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Characterization of Siddha Herbo Mineral formulation *Porikara Parpam* using X – Ray Diffraction

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Abstract

Porikara Parpam is a Siddha herbal-mineral composition recognized for its lithotriptic effects. The classical *Siddha* literature, *Agathiyar Vaidya Pooranam* (205), has procedures for preparation and use. The purpose of this research is to analyse the chemical characterization of this widely used drug using XRD, as well as provide data for making informed therapeutic interventions. The study revealed the presence of Calcite, Tincalconite, and Coesite. This study uses XRD to perform a unique chemical characterisation of the Siddha formulation Porikara Parpam. Additional pharmacological research could be conducted to standardize and support the evidence.

Keywords: *Porikara Parpam*, lithotriptic, *Siddha*, XRD Analysis.

Background:

The *Siddha* system of medicine is renowned for its herbal, herbomineral, and mineral formulations. *Porikara Parpam* is one such formulation stated in *Agathiyar Vaidya Pooranam 205* [1] comprising Borax, Conch shell, and *Cissus quandrangularis*. *Parpam* is extensively administered for renal calculi since it has lithotriptic properties. It is also mentioned as a treatment for urethral stricture and as a diuretic in the above-mentioned text. Despite its widespread utilization, *Parpam* lacks scientific support. This study establishes the basis for standardizing the drug *Porikara Parpam*.

Materials and methods

The raw drugs were procured from an authenticated raw drug store in Parry's corner, Chennai. The raw drugs were authenticated and certified by the experts of Department of Gunapadam (Siddha Pharmacology) and Medicinal Botany, Government Siddha Medical College, Chennai. The raw drugs were then then purified as per the procedures mentioned in the text *Sarakku Suththi Sei Muraigal* [2].

Purification of raw drugs

Porikaram (borax) was taken roasted, grounded into fine powder, weighed and stored in an air tight container. *Sangu*, (conch shell) was taken, soaked in the water containing fullers earth for three hours, then washed, dried, weighed and stored in an airtight container.

