Physico-Chemical Analysis of Siddha Drug POORAM- A comparative Evaluation between before and after purification of raw drug

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Abstract:

Siddha medicine is one of the oldest and the foremost of all other medical systems of the world. In Siddha, Mercurial compounds namely PANCHASOOTHAM are widely used to cure complicated and chronic disease. Pooram is one among the five compounds. Pooram is called as MERCUROUS CHLORIDE (CALOMEL), and it is identified and indicated for the treatment of many diseases in ancient Siddha medicine. One of the most important aspects of siddha medicine is purification of raw materials before using them for medicine. The objective of the present study is to evaluate the Physico-Chemical analysis of Siddha raw drug POORAM before and after purification i.e. quantitative parameters such as pH, ASH (%w/w), Acid Insoluble Ash (%w/w), Loss On Drying @105^{0}C, Water Soluble Extractive, Alcohol Soluble Extractive, are tested is carried out in the present study. Qualitative analysis of the formulation showed the presence of elements of Chloride and Sulphate in both forms and presence of Mercury and Amino Acids in raw pooram and these are absent in purified forms. In this research revealed the physicochemical changes in purification procedures of Siddha drugs. Hence further quantitative chemical & Electro chemical research needed for scientific evidence to prove why Siddhar's give importance to purification for herbo-mineral Drugs.

IndexTerms **- Pooram - Mercurous Chloride, Panchasootham, Siddha**

I. INTRODUCTION

Siddha medicine is one of the oldest and foremost of all other medical systems of the world. It is the first medical system indigenously developed and flourished well in South India especially Tamil speaking area for many centuries. The word "Siddha" comes from the word *siddhi*, which means an object to attain perfection or heavenly bliss. This system of medicine was developed by the incredible spiritual scientists and intellectual masters called Siddhars. Hence it is called as Siddha medicine. They were the spiritual scientists who explored and explained the reality of nature and its relationship with man by their siddhi powers [supernatural powers] and experimental findings [15]. The Siddhars had set a very high standard for themselves and tried to prepare medicines accordingly, a standard that even the modern scientific community dares to prescribe. Siddha medicine can cure all types of diseases, especially the chronic diseases, which baffles and eludes even the modern sophisticated medicine [11]. The drugs used in Siddha medicines are classified into three main groups: Thathu (inorganic substance) Thavara (Herbal products), Jangamam (Animal products). All Siddhars are well versed in preparing the higher level of Medicines using Uloogangal and kanimangal. Among the Metals & Minerals; Silver, Gold, Zinc, Copper and Other Metals, which are mostly used in modern medicines are wonderful life saving drugs against all chronic and infectious diseases. The same was used for thousands of years without any adverse effects in the Siddha system. [2,3]

Mercurial compounds namely Panchasootham are widely used to cure complicated and chronic disease. ***Pooram*** is one among the five compounds. Pooram is called as MERCUROUS CHLORIDE (CALOMEL).The mercurial compound has been in use in Siddha since many centuries and Pooram is identified and indicated for many diseases in ancient Siddha Literatures. Siddha system also has described in detail about the poisonous effects of mercury and its compounds. But it also has explained in depth about the measures for purification and detoxification of the same. One of the most important aspects of the Siddha system is purification of the raw materials before using them as medicine. Such purification methods are more scientific and cannot be found in other systems. The purpose of purification is to remove the all the toxic effects from the materials. So that the end product will not contain any toxi substance and will not end up in giving side effects after taking the medicine. Moreover in purification, it undergoes a series of processes which change the total physical and chemical nature of the drug and make it a much safer than the raw drug without purification. [5, 8]

Evaluations of physicochemical parameters are essential to standardize the Siddha Purification methods. The Present study is to evaluate the changes in pooram before and after purification through modern physico- chemical parameters.

II. MATERIALS AND METHODS

1. Procurement of the raw drugs:

Pooram was procured from the reputed country shop in Nagercoil. Pepper &Betle leafs purchased from local market in Tirunelveli.

