



## Research Article

### CHEMICAL CHARACTERIZATION OF HERBO - MINERAL SIDDHA FORMULATION *KARA SOODA SATHU PAMPAM* BY USING MODERN TECHNIQUES

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#### ABSTRACT

*Kara Sooda Sathu Pampam* (KSSP) is a traditional Siddha Herbo- mineral drug. The aim of the present study was to standardize the physico-chemical traits of the Siddha herbo mineral formulation KSSP. Efforts have been made to lay down the analytical standards for *Kara Sooda Sathu Pampam* which were not found reported to till date. This paper appraises a detail study of physico-chemical properties, phytochemical constituents and heavy metal contents of the selected drug (KSSP) were analyzed. The total ash value was found to be 9.3 %w/w, acid insoluble ash value is 0.94%w/w, water soluble ash value is 5.5 %w/w, and loss of drying at 105 ° c is 7.3 % w/w. The water soluble extractives and alcohol soluble extractives were found to be 8.67 % w/w and 5.0 % w/w. The ICP-OES reveals that the heavy metals such as Mercury, Lead, Arsenic, cadmium are present in the drug are below detected limit. HR-SEM analysis has been used to study particle size shape and distribution. The study highlights the appropriate application of modern scientific methods for developing the new insights into metal based Siddha drugs.

**KEYWORDS:** *Kara Sooda Sathu Pampam*, HR-SEM, ICP-OES, Siddha.

#### INTRODUCTION

Siddha is one of the traditional medicine systems which are the part of human health care system. Unlike other system it includes the number of minerals, metals and animal products, in the same manner as that of herbs. It also employs numerous method of purification for every single metal and minerals used. There by it ensures the safety of Siddha system itself<sup>[1]</sup>. *Pampams* are the powder substances obtained by calcification of purified metals, minerals and animal products by specific process. They are calcined in closed crucibles in pits and with cow dung cakes (*Pudam*). Generally these method of preparation of Siddha medicines involves conversation of minerals or metals into oxide or sulphide form by various herbal treatment followed by repeated high temperature calcinations and grinding cycles<sup>[2]</sup>. The *Pampam* thus obtained constitute ultra-small particles and are taken along with vehicles such as milk, ghee, butter, honey etc according to disease. This makes these drugs easily assailable eliminating their harmful effects and enhancing their biocompatibility. The rigidity of the methods of preparation for a particular *Pampam* makes the drug unique. However very few studies have been carried out to understand the phytochemical nature of these type of traditional medicines for the metal and mineral based preparations it become improve that

these drugs should be characterized with the help of modern instrumental techniques likely inductively coupled plasma optical emission spectrometry (ICP-OES), scanning electron microscopy (SEM), X ray diffraction (XRD) etc, based on these specification of metal based drugs can be well standardised on a scientific basis<sup>[3]</sup>. In the present era of globalization for the development of a world market for traditional medicines research and development is Quality control of Siddha drugs are generates a lot of problems very essential<sup>[4]</sup>. The present study investigate the physiochemical properties of traditional Indian Siddha preparation *Kara Sooda Sathu Pampam* which is mentioned in the Siddha text *Sikichha Rathina Deepam* <sup>[8]</sup> widely used for treating *Kalladaippu*, *Neeradaippu* and *Sathaiadaippu* <sup>[8]</sup> and other urinary disorders.

#### MATERIALS AND METHODS

##### (i) Preparation of Standardized *Kaara Sooda Sathu Pampam*<sup>[5]</sup>

KSSP was prepared as per the methodology mentioned in the Sasthric Siddha text recognized by drugs and cosmetic act 1940<sup>[5]</sup>. The raw drugs were procured from various standard drug stores in Chennai, Tamilnadu, India and mineral drugs were authenticated by SCRI, Chennai. Each drug was purified

by the purification methods mentioned in various Siddha texts [6,7]. The *Parpam* was prepared by grinding the raw materials with lemon juice and *Pudam* process. They are usually prescribed in the dose 488mg/day (*Panavedai/B.D*) and recommended to be taken with honey.

**Ingredients**

Purified *Vengaram* [7]- 1*Palam* (35 gm)

Purified *Silasathu* [7]- 1 *Palam* (35gm)

Lemon juice - Required qty

**(ii) Physico chemical evaluation [8]**

**a) Chemicals:** Analytical grade chemicals were procured from Golchha Chemicals Ltd., Jamshedpur and Himedia laboratories, Mumbai.

**b) Preparation of extract for preliminary basic, acidic radicals and biochemical studies:**

5g of sample was taken in a 250 ml of clean beaker and 50 ml of distilled water was added to it. Then it was boiled well for about 10 min. Then it is allowed to cool and filtered in a 100 ml volumetric flask and made up to 100 ml with distilled water. This preparation is used for the qualitative analysis of acidic/ basic radicals and biochemical constituents in it.

