Research Article

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ANALYTICAL CHARACTERIZATION OF JEEVALOGA CHENDOORAM, A SIDDHA HERBO-MINERAL FORMULATION, THROUGH X-RAY DIFFRACTION

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ABSTRACT

The Siddha medical system utilizes a wide range of Herbo-mineral preparations, among which Jeevaloga Chendooram is traditionally prescribed for ailments such as anaemia, ascites, dropsy, and nephritis. Although it has been in therapeutic use for centuries, scientific evidence regarding its physicochemical profile remains scarce. This study was undertaken to elucidate the crystalline phases of Jeevaloga Chendooram using powder X-ray diffraction (PXRD) as part of its standardization. The formulation was prepared in accordance with classical Siddha texts and analysed using an Aeris analytical diffractometer with Ni-filtered Cu Kα radiation (λ = 1.5418 Å) in Bragg–Brentano geometry. Data were recorded across a 2θ range of 10–90°. The PXRD spectrum exhibited sharp, well-defined reflections, confirming its crystalline nature. Phase identification revealed hematite Fe_2O_3 as the predominant constituent, contributing the highest diffraction intensities. In addition, minor phases of methylammonium fluoride (CH_3NH_3F) and aquadichlorotriamminecobalt (III) chloride $[Co(NH_3)_3(H_2O)Cl]Cl_2$ were detected in low abundance. The predominance of hematite highlights the iron-rich composition of the formulation, consistent with its traditional application in managing blood-related disorders. Overall, the findings indicate that hematite represents the primary stable crystalline phase generated through calcination, while the minor phases likely arise from transformation products or residual precursors. The distinct crystalline fingerprint established by PXRD affirms its importance in the authentication, standardization, and quality assurance of Siddha formulations. This study thereby reinforces the scientific rationale behind the therapeutic use of Jeevaloga Chendooram, bridging traditional knowledge with modern analytical validation.

Keywords: Jeevaloga Chendooram, XRD, Herbo mineral

INTRODUCTION

The Siddha system of medicine is a traditional, holistic approach to treating a wide range of illnesses that dates back thousands of years. Siddha formulations are made from the raw materials of medicinal plants, minerals, and metals. It takes to develop a novel medication molecule and get it onto the market is approximately 12 to 15 years[1]. In contrast to the time-consuming and costly modern approach to drug synthesis, the tried-and-true reverse pharmacology method based on ancient medicine saves both money and time. Drug development involves a step called standardization. A Siddha formulation's quality must be determined before it is used in in vitro, in vivo, or clinical trials.

Jeevaloga chendooram a Siddha Herbo mineral formulation used to treat conditions like anaemia, dropsy, ascites, acute and chronic nephritis.[2] Although Jeevaloga Chendooram has long been employed in traditional practice, scientific evidence regarding its chemical profile is still limited; hence, it was selected for detailed analysis in this study .The present study employs powder X-ray diffraction (PXRD) as a primary analytical technique for determining the chemical composition of the formulation.[3] X-ray diffraction (XRD) plays a pivotal role in the standardization of Jeevaloga Chendooram, a traditional Siddha formulation. As Chendooram are predominantly metallic and mineral-based preparations, their safety and therapeutic efficacy depend largely on the crystalline phases present. XRD provides precise information on the crystalline structure, phase purity, and particle size, thereby enabling the identification of desired medicinally active phases and the detection of unwanted or toxic crystalline impurities. This ensures batch-to-batch consistency, authenticity, and quality control of the formulation. Moreover, correlating XRD data with pharmacological outcomes facilitates the establishment of scientific evidence for traditional claims, thus bridging the gap between traditional knowledge and modern pharmaceutical validation

MATERIALS AND METHODS

The test drug Jeevaloga Chendooram a Siddha Herbo mineral formulation was mentioned in the Siddha literature The Pharmacopeia of Siddha Research Medicines[2]. Ingredients of “Jeevaloga Chendooram” were tabulated in Table 1.

Table 1: Ingredients of Jeevaloga Chendooram

Name of the drugs	Botanical name /Chemical name	Quantity
Aya chendooram	Ferrum	10 gm
Kantha chendooram	Magnetic oxide	10 gm
Mandora chendooram	Silicate of iron	10 gm
Potrilaikaiyan chooranam	*Wedelia chinensis*	10 gm
Chukka chooranam	*Zingiber officinale*	10 gm
Milaku chooranam	*Piper nigrum*	10 gm
Thippili chooranam	*Piper longum*	10 gm
Elakai arisi chooranam	*Elettaria cardamomum*	10 gm
Jeeraka chooranam	*Cuminum cyminum*	10 gm
Lavangam chooranam	*Syzygium aromaticum*	10 gm
Keezhkoinelli chooranam	*Phyllanthus niruri*	10 gm

Source of raw drugs

The raw drug was purchased in Rajendra Country drug store, Thucklay, Kanyakumari. authenticated by a botanist and from the Department of Gunapadam, National Institute of Siddha, Chennai, Tamil Nadu, India, Certificate no. Gun/Aut/26/24.

