



Qualitative and Quantitative Analysis of Poonaga Sathu

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(Received: 07 October 2023

Revised: 12 November

Accepted: 06 December)

KEYWORDS

Earthworm,
Poonaga Sathu,
Copper, XRD, ICP-
OES, Copper
extraction.

ABSTRACT:

Traditional medicines gain its importance due to their therapeutic action, minimal adverse effects and less toxic to humans. Earthworms have been used in traditional medicine in India for at least 2300 years ago. This study mainly focuses to analyze the qualitative and quantitative analysis of Poonaga Sathu and also to analyses the presence of other elements present with it. Earthworm were cultured and collected from red sand as per Siddha literature mentioned in the book Bhogar7000 Moondram kaandam. Earthworm was purified with butter milk, dried at sunlight and then mixed it with goat dung. After that this preparations is put into calcification process. Then the ash obtained from calcification is mixed with distilled water. Filtered and this sediment is grinded in mortar and pistil with elemental mercury. Then, the borax is added to that mixture and is heated in Moosai. Mercury is evaporated and Sathu is settled in Moosai. XRD results shows that the Poonaga Sathu contains 34% of copper oxide 31% of copper dioxide and 19% of Copper nitride. ICP-OES results shows that it contains elements like 29.75ppm of Copper, 22ppm of Iron, Zinc, calcium, Sodium, potassium, Magnesium. From the above study concludes that earthworm is cultured on red sand and Copper is main compound in the extracted product. Further toxicity study and their medicinal value and further usage of Poonaga Sathu (copper) may be evaluated in future to validate the Siddhars Knowledge's as scientific one.

1. Introduction

Employee The most ancient system of Medicine which originated in the land of Tamil Nadu is Siddha Medicine. It works on the principles of *pancha bootham*, six tastes, three humors, seven body constituents, Astrology and *pancha patchi*. All over the world, Siddha systems of medicine have become drastically admired because of their therapeutic property, less toxic and minimal adverse effects. All Indian systems of medicine use plants, animal products feature, minerals and metals to cure various ailments. The unique feature of the system is that it co-relates virtual, spiritual as well as scientific knowledge. Siddha system of medicine comprises of five divisions namely herbals, metals, minerals, salts, animal and its products. Each division is unique in its own way, however medicines prepared from metals and mineral origin has high potency, shelf life and treats the disease as soon as possible. These metals and minerals are widely distributed in earth, mountains and seas. Naturally they

are found in the form of chemical constituents like rocks, sand, minerals and separate elements (1).

This describes that, these metals and minerals are found in association with all the living organisms, which is a wonderful creation made by God. In Siddha system and in the minerals resources department, metals denote the naturally occurring ores and minerals. Artificially, minerals are extracted by adding suitable solvents to these naturally occurring ores. The most significant source of metals is obtained from the lava of volcano and naturally occurring ores. These metals are responsible to maintain the normal healthy physiological functions of the body (1). There are eleven types metals in Siddha medicine preparation. They are Gold, Silver, Copper, Zinc, Steel, Iron, Lead, Brass, Bronze and Tin. In this copper is formed naturally, plants and animal origin. Copper content is found in many plant species which includes *Sirukeerai*, *Karisalai*, *Senthara*, *Mookiratai*, *Puliyaranai*, *Avuri*, *Thekku* and etc. In animal origin copper is found in



earthworm, *Mutilla occidentalis*, feathers of peacock, hairs and etc (3). The extraction of copper from earthworm is described in classical Siddha literature *Boghar 7000* and *Gunapadam Thadhu jeevam*. However there is some variation in the characteristics and uses of copper obtained from natural source, plant and animal origin. The element copper is enriched in the species of earthworm. Earthworms have been used in traditional medicine in India (Siddha, Ayurveda, and Unani) since 2300 years ago. Copper extracted from this species is used in processing of gold and other higher metals and also literature widely says that, copper obtained from earthworm species is considered to be of high standards. In Siddha system of medicine this copper (*chembu sathu*) containing medicine are widely used in the treatment of acid peptic disease, anemia, delirium, wounds, hepatosplenomegaly, chronic ulcer, eye diseases and so on(3). To extract copper from earthworm by method as mentioned in the book *Bhogar 7000 Mudhalam kaandam* and *Bhogar 7000 Moondram Kaandam*. The copper extracted earthworm is said to be more potent and less toxic as per Siddha classical text. With this it can be known whether the obtained copper can be used in the manufacture of various Siddha preparations like the commercial copper. The extracted copper from earthworm called as *Poonaga Sathu*(4). The significant goal of this study is to analyze the qualitative and quantitative analysis of *Poonaga Sathu* (copper extracted from earthworm) and also to analyze the presence of other elements present with it.

