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SCIENTIFIC VALIDATION OF NAAGA SANGU PARPAM THROUGH FTIR, ICP-OES AND TGA ANALYSIS

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ABSTRACT

Plants and metals have been using in Siddha traditional medicine since long years ago. The aim of the present study is to standardize *Naaga Sangu Parpam*, a Siddha herbo metallic preparation through modern techniques. FTIR, ICP-OES and TGA analysis were done in this study. The results revealed the presence of amine, acids, alkane, alcohol, alkene, alkyl halide, alkene, alkyl halide and alkyl halide. Elements such as Calcium, Iron, Sodium, Potassium, Magnesium, Sulphur, Phosphorus and Zinc were present. The stability of the drug is at the range of 50 – 460^0 C. Hence, the drug *Naaga Parpam* is scientifically validation.

KEYWORDS: Naaga Sangu Parpam, FTIR, ICP-OES, TGA.

INTRODUCTION

There are many traditional medicinal systems in the world of which Siddha system is unique. In Siddha system of medicine, drugs are classified into 32 internal medicines and external medicines. *Naaga SanguParpam* is a calcinated drug fit in internal medicines category. The use of traditional medicines has been gaining importance in recent years. India is blessed with rich flora in which medicinal plants are also present. According to World Health Organization the herbal medicines have been defined as those containing plant parts or plant materials in raw state or processed form containing active principles.[1] Phytotherapy is

highly diffused in high income countries, but the scientific medical model is more diffused in the developing countries. This contact between the two models has raised the urgent need to compare the immense background of traditional knowledge with the scientific procedures of research and validation.[2] The presence of rich phytochemicals and minerals provides medicinal property for herbs. Herbo mineral formulations have rich potency to cure various diseases. But there is a need to standardize herbal medicines in order to utilise its medicinal value safely and effectively. In this study the drug *Naaga Sangu Parpam* was analysed according to PLIM guidelines.[3]

MATERIALS AND METHODS

Collection of the raw drugs

Naagam and *Sangu* were procured from a well reputed country shop in Parrys, Chennai. *Uthamani* was freshly collected from Tambaram sanatorium. *Naagam and Sangu* were purified and the medicine was prepared in the *Gunapadam* laboratory of National Institute of Siddha.

Identification and Authentication of the drug

Sangu (Conchshell) was authenticated at Marine Biology Regional Centre, Zoological Survey of India, Chennai. Metal drug *Sangu* (Zinc) was authenticated at Department of Geology, University of Madras, Chennai. *Pergulaeria daemia* Linn. was Identified and authenticated by Botanist, National Institute of Siddha, Tambaram Sanatorium, Chennai.

Fourier Transform Infrared Spectroscopy

Fourier Transform Infrared Spectroscopy is a powerful tool for identifying types of chemical bonds in a molecule by producing an infrared absorption spectrum that is like a molecular "fingerprint". This property is used for characterization of organic, inorganic and biological compounds. The band intensities are proportional to the concentration of the compound and hence qualitative estimations are possible. The IR spectroscopy is also carried out by using Fourier transform technique.

The Perkine Elmer Spectrum One Fourier Transform Infrared (FTIR) Spectrometer was used to derive the FTIR Spectra of *Naaga Sangu Parpam* in Potassium Bromide (KBr) matrix with scan rate of 5 scan per minute at the resolution 4cm-1 in the wave number region 450-4000cm-1. *Naaga Sangu Parpam* was grounded to fine powder using agate motor and pestle and then mixed with KBr. They were then Pelletized by applying pressure to prepare the

specimen (the size of specimen about 13 mm diameter and 0.3 mm in thickness) to recorded the FT- IR Spectra under Standard conditions. FTIR Spectra were used to determine the presence of the functional groups and bands in the *Naaga Sangu Parpam*.

Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) Analysis

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.

Sample preparation – Microwave Digestion

Inductively Coupled Plasma Spectroscopy techniques are the so-called "wet" sampling methods whereby samples are introduced in liquid form for analysis. Solids cannot be analyzed directly. Such samples should be made into clear aqueous medium quantitatively. 0.37 g of test sample *Naaga Sangu Parpam* was weighed and transferred into a liner provided with instrument. 9ml of Nitric acid was slowly added, such that no piece of sample sticks on the slide. It was mixed thoroughly and allowed to react for few minutes. The liner was placed in the vessel jacket. The screw cap was closed hand- tight in clockwise direction. The vessel was sealed and placed in the rotor fixed in microwave. The temperature was set to 180°C for 5 minutes and holded at 180°C for least 10 minutes. The vessel was allowed to cool down to a vessel interior temperature below 60°C and to a vessel surface temperature (IR) below 50°C before removing the rotor. The digested sample was made upto 100ml with Millipore water. If visible insoluble particles exist, solution could be filtered through whatmann filter paper. The digested solution was transferred into plastic containers and labelled properly.