Preparation of the drug – Jeevaloga Chendooram

The test drug Jeevaloga Chendooram was prepared at Gunapadam laboratory of National Institute of Siddha, Chennai, Tamil Nadu, India.

Method of preparation

Number 1 to 3 is specially prepared as mentioned below.

These seven ingredients numbers 5 to 11 are mixed and rubbed with Potrilaikaiyan juice for 3 days villais is made dried powdered again and used in this process.

Then number 1 to 3 ingredients and compound churnam of 4 to 11 are well mixed together in a kalvam and bottled up. This is called Jeevaloga Chendooram.

Aya Chendooram

Purified Ayapodi is placed in a kalvam and powdered. Acidum sulphuricum is added, mixed well, exposed to the sun, and dried. It is then rubbed with Potrilaikaiyan juice for 2 days in the kalvam and allowed to dry in the sun. Again, it is powdered, acid sulphuricum is added, mixed well, dried, and rubbed with the juice of Potrilaikaiyan leaves for 2 to 3 days. Thin villais are made, enclosed in a pair of suitable agals, and the junction of the agals is sealed with seven layers of clay cloth. After drying, the agals are subjected to putam with about 300 to 400 vratties in a pit in an airtight compartment. On cooling, the villais are secured and weighed.

Next, two more similar putams may be done to secure the finest chenduram by rubbing with the same Potrilaikaiyan leaf juice. [2]

Kantha Chendooram

Purified usikantham is placed in a kalvam powdered acid sulphuricum is added mixed well exposed to the sun and dried. This is then rubbed with the juice of Potrilaikaiyan leaves for 2 to 3 days and dried in the sunlight with the kalvam, again the above process of powdering adding acid sulphuric mixing drying rubbing with the juice of Potrilaikaiyan leaves for 2 or 3 days is repeat. Villais are made dry, enclosed in a pair of agals clay seven layers are provided at the junction of the agals, dried, and subjected to putam with about 300 to 400 vratties in a pit in an airtight compartment. On being cooled the chendooram villais are taken out, weighed, and powdered. [2]

Next two more putams may be applied in the same manner as mentioned above without using acidum sulphuricum for the 2nd and 3rd time. Rubbing with the juice of Potrilaikaiyan leaves for 2 or 3 days is done for a pair of agals and putam is applied as before.

Mandoora Chendooram

Lohamandooram purified is taken. This is powdered and placed in a kalvam, rubbed with the juice of Potrilaikaiyan leaves for 2 or 3 days, villais are made dried and enclosed in a pair of agals, clay cloth seven layers are provided to the junction of the agals, dried and subjected to putam with about 300 to 400 vratties in a pit in an airtight compartment. On being cooled it is taken out and weighed.

Next, two more similar putams are applied by using the same juice of Potrilaikaiyan leaves for rubbing, and putam is applied each tie as mentioned under the first putam. [2]

Instrumental Analysis of Jeevaloga Chendooram

The PXRD analysis was carried out on an Aeris PANalytical diffractometer (Netherlands) employing Ni-filtered copper radiation (Cu Kα, λ = 1.5418 Å) in Bragg–Brentano geometry. The powdered formulation was mounted as a thin layer on a silicon zero-background holder, and diffraction patterns were recorded across a 2θ range of 10–90° with a scanning speed of 4° per second. [4]

RESULTS AND DISCUSSION

The XRD results for Jeevaloga chendooram are presented in Figure 1, with the corresponding diffraction pattern detailed in Table 2.

PXRD Pattern and Phase Identification

The powder X-ray diffraction pattern of sample SF-006 shows several sharp, well-defined reflections, confirming a predominantly crystalline material. The most intense peaks appear at 2θ = 33.145° and 35.618°, with additional notable peaks at 24.123°, 26.640°, 40.840°, 49.445°, 54.046°, 62.434° and 63.985°. Indexing and database matching attribute the dominant phase to hematite, which accounts for the major diffraction intensity. The observed peak positions and relative intensities are consistent with reported hematite patterns in the literature.[5]

Minor phases

Two minor crystalline phases methylammonium fluoride (CH_3NH_3F) and an aquadichlorotriamminecobalt (III) chloride complex ($[Co(NH_3)_3(H_2O)Cl]Cl_2$), with lower match scores and scale factors indicating minor abundance. These minor phases likely correspond to residual reagents, ammonium-containing by-products, or adsorbed surface species introduced during preparation or handling; their presence should be regarded as tentative based on the automated match and warrants orthogonal confirmation. Comparable practice, using XRD to identify main and trace crystalline constituents in Ayurvedic/Siddha metallic preparations has been reported previously.