2. Identification and Authentication of the raw drugs:

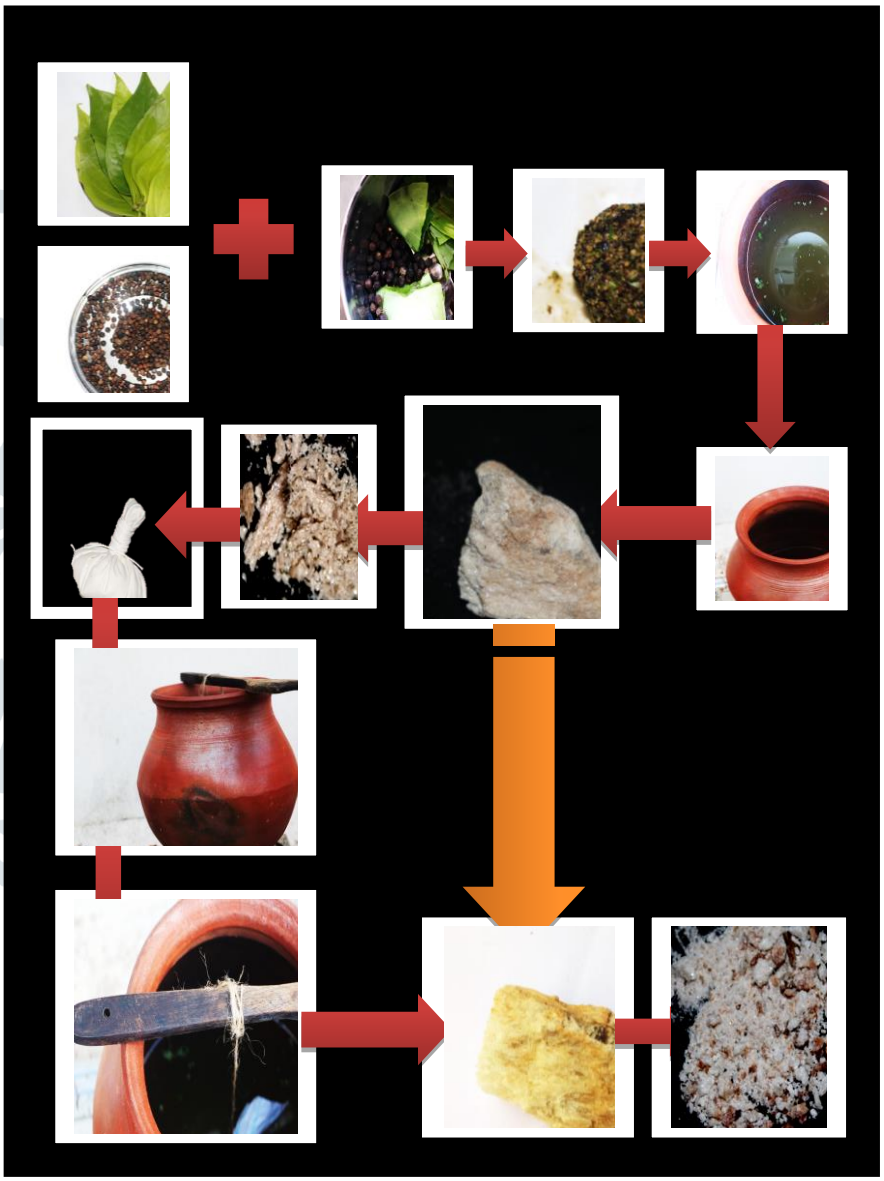
The mineral drug was identified and authenticated by Chemist in Siddha Central Research Institute (SCRI) Arumbakkam Chennai. The herbs were identified and authenticated by Botanist, Siddha Clinical Research Unit (SCRI) Palayamkottai, Tirunelveli.

3. Purification of Pooram

3.1. Required materials:

1.	*Pooram*	-	35gm
2.	Vetrilai (*Piper betel*) leafs	-	8.75 gm
3.	Milagu(*Piper nigrum*)	-	8.75 gm
4.	Water	-	1.3 litre

3.2. Method of purification: Betle leaves and *Piper nigrum*dry fruits were taken separately and cleaned. Then these were ground together and made into a poultice (karkam). Then water was taken in a medium size mud pot and the poultice was mixed in that water. Pooram (raw) was covered with a piece of clean dry cloth, so that it was not exposed outside. The good twine was taken and tied the cloth with Pooram with one end and another end was tied with the bamboo stick and which was placed horizontally over the opening of the mud pot. The raw drug Pooram in cloth was dipped in the mixture of water and poultice. The vessel was constantly heated till mixture of water reduced by three fourth of its volume.



