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PHARMACEUTICAL AND PRELIMINARY ANALYTICAL STUDY OF AN ARKA FOR ANAEMIA

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ABSTRACT

Introduction: Pandu (anaemia) is described in Ayurveda as a Rasa Pradoshaja Vikara presenting with pallor, weakness, palpitations, and periorbital edema, closely resembling iron deficiency anaemia (IDA). As IDA remains one of the most prevalent nutritional disorders worldwide, Ayurvedic formulations addressing both iron deficiency and impaired digestion are of therapeutic importance. Pandurogaghna Arka, prepared using Loha Bhasma processed with Triphala Arka and Trikatu Arka, was selected for pharmaceutical preparation and preliminary analytical evaluation. Materials and Methods: Triphala Arka and Trikatu Arka were prepared by distillation of coarsely powdered drugs after soaking in water. Loha Bhasma obtained from a GMP-certified pharmacy was subjected to sequential Bhavana with Triphala Arka followed by Trikatu Arka until Siddhi Lakshana was achieved. The final formulation was assessed for organoleptic characteristics and physicochemical parameters including loss on drying, total ash, acid-insoluble ash, water-soluble ash, water-soluble extractive, and alcohol-soluble extractive. Results: Both Arka preparations yielded consistent volumes, indicating a reliable distillation process. Pandurogaghna Arka appeared reddish-brown with a characteristic odor and taste. Analytical evaluation showed low moisture content (4.2%), high total ash

(99.33%), acid-insoluble ash (68.34%), and water-soluble ash (51.33%). Water- and alcohol-soluble extractive values were 0.8% and 0.4% respectively. Discussion: Bhavana Samskara significantly modified the organoleptic and physicochemical properties of Loha Bhasma. Triphala Arka contributed digestive and antioxidant support, while Trikatu Arka enhanced bioavailability, collectively strengthening the hematinic potential of the formulation.

KEYWORDS: Anemia, Loha bhasma, Arka, Iron deficiency anaemia, Pandurogaghna arka.

INTRODUCTION

In Ayurveda, Pandu (anaemia) is considered a specific disease with its own pathogenesis and treatment listed under Rasa Pradoshaja Vikara. Ancient texts like Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya explain Panduroga with main signs such as paleness (Panduta), weakness (Daurbalya), fast heartbeat (Hridspandanadhikya), and swelling around the eyes (Akshikutashotha). These features are very similar to iron deficiency anaemia (IDA), where pallor is the most common symptom. Since IDA is one of the most widespread nutritional problems worldwide, affecting nearly one-third of people, the Ayurvedic understanding of Panduroga offers valuable insight into this condition.[1]

Arka is a liquid preparation made by distilling herbs or other substances soaked in water. Earlier, this was done using an instrument called the Arka yantra, though modern distillation tools can also be used. The text Arka Prakasha is the earliest source to describe Arka, listing it as one of the Panchavidha Kashaya Kalpana (five primary preparations) and highlights its added potency compared to other preparations.[2]

Pandurogaghna arka is an Ayurvedic formulation prepared to manage Panduroga (anaemia). It is made by processing Loha Bhasma through Bhavana (trituration) with Triphala Arka (arka of Terminalia chebula, Terminalia bellarica and Emblica officinalis) and Trikatu Arka (Zingiber officinale, Piper nigrum and Piper longum), which enhances its therapeutic efficacy against the condition.

OBJECTIVES

- To prepare Triphala Arka
- To prepare Trikatu Arka
- To prepare and analyze Pandurogaghna arka.

MATERIALS AND METHODS

The materials and methods of this work can be classified into the following section.

- Pharmaceutical study
- Analytical study

Pharmaceutical Study

Collection of drugs: Loha Bhasma was procured from GMP certified pharmacy, triphala and trikatu were procured from local market, Thanniruhalla, Hassan, Karnataka, India.

Table 1: Ingredients of the formulation and its guna karma.