2. Materials and methods

Culture and Collection of Earthworm:

A pit (10×10) was made in red sand ground; paddy straw was kept into the pit. Cane sugar mixed with water and sprayed over the paddy straw. The red sand was spread above the pit. Repeated the same for five times. Required amount of water was irrigated to this pit two times per day to maintain soil wet for 30 day until the paddy straw was decomposed. After 30 days earthworm was grow in the pit was collected.

Collected earthworm was washed with water until soil gets eliminated. After that it was poured in buttermilk left it for three hours (Soil and other waste product present in body of Earthworm were excreted). After

washed with water for 10 times and dried it in sun light by placing it in large plate.

Dried earthworm is weighed and equal quantity goat dung is mixed and made into small cake by adding water. And allowed to dry in sunlight after that this cakes are placed in mud pot and put into incineration process (Incinerated for 36 hours). Ash obtained from this process is mixed with distilled water allow it free for 3 hours. After 3 hours water is removed and sediment is filtered again these procedure is repeated for three times. After that it is mixed and grinded with elemental mercury. And this product is placed in *Moosai* and heated until it reaches liquid consistency then borax is added to that. When it gets liquid consistency it is spread over mud pot. Borax and Mercury get evaporated. End product obtained by these procedure is *Ponaga sathu* i.e., extracted copper.

ICPOES (Inductively coupled plasma optical emission spectroscopy)

Procedure:

Take about 500 mg of sample into the Teflon microwave digestion vessel and add 1 ml of ultrapure nitric acid to digest about 45 minutes using Anton Paar microwave digestion unit. After that the sample is made up to a 50 ml standard measuring flask. The calibration standard solution is prepared from 0.25 µg/ml to 10 µg/ml by using ultrapure nitric acid and blank also. Agilent ICP-OES 5100 VDV instrument used with the following operation conditions: a RF power 1.2 kW, a plasma gas flow rate 12 l min⁻¹ and a nebulizer gas flow rate 0.70 l min⁻¹. The samples are introduced into the plasma using nebulizer and spray chamber for the analysis (6, 7).

X-ray diffractometry

Procedure:

XRD can be done on a number of different kinds of samples. The ideal sample will be a crystalline powder that has been pressed into the sample holder, have a smooth surface and hold in the sample at angle of 45 degrees. Solid samples, Small volumes of sample tapped on microscope slide glass or thin films deposited on a substrate can also be used, but will have degree of effectiveness (8, 9).



3. RESULTS

In order to understand the *poonaga sathu* using XRD, and ICP-OES studies were performed. The presences of minerals were tested by XRD studies for *poonaga sathu* (figure 1). XRD is used to determine the mineral composition of the raw material with its qualitative and quantitative analysis. XRD Peak and pattern of *poonaga sathu* was mentioned (table 1 & 2). Secondly ICP-OES was performed to quantify the sample *poonaga sathu*. Elements present in *poonaga sathu* were observed (Table 3). The findings of the sample analysis of the macronutrient, micronutrient, and trace element content are provided for each element in table 4.

X-RAY DIFFRACTOMETRY:

Figure 1 : XRD Analysis of Copper in Poonaga sathu

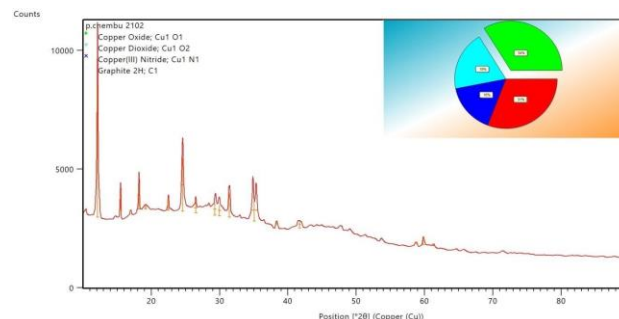


Table 1: Peaks of Poonaga sathu

Pos.[°2θ]	Height[cts]	FWHMLeft[°2θ]	d-spacing [Å]	Rel.Int.[%]
12.1074	5706.72	0.1696	7.30416	100.00
15.4672	685.21	0.1131	5.72425	12.01
18.1704	1105.79	0.1605	4.87831	19.38
19.1590	184.21	0.2966	4.62876	3.23
22.4767	498.63	0.1622	3.95247	8.74
24.5612	2281.93	0.2641	3.62153	39.99
26.4861	420.11	0.5087	3.36255	7.36
29.2971	520.07	0.4772	3.04600	9.11
29.9689	435.46	0.4654	2.97923	7.63
31.3986	1013.08	0.2988	2.84676	17.75
35.0762	935.14	0.8880	2.55625	16.39
38.3332	73.53	0.1731	2.34621	1.29
41.7068	309.87	0.3451	2.16390	5.43
58.7085	61.50	0.1698	1.57137	1.08
59.8249	304.20	0.2128	1.54469	5.33
61.2335	56.51	0.2573	1.51249	0.99