**c) Inductively coupled plasma optical emission spectrometry (ICP-OES) study:** Analysis of KSSP was performed using Optima 5300 DV ICP-OES equipped with a Sea Spray concentric nebulizer (Glass Expansion, Pocasset, MA) and cyclonic spray chamber. Following parameters were introduced:

nebulizer flow, 0.8 l min<sup>-1</sup>; radiofrequency power, 1450 W; sample introduction, 1.5 ml min<sup>-1</sup>; flush time, 20 s; delay time, 10 s; read time, 10 s; wash time, 30 s; and replicates, three. Standards were prepared by dilution of 1000 mg l<sup>-1</sup> stock solutions and the calibration curve was obtained using five to ten points including the blank. The other physico chemical analyses were carried out by using the standard procedures.

**d) HR- SEM analysis**

The particle size was determined by using the HR-SEM analysis. JEOL ASM 3500 SEM was used for the analysis. A representative portion of each sample was sprinkled onto a double side carbon tape and mounted on aluminum stubs in order to get a higher quality secondary electron image for SEM examination.

All the analytical procedures were carried out in SAIF, IIT, and MADRAS. Chennai 36.

**Results**

**i). Physio chemical and analytical specifications of KSSP**

Traditional tests for the KSSP was tabulated in table-1

Physical and chemical properties of KSSP was tabulated in table-2.

The preliminary constituents such as acidic, basic radicals and other constituents were tabulated in table 3-5.

Analytical specification of *Parpam* as per AYUSH guidelines was tabulated in table 6-8.

**Table 1: Traditional Tests for *Parpam***

S.No.	Test
1	white in colour without any shiny appearance
2	Tasteless and odourless
3	Did not regain luster on heating again at same temperature
4	Sample floats on water. Did not immediately immersed in water
5	Not translucent
6	Impinged in the papillary ridges when the sample rubbed in between Index finger and thumb

**Table 2: Physical and chemical properties**

S.No.	Procedure	<i>Vengaram</i> <i>B.P</i>	<i>Vengaram</i> <i>A.P</i>	<i>Silasathu</i> <i>B.P</i>	<i>Silasathu</i> <i>A.P</i>	KSSP
1	<b>Appearance Of The Sample</b>	Crystalline white incolour	Crystalline white incolour	Crystalline white incolour	Crystalline white incolour	Fine Powder white incolour
2	<b>Solubility</b>	no sparingly soluble	no sparingly soluble	no sparingly soluble	no sparingly soluble	no sparingly soluble
3	<b>Action of the heat</b>	no colour fumes	no colour fumes	no colour fumes	no colour fumes	no colour fumes
4	<b>Flame test</b>	no colour flame	no colour flame	no colour flame	no colour flame	no colour flame
5	<b>Ash test</b>	yellow flame	yellow flame	yellow flame	yellow flame	yellow flame

**Table 3: Test for Basic radicals**

S.No.	Procedures	Vengaram B.P	Vengaram A.P	Silasathu B.P	Silasathu A.P	KSSP
1	Test for Ammonium	-	-	-	-	-
2	Test for Sodium	+	+	+	+	+
3	Test for Magnesium	-	-	+	+	-
4	Test for Aluminium	-	-	+	+	-
5	Test for Potassium	+	+	+	+	+
6	Test for Calcium	+	+	+	+	+
7	Test for Ferrous iron	+	+	+	+	+
8	Test for Copper	-	-	-	-	-
9	Test for Zinc	-	-	-	-	-
10	Test for Arsenic	-	-	-	-	-
11	Test for Mercury	-	-	-	-	-
12	Test for Lead	-	-	-	-	-

**Table 4: Test for Acidic radicals**

S.No.	PROCEDURES	Vengaram B.P	Vengaram A.P	Silasathu B.P	Silasathu A.P	KSSP
1	Test for Sulphate	+	+	-	-	-
2	Test for Chloride	-	-	-	-	-
3	Test for Phosphate	+	+	+	+	+
4	Test for carbonate	-	-	-	-	-
5	Test for Flouride& Oxalate	-	-	-	-	-
6	Test for Nitrate	-	-	-	-	-
7	Test for borate	+	+	-	-	-

**Table 5 : Other constituents**

S.No	Procedures	Vengaram B.P	Vengaram A.P	Silasathu B.P	Silasathu A.P	KSSP
1	Test for Starch	-	-	-	-	-
2	Test for Reducing sugar	-	-	-	-	-
3	Test for Alkaloids	-	-	-	-	-
4	Test for Amino acids	-	-	-	-	-
5	Test for Tannic acids	-	-	-	-	-
6	Test for type of compounds	-	-	-	-	-

