

ICP-OES Analysis of *Inji Chooranam-II*

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ABSTRACT

Background: The *Inji chooranam* (IC) is a polyherbal formulation used for *Soothaga vayu*. (PCOD).

Objective: The objective of the present study is to detect heavy metals (arsenic, lead, cadmium, mercury) and other elements within the permissible limits as per WHO guidelines present in the Siddha polyherbal formulation "*Inji Chooranam*".

Materials and Methods: The ingredients were collected and purified and the drug was prepared as per Siddha literature "*Siddha vaithya thirattu*" by Dr. kuppasamy mudhaliar. Here, the drug was subjected to standardization by simultaneous ICP-OES analysis equipment (PERKIN ELMER OPTIMA 5300 DV).

Result: This paper revealed the therapeutic safer level of heavy metals and other elements present in *Inji chooranam*, as per WHO guidelines with the help of simultaneous ICP- OES analysis equipment (PERKIN ELMER OPTIMA 5300 DV).

Conclusion: From the ICP-OES analysis reveals that *Inji chooranam* are free from toxicity there by proving the safety of its utilization in siddha system. This study forms the base for the pharmaceutical analysis of *Inji Chooranam* (IC) which will be followed by safe and efficacy studies later.

Keywords: *Inji chooranam* (IC), polyherbal formulation, *Soothaga vayu*, Siddha Medicine

INTRODUCTION

Siddha medicine traditional system of healing that originated in South India and is considered to be one of India's oldest systems of medicines. The siddha system is

based on a combination of ancient medicinal practices and spiritual disciplines as well as alchemy. *Inji chooranam* is a poly herbal formulation used to treat *Soothaga vayu*, *pakka vayu*, *oon veruppu*, *suvaikinmai*.

Inji chooranam is a classical siddha compound drug which is mentioned in Siddha text book of *Siddha vaithya thirattu* (Pg no:214). The drug of *Inji chooranam* is one of the Siddha sathric poly herbal formulations containing 17 herbal ingredients.

MATERIALS AND METHODS

Collection of Raw Materials:

All herbal ingredients were purchased from ASN herbal Drug Shop, Melapalayam, Tirunelveli.

Authentication of Raw Materials:

Raw drugs were authenticated by faculties of Department of Gunapadam, Govt.Siddha Medical College, Palayamkottai.

Standard operating procedure for preparation of *Inji chooranam*:

Purification of raw drugs:

All the raw drugs are purified as per the methods mentioned in siddha literature.

INJI CHOORANAM

Ingredients

Inje (*Zingiber officinale* Linn) -3 palam

Thippili(*Piper longum*) -3 palam

Milagu (*Piper longum*) - 3 palam

Thippili moolam (*Piper longum*) - 1 palam

Ealam (*Electtaria cardamomum*) - 1 Palam

Chukku (*Zingiber officinale*) - 1 palam
 Sathikkai (*Myristica fragrans*) - 1palam
 Sadamanjil (*Nardostachys grandiflora*) - 1palam
 Sompu (*Pimpinella anisum*) - 1Palam
 Kottam (*Costus speciosus*)- 1Palam
 Chiru nagappu (*Mesua nagassaram*) - 1Palam
 Elavangapathiri (*Cinnamomum tamala*) - 1Palam
 Vetiver (*Vetiveria Zizanioides*) - 1Palam
 Kirambu (*Syzygium aromaticum*) - 1Palam
 Chathi paththiri (*Myristica fragrans*) - 1Palam
 Thaliam (*Abies spectabilis*) - 1Palam

Sugar (*Saccharum officinarum*) - 1Palam

METHOD OF PREPARATION:

The ingredients are slightly fried in earthen plate then by using stone mortar. The ingredients and powdered well and filtered by a sieve to it half quantity of powdered are mixed well thoroughly and stored in a air tight glass container.

DOSAGE:

800 to1000mg

INDICATION:

Suvayinmai, Oon veruppu, Pakkavayu, Kulai erivu, Vayu, Kozhai, Soodhaga vayu

Table:1 Family &part used of the medicinal ingredients:

Tamil Name	Botanical Name	Family	Part Used
Inji	<i>Zingiber officinale</i>	Zingiberaceae	Rhizome
Thippili	<i>Piper longum</i>	Piperaceae	Dry fruit
Thippili moolam	<i>Piper longum</i>	Piperaceae	Root
Ealam	<i>Elettaria cardamomum</i>	Zingiberaceae	Dry fruit
Chukku	<i>Zingiber officinale</i>	Zingiberaceae	Rhizome
Sathikkai	<i>Myristica fragrance</i>	Myristicaceae	Seed
Sadamanjil	<i>Nardostachys grandiflora</i>	Valerianaceae	Root
Sombu	<i>Pimpinella anisum</i>	Apiaceae	Seed
Milagu	<i>Piper nigrum</i>	Piperaceae	Dry fruit
Kottam	<i>Costus speciosus</i>	Costaceae	Rhizome
Chirunagappu	<i>Mesua nagassarium</i>	Lauraceae	Flower
Elavangapathiri	<i>Cinnamomum tamala</i>	Lauraceae	Leaf
Vetiver	<i>Vetiveria zizanioides</i>	Poaceae	Root
Kirambu	<i>Syzygium aromaticum</i>	Myrtaceae	Flower
Chathipaththiri	<i>Myristica fragrance</i>	Myristicaceae	Leaf
Thaliam	<i>Abies spectabilis</i>	Pinaceae	Leaf
Sugar	<i>Saccharum officinarum</i>	Poaceae	Sugar