Table 2: List of Pattern present in poonaga sathu

S.no	Ref.Code	Score	Compound Name	Displ. [°2θ]	ScaleFac.	Chem.Formula
1	98-004-3181	8	Copper Oxide	0.000	0.123	Cu ₂ O
2	98-008-9236	15	Copper Dioxide	0.000	0.128	CuO
3	98-016-1756	16	Copper(III) Nitride	0.000	0.135	Cu ₂ N ₃
4	98-007-6767	21	Graphite 2H	0.000	0.072	C



ICP-OES:

Table 3: ICP-OES for Poonaga Sathu

Elements	Poonaga Sathu (ppm)
As	BDL
Cd	BDL
Cu	29.75 ppm
Fe	22 ppm
K	4.05 ppm
Mg	1.3 ppm
Mn	BDL

Mo	BDL
Ni	BDL
Pb	BDL
Sr	BDL
Zn	15 ppm
Ca	14.8 ppm
Na	12 ppm
Hg	BDL

Note: BDL–BelowDetection Limit;ppm parts/ million;
(%)-Percentage

TABLE 4: Standard Linearity of Poonaga sathu

SL.NO	ELEMENT	WAVE LENGTH	R ² VALUE
1	Arsenic [As](µg/g)	188.980	0.9958
2	Cadmium [Cd](µg/g)	214.439	0.9995
3	Copper [Cu](µg/g)	327.395	0.9993
4	Iron [Fe](µg/g)	238.204	1.0000
5	Potassium [K](µg/g)	766.491	0.9995
6	Magnesium [Mg](µg/g)	279.553	0.9998
7	Manganese [Mn](µg/g)	257.610	0.9995
8	Molybdenum [Mo](µg/g)	202.032	0.9992
9	Lead [Pb](µg/g)	220.353	0.9985
10	Zinc [Zn](µg/g)	213.857	0.9992
11	Calcium [Ca](µg/g)	396.847	0.9966
12	Sodium [Na](µg/g)	589.592	0.9996
13	Nickel [Ni](µg/g)	231.604	0.9995
14	Strontium [Sr](µg/g)	407.771	0.9992
15	Mercury [Hg](µg/g)	184.887	0.9951



4. DISCUSSION

The *Poonaga Sathu* is extracted from earthworm as per the Siddha classical text Bogar 7000 *Muthalam* and *moondram kaandam*, *Gunapadam Thathu Jeeva vaguppu* Earthworm is cultured based on methods mentioned in classic Siddha literature Bogar 7000 *Muthalam kaandam* and it takes 3 months duration to culture 7 kg earthworms. After the purification process, only 400 grams of Earthworm (dried) was obtained. As an end product of Poonaga sathu 40g were collected. The extracted product was analyzed for its chemical constituents in XRD and ICP-OES methods.

X-RAY DIFFRACTOMETRY:

XRD results show that the *Poonaga sathu* contains 34% of copper oxide Cu_2O , 31% of copper dioxide CuO , 19% of Copper nitride Cu_3N_2 , and 16% of Graphite C .

ICP-OES:

ICP-OES results show that it contains elements like 29.75ppm of Copper, 22ppm of Iron, 15 ppm of Zinc, 14.8 ppm of calcium, 12 ppm of Sodium, 4.05 ppm of potassium, and 1.3 ppm of Magnesium. No evidence of heavy metals like Arsenic, Cadmium, Manganese, Molybdenum, Nickel, Lead, Selenium, and Mercury. From the results, *Poonaga sathu* contains major components of Copper Byproducts i.e., copper oxide, copper dioxide and copper nitride, Iron, Zinc, etc., and there are no heavy metals like mercury, lead, cadmium, and Arsenic. According to Siddha classic texts, earthworm contains copper which is proven from the above results as this product contains copper and its products. Siddhars used this *Poonaga sathu* for Rasa Vatha process in the production of gold and other higher-order metals. Extraction of *Poonaga sathu* takes 6 months and only a small quantity is obtained i.e., 40gm of *Poonaga sathu* from 7 kg live earthworm. It's a huge period so Siddhars used these procedures and products for the production of higher order metals despite medicine preparation.

5. CONCLUSION

The above study concludes that earthworm is cultured on red sand, and copper is the main compound in the extracted product. Qualitative and Quantitative analysis

of extracted products reveals copper and its byproducts, Iron, zinc, and calcium. Methods are standardized. Further toxicity study and their medicinal value, another usage of Alchemy may be evaluated in the future to validate the Siddhars Knowledge as a scientific one.

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