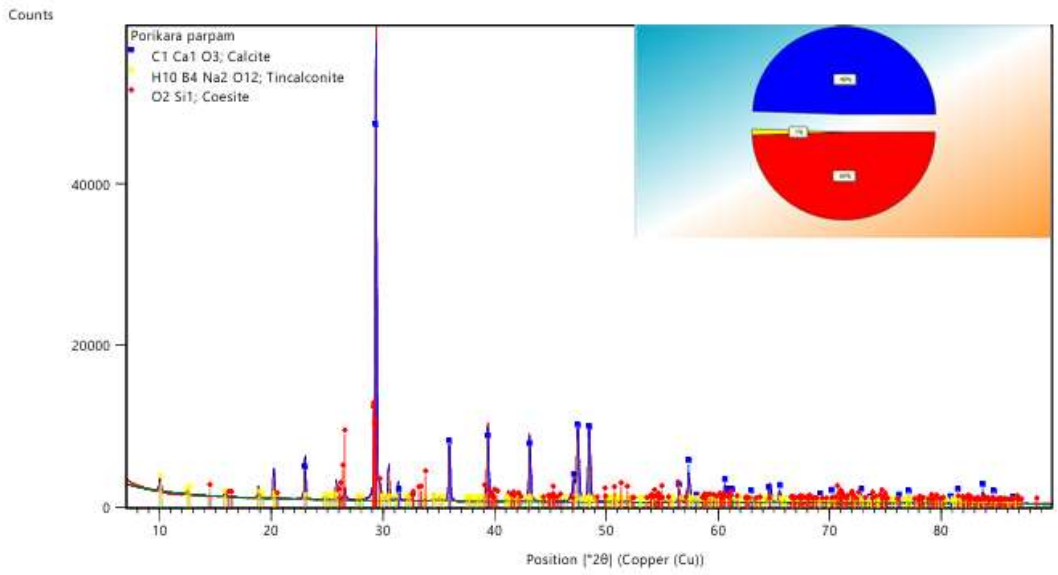
Preparation of the drug

Purified conch shell of 3 *palam* (105 gms) was taken and powdered using an iron mortar and pestle, that then triturated with *Cissus quandrangularis* juice for 6 hours. The mixture was made into pellets and dried in sunlight. Then the dried pellets were placed in an earthen bowl, covered with earthened lid and sealed by clay plasters. The apparatus was incinerated using 20 cow dung cakes. The obtained *Parpam* was grinded with water and made into a crucible. The purified borax of 1 *palam* (35 gms) was placed in the above prepared crucible, sealed with the clay plasters and subjected into incineration with 10 cow dung cakes. After incineration the *parpam* was collected, powdered well, and stored in a clean air tight container.

Powder XRD analysis

Powder diffraction data were collected by Aeris PANalytical diffractometer (Netherlands) with Ni-filtered copper radiation in Bragg-Brentano geometry. Fine powder of the sample taken in a thin layer on a silicon zero background holder. The sample was recorded for the angle 2θ in the range of 10-90 degrees at a scanning rate of 4 degrees/sec with CuKα (λ 1.5418 A°).

Results



Pattern List:

Visible	Ref.Code	Score	Compound Name	Displ.[°2θ]	Scale Fac.	Chem. Formula
*	98-015-8258	77	Calcite	0.000	0.771	$Ca_1C_1O_3$
*	98-003-6362	10	Tincalconite	0.000	0.023	$Na_2\ B_4\ O_5\ (OH)_4\ .3H_2O$
*	98-010-0755	27	Coesite	0.000	0.193	Si_1O_2

Discussion

The X-ray diffraction (XRD) pattern of *Porikara Parpam* (Fig.1) demonstrates a well-defined crystalline nature, as indicated by the presence of numerous sharp and intense diffraction peaks. Phase identification, performed using standard reference patterns, confirmed the presence of three major crystalline components: **Calcite ($CaCO_3$)**, **Tincalconite ($Na_2B_4O_7 \cdot 5H_2O$)**, and **Coesite (SiO_2)**. Among these, **Calcite** was identified as the predominant phase, exhibiting a highly intense diffraction peak around $2\theta \approx 29–30°$, signifying its abundance in the formulation. **Tincalconite** and **Coesite** were detected as minor phases, with lower-intensity peaks distributed across the pattern. The inset phase composition diagram further corroborates the predominance of calcite, followed by silica and borate components in comparatively lesser proportions. The presence of calcite indicates a calcium carbonate–rich base material, possibly derived from shell sources, while the detection of tincalconite suggests borate incorporation, likely due to traditional purification processes involving borax. The identification of coesite, a high-temperature polymorph of silica, implies that the formulation underwent considerable thermal treatment during preparation. Overall, the XRD analysis confirms that *Porikara Parpam* is a **highly crystalline, multi-mineral formulation** composed mainly of calcium carbonate with silica and borate as associated phases, validating its traditional method of preparation and compositional stability.

Conclusion

The X-ray diffraction analysis of *Porikara Parpam* confirms that the formulation is **crystalline in nature**, consisting predominantly of **Calcite ($CaCO_3$)** as the major phase, along with **Tincalconite ($Na_2B_4O_7 \cdot 5H_2O$)** and **Coesite (SiO_2)** as minor components. The detection of coesite further implies that the preparation underwent **high-temperature thermal transformation**, ensuring material stability and phase purity. Overall, the XRD findings validate the **mineral composition, crystalline integrity, and proper preparation** of *Porikara Parpam*, supporting its authenticity and potential therapeutic mineral profile as described in *Siddha* medicine.

Reference

1. Agathiyar Vaidhya Pooranam -205, First Edition Central Council for Research in Ayurveda and Siddha, 1997
2. Directorate of Indian Medicine and Homeopathy, Sarakku Suththi Sei Muraigal.