Ingredients	Rasa	Guna	Veerya	Vipaka	Karma
Loha bhasma[3]	Tikta, kashaya, madhura	Guru, ruksha	Sheeta	Madhura	Pittakaphahara
Amalaki[4]	Pancharasa lavanavarjita	Guru, ruksha, sheeta	Sheeta	Madhura	Tridosha shamaka
Haritaki[5]	Pancharasa lavanavarjita	Ruksha, ushna, laghu	Ushna	Madhura	Tridoshahara
Vibhitaki[6]	Kashaya	Ruksha, laghu	Ushna	Madhura	Kapha pitta hara
Shunti[7]	Katu	Laghu, snigdha	Ushna	Madhura	Kaphavatahara
Maricha[8]	Katu	Laghu, tikshna	Ushna	Katu	Vatakapha hara
Pippali[9]	Katu	Laghu,tikshna, snigdha	Ushna	Madhura	Kaphavata shamaka

Preparation of Triphala Arka

100 g of coarsely powdered Triphala was soaked in 150 ml of water and kept aside for 2 hours. After this period, the remaining 150 ml of water was added, and the mixture was subjected to distillation. Throughout the process, a constant flow of water was maintained through the condenser, while heating was kept below 10 gradients in the heating mantle.[10]

Preparation of Trikatu Arka

100 g of coarsely powdered Trikatu was soaked in 150 ml of water and kept aside for 2 hours. After this period, the remaining 150 ml of water was added, and the mixture was subjected to distillation. Throughout the process, a constant flow of water was maintained through the condenser, while heating was kept below 10 gradients.[11]

Preparation of Pandurogaghna Arka

80 g of Loha Bhasma was taken and subjected to Bhavana (trituration) with Triphala Arka until the attainment of subhavita lakshana (tests of perfectness of trituration). On the following day, Bhavana was repeated using Trikatu Arka until Siddhi Lakshana was

observed. The processed Bhasma was then completely dried and preserved for further analysis.[12]

Analytical study

The analytical study was done to assess the standard parameters mentioned for the formulation as per guidelines of CCRAS 9.

A) Organoleptic characters - Color, Odor, Taste and Appearance.

B) Physical and chemical parameters- loss on drying, total ash, acid insoluble ash, water soluble ash, water soluble extractive and alcohol soluble extractive.

Determination of Loss on Drying: To determine the loss on drying, 5 grams of the sample were placed directly onto the moisture meter plate. The lid of the moisture meter was closed, and heating was initiated by pressing the start button. The volatile matter or moisture, if present, was evaporated and dried at a temperature of 105°C ± 2°C. Once the process was completed, the final reading was recorded. This reading was subtracted from 100 to calculate the loss on drying at the specified temperature.[13]

Determination of Total Ash: About 3g of drug accurately weighed and kept crucible in a muffle furnace at a temperature not exceeding 600°C was incinerated until free from carbon; it was cooled and weighed.[14]

Determination of Acid Insoluble Ash: The ash was taken into a 250ml beaker without loss of ash and added with 100ml of dil. HCl. The crucible was washed with 10ml of acid and the washings were transferred to the beaker; the beaker was heated till liquid boils. The solution was filtered and the insoluble matter was collected on ashless filter paper, washed with hot water until filtrate was neutral. The filter paper containing the insoluble matter was transferred to the original crucible, dried on a hot plate and ignited at 600°C in muffle furnace. The residue was allowed to cool in suitable desiccators for 30mins and weighed without delay. The process was repeated until constant weight was obtained, then the acid insoluble ash was calculated with reference to the sample taken.[15]

Determination of Water-Soluble Ash: The total ash was boiled for 5 minutes with 25ml of water. The insoluble matter was collected using ashless filter paper. It was washed with hot water and ignited for 15 minutes at a temperature not exceeding 600°C. The weight of the insoluble matter was subtracted from the weight of the ash; the difference in weight

represented the water-soluble ash. The percentage of water-soluble ash with reference to the sample taken was calculated.[16]

Determination of Water-Soluble Extractive: 5g of the sample drug was macerated with 100ml of distilled water in a closed flask for 24 hours. It was shaken frequently for six hours. It was allowed to stand for eighteen hours, filtered rapidly taking precautions against loss of water. 25ml of the filtrate was evaporated to dryness in a tarred flat bottom shallow dish and dried at 105°C to constant weight and weighed. The percentage of water-soluble extractives with reference to the sample taken was calculated.[17]

Determination of Alcohol-Soluble Extractive: 5g of the sample drug was macerated with 100ml of alcohol in a closed flask for 24 hours. It was shaken frequently for six hours. Allowed to stand for eighteen hours, filtered rapidly taking precautions against loss of water. 25ml of the filtrate was evaporated to dryness in a tarred flat bottom shallow dish and dried at 105°C to constant weight and weighed. The percentage of water-soluble extractives with reference to the sample taken was calculated.[18]

OBSERVATIONS AND RESULTS

Pharmaceutical study

Preparation of Arka: The powdered drug exhibited its characteristic fragrance, and within 10–20 minutes of initiating the distillation process, vapors were observed rising through the neck of the round-bottom flask. The first drop of Arka was obtained after approximately 40–45 minutes of heating. Continuous condensation of these vapors occurred, and the resulting arka was steadily collected in a conical flask. The temperature was carefully regulated and maintained below 10 gradients to ensure proper distillation.