In ICP intensity of light emitted when the sample "sprayed or aspirated into an argon plasma" is measured at different wavelengths. The intensity of light at a given wavelength will be proportional to a particular elemental ion concentration. The intensity is calibrated with known standard concentration. For accurate quantitative results it is necessary to stimulate the sample matrix condition with that of the standard. Each element generally will have many emission lines and the sensitivity is different for each of this wavelength. When more than one element is present it is quite common that some emission lines interfere due to overlapping.

Thermogravimetric Analysis

12.4 mg of sample drug *Naaga Sangu Parpam* was taken and it was evenly distributed in the bottom of the sample crucible (holder). While filling the crucible, no sample material should be left remaining on the edge of the crucible. The sample crucible was placed on the front-hand sample support and subjected for reading. Good thermal contact between the sample and heat- flux sensor is an indispensable requirement for optimum results.

RESULTS AND DISCUSSION

In the FTIR Spectra analysis, *Naaga Sangu Parpam* sample exhibits the peak value as shown in Table No. 1, at the wave number of 3380, 2510, 1423, 1140, 874, 711, 675, 656, 599 having N-H Stretch, O-H Stretch, -C-H bending, C-O Stretch, =C-H bending, C-Cl Stretch, =C-H bending, C-Cl Stretch, C-Br Stretch.

This indicates the presence of some organic functional groups such as amine, acids, alkane, alcohol, alkene, alkyl halide, alkene, alkyl halide and alkyl halide.

Table 1: Vibrations and Functional Groups of Naaga Sangu Parpam In Ftir.

Wave number(cm-1)	Vibrationalmodesof Naaga Sangu Parpam inIR region	Functional group
3380	N-H Stretch	Amine
2510	O-HStretch	Acid
1423	-C-H bending	Alkane
1140	C-Ostretch	Alcohol
874	=C-H bending	Alkene
711	C-CIStretch	Alkyl halide
675	=C-H bending	Alkene
656	C-CI Srtetch	Alkyl halide
599	C-Br Stretch	Alkyl halide

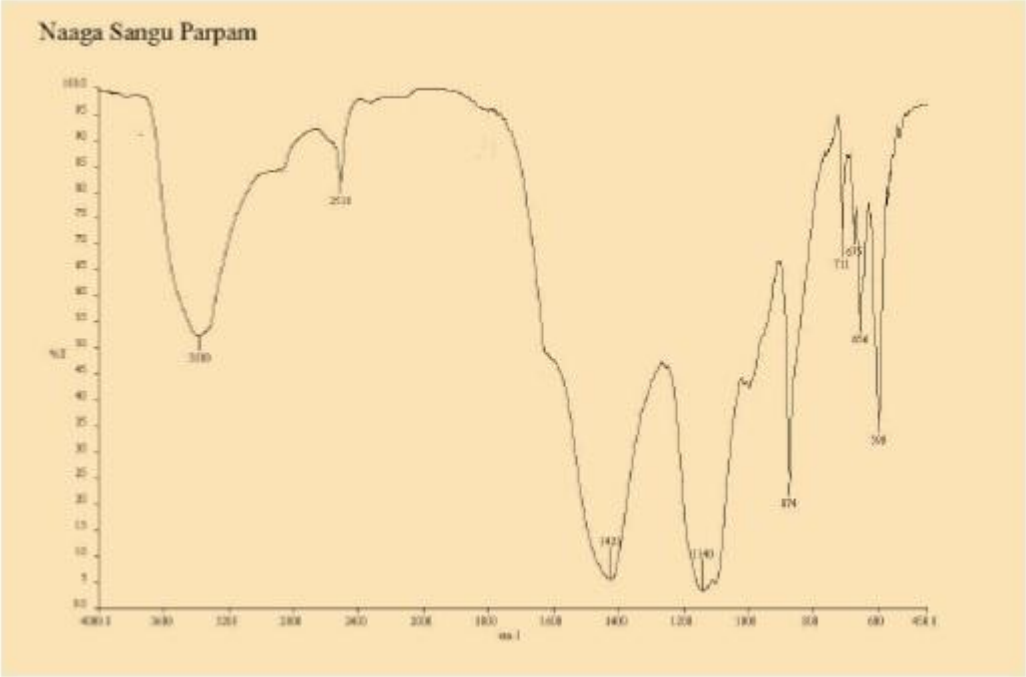

Figure 1: FTIR curve of Naaga Sangu Parpam.