Finally the Pooram was taken out from the mud pot and wait for some time to cool the raw drug. After that, the Pooram was taken out from the cloth, washed with clean water and dried in sunlight and stored in the container. [2, 14]

4. Physicochemical parameters

Organoleptic characters (color, odour), different quantitative parameters such as pH, Total Ash (%w/w), acid insoluble ash (%w/w), loss on drying @105^{0}C, water soluble extractive, alcohol soluble extractive, were tested according to the prescribed standard methods in VS Clinical Research and Hospital (P) LTD, Taramani, Chennai -113.Qualitative analysis was carried out in Department of Biochemistry, Government Siddha Medical College, Palayamkottai.[9]

5. Organoleptic characters

5.1. Colour

About 5 g of Pooraparpam was taken in a clean glass beaker and tested for its color by viewing against a white opaque background under direct sunlight [4, 7].

5.2. Odour

About 5 g of the Pooraparpam was placed in a 100 ml beaker and tested for its odour by wafting the air above the beaker.

5.3. Determination of pH of Aqueous Solution:

One gram of the test drug was taken in to a 100 ml graduated cylinder containing about 50ml water. The cylinder was shaken vigorously for two minutes and the suspension was allowed to settle for hour at 25^{0}C to 27^{0}C, then 25 ml of the clear aqueous solution was transferred in to a 50 ml beaker and tested for pH using digital pH meter.[6]

5.4. Loss of Weight

Loss of weight in percentage was estimated in the purified samples to determine the reduction of metallic concentration by the formula [(Weight of the sample before purification - Weight of the sample after purification) / Weight of the sample before purification] x 100.[13]

5.5. Physical evaluation

Loss on drying:

5 g of the drug without preliminary drying was weighed accurately in a tared evaporating dish, dried at 105^{0}C for 5 hours, cooled in desiccator and weighed. Later the drying and weighing process was continued at one hour interval until difference between two successive weighing of sample corresponds to not more than 0.25 percent. When the constant weight was obtained the percentage of moisture content was calculated with reference to the air dried drug.[1]

5.6. Total Ash Value

2 to 3 g of drug was weighed in the pre weighed and tared Gooch crucible was kept in the muffle furnace at a temperature not exceeding 450ºC until free from carbon then cooled and weighed and the percentage of the total ash content were calculated with reference to the air dried drug. [12]

5.7. Water Soluble Ash Value:

The ash obtained from total ash content was boiled with 25 ml of water for 5 minutes and insoluble matter were collected in an ash less filter paper, washed with hot water and ignite for 15 minutes at a temperature not exceeding 450ºC the weight of the insoluble matter were subtracted from the weight of the ash. The difference in weight represents the water soluble ash and the percentage of the water soluble ash content were calculated with reference to the air dried drug.[16]

5.8. Acid Insoluble Ash Value:

The ash obtained from total ash was boiled with 25ml of dilute hydrochloric acid for 5 minutes and insoluble matter were collected in an ash less filter paper, washed with hot water and ignited to constant weight. Later the percentage of the acid insoluble ash content was calculated with reference to the air dried drug.

5.9. Determination of alcohol soluble extractive

5g of coarsely powdered air dried drug was macerated with 100ml of absolute alcohol in a closed flask for twenty-four hours, shaken frequently during six hours and allowed to stand for eighteen hours. After filtering the solution 25ml of this filtrate was evaporated in a tared flat bottomed shallow dish, and dried at 105ºC until a constant weight was obtained. Later the percentage of alcohol-soluble extractive with reference to the air-dried drug was calculated.[17]

5.10Determination of water soluble extractive

5g of coarsely powdered air dried drug was macerated with 100ml of chloroform-water in a closed flask for twenty-four hours, shaken frequently during six hours and allowed to stand for eighteen hours. After filtering the solution 25ml of this filtrate was evaporated in a tared flat bottomed shallow dish, and dried at 105ºC until a constant weight was obtained. Later the percentage of water-soluble extractive with reference to the air-dried drug was calculated.

6. Qualitative Tests

5gm of unpurified *Pooram*and purified *Pooram* were taken in a 250ml of clean beaker and 50ml 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 100ml with distilled water.[10]

6.1.Test for Chloride:

2ml the extract is treated with silver nitrate solution. Presence of white precipitate indicated the presence of Chloride.

6.2. Test for Sulphate:

2ml of the extract is added to 5% barium chloride solution. Presence of white precipitate indicated the presence of Sulphate.

6.3. Test for Phosphate:

2ml of the extract was treated with 2 ml of con. HNO_3 and2ml of dil. Ammonium molybdate solution. Presence of yellow precipitate indicated the presence of Phosphate.