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 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 favorable for measurement of high-matrix samples.

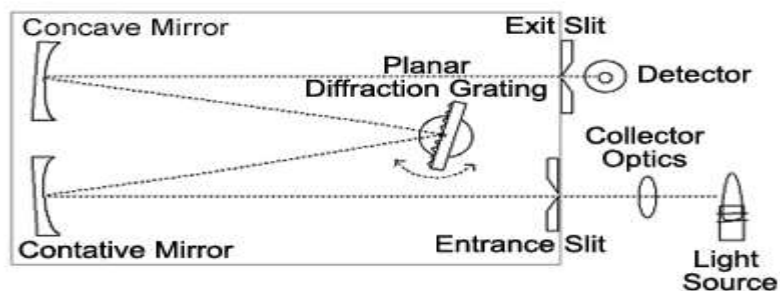


Figure 1: Sequential Type ICP-OES

2) Simultaneous Type

This type typically uses an echelle cross disperser in spectrophotometers and semiconductor 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.

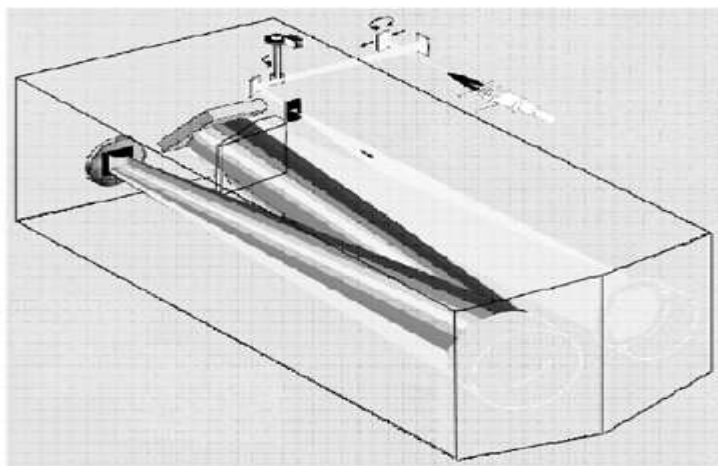


Figure 2: Simultaneous ICP-OES

Application:

Siddha drug analysis

IC 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 D

Sample: 0.5g of Inji chooranam is measured, and then dissolved in a

decomposition vessel with nitric acid into 10ml solution.

Partial spectral profile and analysis results shown below

RESULT

INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION

S.NO	Elements	Wavelength(nm)	Concentration
1	As	188.979	BDL
2	C	193.030	105.210mg/L
3	Ca	315.807	BDL
4	Cd	228.802	BDL
5	Cu	327.393	BDL
6	Fe	238.204	00.100mg/L
7	Hg	253.652	BDL
8	K	766.491	100.110mg/L
9	Mg	285.213	01.100mg/L
10	Na	589.592	51.350mg/L
11	Pb	220.353	BDL
12	P	213.617	140.301mg/L
13	S	180.731	01.115mg/L
14	Zn	206.200	01.239mg/L

DISCUSSION

ICPOES analysis of Inji chooranam indicates the presence of elements like Iron (Fe)-00.100mg/L, Potassium(K)-100.110mg/L, Magnesium (Mg)-01.100mg/L, Sodium (Na)-51.350mg/L, Phosphorus(P)140.3301mg/L, Sulphur(S)-01.115mh/L, Zinc (Zn)-01.239mg/L. Elements like Lead, Mercury, Arsenic, Cadmium was present below detection limit as Per WHO guidelines.

CONCLUSION

From the ICP-OES analysis reveals that *Inji chooranam* are free from toxicity there by proving the safety of utilization in siddha system. This study forms the base for the pharmaceutical analysis of *Inji chooranam* (IC) which will be followed by safe and efficacy studies later.

Declaration by Authors

Acknowledgement: None

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Conflict of Interest: The authors declare no conflict of interest.

SPECTROMETRY(ICP-OES)

The drug (inji chooranam) sample was analysed by the inductively coupled plasma optical emission spectroscopy (ICO-OES) to detect the trace elements and other elements qualitatively.

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