The heavy metals like Arsenic, Mecury, Lead and Cadmium were found in below detectable limits. The presence of other elements shows the therapeutic value of *Naaga Sangu Parpam.*

Table 2: Icp-oes study analysis of naaga sangu parpam.

S.No	Elements	Wavelength in nm	Mg/L
1	Aluminium	Al 396.152	BDL
2	Arsenic	As 188.979	BDL
3	Calcium	Ca 315.807	502.180mg/L
4	Cadmium	Cd 228.802	BDL
5	Copper	Cu 327.393	BDL
6	Iron	Fe 238.204	01.376mg/L
7	Mercury	Hg 253.652	BDL
8	Potassium	K 766.491	03.821mg/L
9	Magnesium	Mg 285.213	01.104mg/L
10	Sodium	Na 589.592	06.320mg/L
11	Nickel	Ni 231.604	BDL
12	Lead	Pb 220.353	BDL
13	Phosphorus	P 213.617	86.341mg/L
14	Sulphur	S 180.731	41.252mg/L
15	Zinc	Zn206.200	421.018mg/L

Thermogravimetric analysis of *Naaga Sangu Parpam* carried out at the maximum of 1300 degree centigrade. The main objective of the study is to evaluate the decomposition and stability limit of the prepared formulation *Naaga Sangu Parpam*. Prepared formulation

Naaga Sangu Parpam seems to be stable at the temperature varying from 50 ºC to 460 ºC. Point of decomposition begins when the temperature increases beyond 460 ºC. Weight of the final residual matter was observed with 88.73% of residual volume. From the result of the present investigation it was concluded that the formulation *Naaga Sangu Parpam* seems to be stable at varying temperature ranges from 50 to 460 ºC.

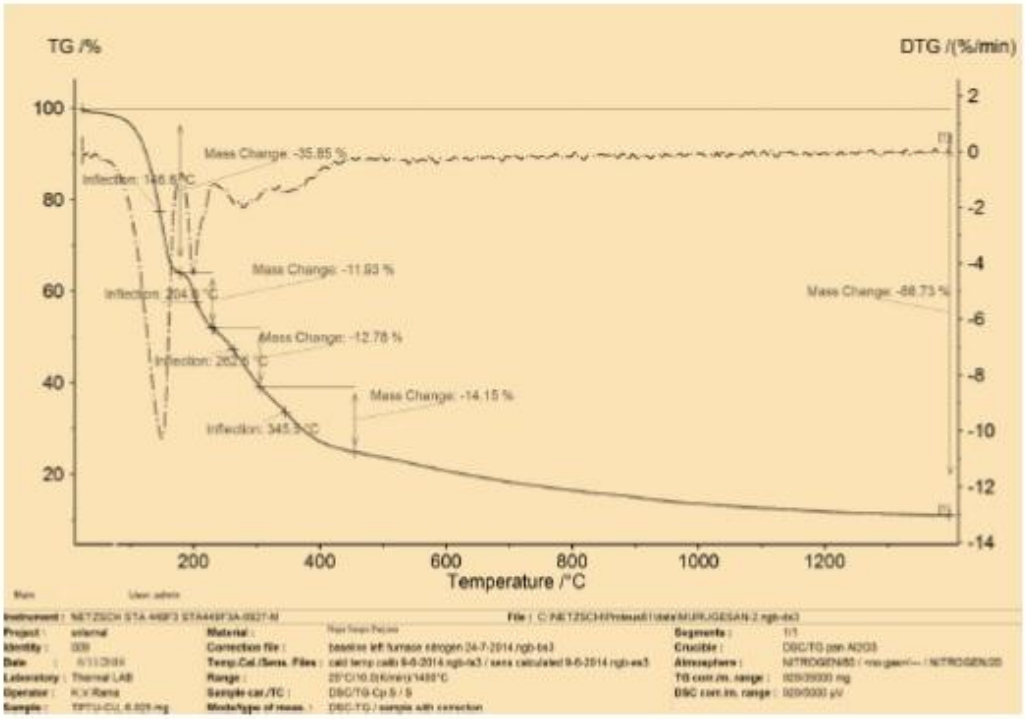

Figure 2: Thermo Gravimetric Analysis of Naaga Sangu Parpam.

CONCLUSION

FTIR analysis revealed the presence of some organic functional groups such as amine, acids, alkane, alcohol, alkene, alkyl halide, alkene, alkyl halide and alkyl halide. ICPOES study showed that the drug contains Arsenic, Mecury, Lead and Cadmium in below detected level and the presence of other elements having therapeutic value. Stability of *Naaga Sangu Parpam* at varying temperature ranges from 50 to 460 ºC was revealed through TGA.

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