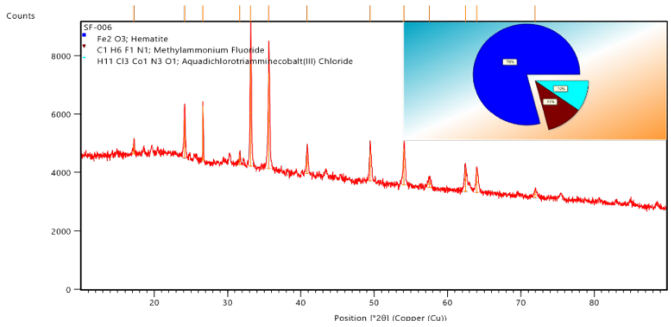

Figure 1: XRD Analysis of Jeevaloga Chendooram

Table 2: Pattern List for Jeevaloga Chendooram

Visible	Reference Code	Score	Compound Name	Displ. [°2θ]	Scale Fac.	Chemical Formula
*	98-002-2505	89	Hematite	0.000	0.978	Fe2 O3
*	98-011-0656	18	Methylammonium Fluoride	0.000	0.209	CH_3NH_3F
*	98-002-2077	13	Aquadichlorotriam minecobalt (III) Chloride	0.000	0.262	$[Co(NH_3)_3(H_2O)Cl]Cl_2$

Hematite (Fe_2O_3) is an iron oxide mineral commonly found as the crystalline product in red/metallic traditional formulations that undergo calcination or controlled oxidation. Its predominance in SF-006 indicates that iron has been transformed into a stable oxide phase during processing, which may be responsible for a portion of the formulation's intended therapeutic action. The detection of ammonium-containing and cobalt-containing crystalline phases at low levels suggests either incomplete removal of precursor salts used during preparation or adventitious contamination, or intentional incorporation of dopants/metal complexes. The presence of cobalt (even at trace levels) is of particular relevance to safety/toxicity and should be confirmed and quantified because cobalt salts can have pharmacological/ toxicological effects at relatively low concentrations.[6-7]

PXRD has established value in the standardization of traditional mineral-metal medicines because it directly identifies crystalline phases and can detect unwanted crystalline impurities; this is especially pertinent for chendooram and Parpam where oxidation states and phase identity determine both safety and activity. The clear identification of hematite as the major crystalline phase supports batch identity for SF-006, while the minor phases indicate a need for improved process control (washing, calcination conditions, precursor purity) to minimize impurities and ensure reproducibility.[6]

In Ayurvedic and Siddha medicinal systems, iron-containing minerals, including hematite are traditionally valued for their roles in managing blood-related and digestive disorders. Hematite (g is described as possessing cool potency, and properties such as astringent and bitter taste, which facilitate its application in treating conditions such as diarrhoea, bleeding disorders, and gastrointestinal dysfunctions.[8] Scientifically, hematite nanoparticles have demonstrated dose-dependent cytotoxicity against cancer cells, specifically MCF-7 breast cancer cells, mediated via reactive oxygen species (ROS) generation and intracellular calcium modulation. [9]

CONCLUSION

The PXRD analysis of Jeevaloga Chendooram revealed a well-defined crystalline profile, confirming the presence of hematite (Fe_2O_3) as the predominant phase, accompanied by minor constituents such as methylammonium fluoride and aquadichlorotriamminecobalt (III) chloride. The dominance of hematite (79%) underscores the iron-rich nature of the formulation, which aligns with the traditional Siddha use of iron-based medicines in the management of haematological and chronic conditions. The detection of additional minor phases suggests possible transformation or stabilization products formed during the calcination and preparation process, which may contribute to the overall pharmacological and safety profile of the formulation. Importantly, the crystalline fingerprint obtained from PXRD provides a reliable tool for standardization and authentication of Jeevaloga Chendooram, ensuring batch-to-batch reproducibility and quality control. These findings highlight PXRD as a critical analytical method for validating the mineralogical composition of Siddha herbo-mineral preparations and establishing their scientific basis for therapeutic applications.

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