**Analytical Specification of Parpam as per AYUSH guidelines****Table 6: Colour&characters of KSSP**

S. No	Solvent used	Under ordinary light	Under ultra violet light
1	PM	White	white

PM-Powdered material

**Table 7: Physicochemical properties of Kaara Soda Sathu Parpam [9]**

S. No.	Parameters	Values obtained(%w/w)	Heavy/ toxic metals	
1	Total ash value	9.3	Lead	BDL
2	Acid insoluble ash	0.94	Cadmium	BDL
3	Water soluble ash	5.5	Mercury	BDL
4	Moisture content	7.3	Arsenic	BDL
5	Foreign organic matter	5.2	Volatile oil	BDL
6	Alcohol soluble extractive	5		
7	Water soluble extractive	8.67		

**Table 8: Colour, nature of extracts of KSSP**

S.No.	Extract Solvents	Colour	SEM Particle size(μ)	pH
1	Water	white	10-50	7.2-7.6

ii) ICP-OES analysis

ICPOES analysis of before and after purification of the ingredients of KSSP and test drug was tabulated in table 9-10

**Table 9: ICP-OES analyses of before and after purification of Vengaram**

Element	Bp Mean mg/L	Ap Mean mg/L
As	BDL	BDL
B	238.225	200.225
Ca	46.51	38.41
Cd	BDL	BDL
Fe	2	1.959
K	108.524	100.245
Na	258.87	249.321
P	30.65	28.52
Pb	BDL	BDL
S	20.554	18.952

**Table 10: ICP-OES analyses of before and after purification of Silasathu**

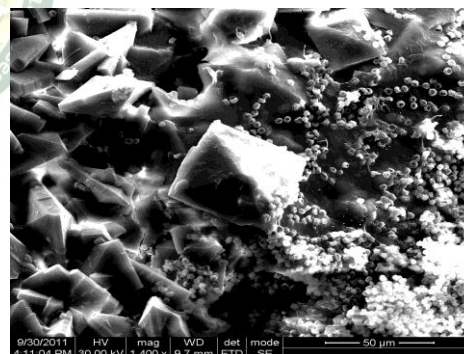
Element	Bp Mean mg/L	Ap Mean mg/L
As	BDL	BDL
Al	132.251	130.952
Ca	142.584	139.977
Cd	BDL	BDL
Fe	138.254	135.856
K	132.55	131.254
Na	366.25	358.754
P	100.85	97.11
Mg	145.849	142.261
Si	169.253	166.45

BDL = below detection limit

**Table 11: ICP-OES analyses of KSSP**

Element	KSSP Mean mg/L
As	BDL
Al	50.253
Ca	59.214
Cd	BDL
Fe	49.362
K	43.21
Na	106.265
P	40.247
Mg	65.265
Si	72.842

KSSP-Kara Sooda Sathu Parpam



**Figure 1: HR - SEM analysis**

Particle Size: 10-50μ  
Distribution: homogenous  
Surface: smooth

## DISCUSSION

There is an intense competition from other countries in the trading of traditional medicinal products. India's share in the world market is negligible as proper standardization techniques for the checking the quality is inadequate. This study is an earnest attempt at making appropriate scientific validation of mineral based traditional Siddha medicines. The results of ICP-OES, SEM studies could be used as excellent physio chemical fingerprints for the validation of medicine.

The *Parpam* was a white coloured fine powder, odorless without any taste. The *Parpam* answered the following tests showing that it was properly processed. There was no metallic luster when taken between the index finger and thumb and spread it was as fine as to get easily into finger lines. When a small quantity of *Parpam* was spread on cold and still water it floated on the surface. The *Parpam* does not revert to the original state. The ash content of 9.3% indicated that the drug contains organic matter and negligible amount of inorganic matter. Acid insoluble ash was 0.9% revealing

that the *Parpam* contained negligible amount of acid insoluble silica and salts of tin.

Physicochemical properties of *Kara Soda Sathu Parpam* has given the result that the pH of KSSP was 7.2 -7.6, which was weakly alkali. Hence on oral Intake it will not cause any strong alkali or acid like irritation to the gastrointestinal tract i.e. any physical irritation. The loss on drying at 105 °c was only 7.20% w\w; hence the drug will not lose much of its volume on exposure to this range of temperature. Qualitative analysis revealed the presence of Sulphate, Calcium, Phosphate, Iron, and Sodium. HR SEM analysis reveals the particle size, surface and distribution of particles; the particle size 10 - 50 μ and the particles were homogenously distributed and has smooth surface. It reveals easy for flowing. Hence the drugs will have chance for smooth flowing within the gastro intestinal tract without any irritation. ICP-OES analysis of sample for the trace elements revealed the content of sodium, Potassium, Calcium, Iron, Aluminum, and silicon might be attributing therapeutic activity of the *Parpam*.

#### CONCLUSION

The confirmation of nano particle size and the contents of heavy metals are under the deduction limit favors the *Kara Soda Sathu Parpam* as a safer drug under Siddha system. Future studies will be focused on the evaluation of toxicology profile is the essential component for its global marketing.

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