Inside the system most of the medicines are effective, but they lack of standardisation. Many herbal based formulations also have presence of toxic elements so there is a need to subjected with standardisation for safety profile of drug and therapeutic utilisation. Here the drug was objective to standardization by simultaneous ICPO _ES analysis equipment (Berkin optima 5300 DV) to detect heavy metals (arsenic, lead, cadmium, Mercury) and other elements within the permissible limits as per who guidelines present in the crude drug *kalappai kilangu.*

2. Materials and Methods

The drug *kalappai kilangu* is selected from a classical siddha literature cited in *Padhartha Guna Vilakkam (Moola Varkam).*

Table 1
Ingredients

S.no.	Drug	Botanical name	Parts used
1.	*Kalappai kilangu*	*Gloriosa Superba*	Tuber

Table 2
For purification

S.no.	Drug	Zoological name
1.	Cows' urine	*Bos taurus* urine
2.	Buttermilk	*Bos taurus* butter milk

(ICPO_ES analysis were done in sophisticated analysis instrument facility IITM chennai_36).

Collection, Identification and Authentication of the drug:

The required drug were purchased from a well reputed siddha store. The drug identified an authenticated by the HoD, Department of Gunapadam, government siddha medical College and hospital, Palayankottai, Tirunelveli.

Method of purification and preparation:

The drug was purified as per the evidence mentioned in *PADHARTHA GUNA VILAKKAM (Moola varkam).*

Preparation of medicine:

By the following procedure mentioned in siddha literature it

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is made into a fine powder after purification named as chooranam in Siddha text.

Principle of ICP Optical Emission Spectrometry (ICP-OES):

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 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 mono chrometor, 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 favorable for measurement of high-matrix samples.

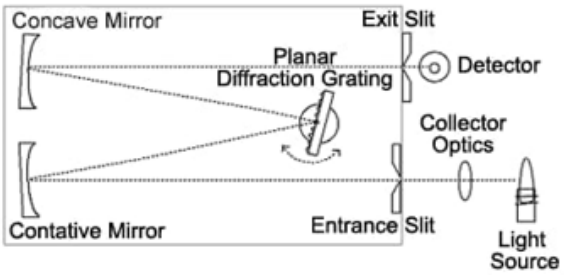

Fig. 1.

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.

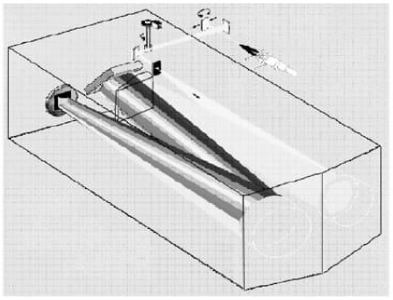

Fig. 2.

Application:

Siddha drug analysis:

K.K 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: 0.5g of KK 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 Analysis:

Sophisticated Analytical Instrument Facility IITM, Chennai-36. Perkin Elmer Optima 5300 DV ICP-OES

KK----------(wt :0.5100210g)

Table 3
Elements of purified *Kalappai kilangu* (kk)

S.No.	Elements	Wavelength	Concentration
1	As	188.79	BDL
2	C	193.030	75.900mg/L
3	Ca	315.807	BDL
4	Cd	228.802	BDL
5	Cu	327.393	BDL
6	Fe	238.204	01.100mg/L
7	Hg	253.652	BDL
8	K	766.491	250.123mg/L
9	Na	589.592	66.350mg/L
10	P	213.617	121.341mg/L
11	S	180.731	01.100mg/L
12	Zn	206.200	02.213mg/L
13	Mg	285.213	00.100mg/L
14	Pb	220.353	BDL

*BDL _Below detectable limit

3. Results and Discussion

The ICPO_ES analysis of drug kalappai kilangu was tabulated in table 3. The trial drug reveals the heavy metals Viz. arsenic (As), Cadmium (Cd), mercury (Hg), lead (pb), copper (Cu) and other elements were found to be in the limits as per the WHO guidelines.

4. Conclusion

From the ICPO_ES analysis reveals that kalappai kilangu after purification is free from toxicity there by proving the safety of its utilisation in siddha system. The study forms the base for the pharmaceutical analysis of kalappai kilangu which will be followed by further studies later. So, the study will be a step forward to scientific validation of this drug.

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