6.4. Test for Lead:

2 ml of the extract was added with 2 ml of dil. potassium iodine solution. Presence of yellow precipitate indicated the presence of Lead.

6.5. Test for Copper

One pinch(50mg) of substance was made into paste with con.HCL in watch glass and introduced into the non-luminuous part of the flame. Presence of blue coloured precipitate indicated the presence of Copper.

6.6. Test for Mercury

2ml of the extract was treated with 2ml of dil. sodium hydroxide solution. . Presence of yellow precipitate indicated the presence of Mercury.

III. RESULTS AND DISCUSSION

Table.1Organoleptic characters of pooram before and after purification

S.no	Parameters	Pooram (Before purification)	Pooram (After purification)
1	Colour	Creamy brown	Wheaties brown
2	Odour	Odourless	Odourless
3	Loss of weight	-	8.57%

The result of table 1 shows; the similarities and differences in the organoleptic characters among the raw and purified samples. It was observed that the purified sample differs in its colour (Wheaties brown) on compared with raw sample (Creamy brown) and the smell was not to be found characteristic in both samples. After purification, sample loss its 8.57g% weight and qualitatively indicated that the concentrations of mercury was reduced better on compared with raw Pooram.

Table2.Physicochemical Parameters:pooram before and after purification

Sl.no	Parameters	Results	
		Pooram (Before purification)	Pooram (After purification)
1	pH		
2	Ash (%w/w)	0%ash content	0% ash content
3	Acid insoluble ash (%w/w)	-	-
4	Loss of drying @ 105^0c (%w/w)	4.73%	4.69%
5	Water soluble ash	-	-
6	Water soluble extractive	0.414%	0.075%
7	Alcohol soluble extractive	1.2%	0.29%

The result of table 2 shows; the similarities and differences in the physical properties among the raw and purified samples. It was observed that the loss on drying at 105°C of Pooram before and after purification was found to be 4.73% and 4.69%.Moisture content/ LOD of the sample are less than 5% w/w, so it could prevent microbial growth. Total ash value used to estimate the inorganic material such as silicate, carbonates, oxalates and phosphates. Total ash in the given samples was found 0%.which indicates the absence of silicate, carbonates, oxalates and phosphates. No significant value was observed in acid insoluble ash and water soluble ash in both samples. pH of pooram before and after purification found to be 5.7 and 5. Water soluble extractive value of pooram before and after purification was found to be 0.414% and 0.29%. Alcohol soluble extractive value of pooram before and after purification found to be 1.2% and 0.29%.

Table.3 Qualitative analysis of pooram before and after purification

Sl.no	Parameters	Results	
		Pooram (Before purification)	Pooram (After purification)
1	Chloride	Present	Present
2	Sulphate	Present	Present
3	Mercury	Present	Absent
4	Lead	Absent	Absent
5	Copper	Absent	Absent
6	Phosphate	Absent	Absent
7	Amino acid	Present	Absent
8	Calcium	Absent	Absent

The result of table 3 shows the Qualitative analysis of pooram before and after purification. It was observed that of elements of Chloride, Sulphate present in both forms and presence of Mercury (figure 1) and Amino acids in raw pooram and these are absent in purified forms. In addition to the qualitative tests the elements Lead, Magnesium, Copper, Calcium, Phosphate, Arsenic, Aluminium, Zinc, Iron, Ammonium, Tannic acid, Starch and unsaturated compounds are not found in Pooram before and after purification.

Figure 1- *Test for Mercury; P1- raw Pooram, P2-Purified Pooram*

IV. CONCLUSION

The Physico-Chemical analysis of siddha raw drug pooram before and after purification i.e. quantitative parameters such as pH, ash (%w/w), acid insoluble ash (%w/w), loss on drying at 105°C, water soluble extractive, alcohol soluble extractive, were tested was carried out in the present study. Qualitative analysis of the formulation showed the presence of elements of chloride and sulphate in both forms and presence of Mercury and amino acids in raw pooram and these are absent in purified forms. In this research revealed the physicochemical changes in purification procedures of Pooram. Finally concluded as, purification of raw pooram is essential before using it in any medicinal preparation. Hence further quantitative chemical and Electro chemical research needed for scientific evidence to prove why Siddhars' give importance to purification for herbo-mineral Drugs.

V. ACKNOWLEDGEMENT

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