Results of both arka

Table 2: Showing quantity of drug and water for arka.

Drugs	Quantity (in ml)	Water (in ml)	Yield (in ml)
Triphala	100	300	180
Trikatu	100	300	180

Preparation of Pandurogaghna Arka: Loha Bhasma was subjected to bhavana with Triphala Arka for 5 hours, after which the formulation acquired a distinct odor of Triphala. The Bhasma was carefully dried, retaining the characteristic taste of Triphala. On the subsequent day, the dried Bhasma was subjected to bhavana with Trikatu Arka for 5 hours,

resulting in a preparation that exhibited the sharp taste of Trikatu and was notably free from any trace of amlatva (sourness). This process highlights the transformation of organoleptic properties during bhavana, reflecting the influence of both arka and duration of processing on the final characteristics of Loha Bhasma.

Table 3: Showing quantity of drugs for Pandurogaghna arka.

Drugs	Quantity	
Loha bhasma	Before bhavana	After bhavana
	80g	79g
Triphala arka	40ml	
Trikatu arka	40ml	

Table 4: Showing results of organoleptic characters of Pandurogaghna arka.

Characters	Results
Color	Reddish brown
Odor	Characteristic
Taste	Characteristic
Appearance	Bhasma form

Table 5: Showing results of physicochemical analysis of Pandurogaghna Arka.

Parameters	Results
Loss on drying	4.2%
Total ash	99.33%
Acid insoluble ash	68.34%
Water soluble ash	51.33%
Acid soluble extractive	0.4%
Water soluble extractive	0.8%

DISCUSSION

Panduroga closely resembles the clinical presentation of iron deficiency anaemia (IDA), which is one of the most prevalent nutritional disorders worldwide. The Ayurvedic perspective emphasizes derangement of Rasa dhatu and impaired Agni as the root causes, leading to rasadhi dhatu kshaya. Thus, the management of Panduroga requires both replenishment of iron and correction of digestive and metabolic imbalances.

The preparation of Triphala arka and Trikatu arka yielded consistent volumes, confirming the efficiency and reliability of the distillation process. When both are employed as Bhavana media for Loha Bhasma, they impart distinct qualities to the formulation, demonstrating the importance of bhavana samskara, wherein repeated processing modifies and enhances the therapeutic attributes of a drug. The final reddish-brown Pandurogaghna Arka obtained after

sequential bhavana reflects the successful integration of mineral and herbal components, signifying both pharmaceutical and therapeutic potential.

Pharmaceutical observations showed that Loha bhasma underwent clear transformation during bhavana. Triphala arka adds mild digestive and antioxidant properties, while Trikatu arka contributes sharpness and improves bioavailability. Together, they enhance the taste, appearance, and overall effectiveness of Loha bhasma, particularly strengthening its hematinic action. This combination is especially important in Panduroga, where iron deficiency is often linked with weak digestion and poor absorption.

The analytical findings confirm the quality and stability of the formulation. A low moisture content (4.2%) indicates good preservation, while the high total ash (99.33%) reflects its mineral-rich composition. The acid insoluble ash (68.34%) shows the presence of siliceous matter, and the water-soluble ash (51.33%) highlights appreciable solubility, supporting potential bioavailability of active components. Acid soluble extractive (0.4%) reflects the predominance of mineral matter resistant to acid dissolution. Water soluble extractive (0.8%) aligns with the high ash values, confirming that the formulation is largely mineral based rather than organic.

These results establish the pharmaceutical significance of the preparation and its suitability for therapeutic use. The combination of herbal arka's with Loha Bhasma further enhances extractive values, though detailed phytochemical analysis would provide stronger evidence for its efficacy.

Overall, the study demonstrates that Pandurogaghna arka effectively addresses panduroga by combining the hematinic property of Loha bhasma with the digestive and bioavailability-enhancing actions of Triphala and Trikatu.

CONCLUSION

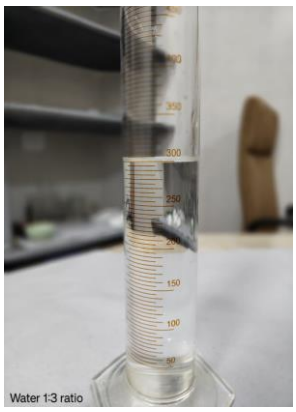
The pharmaceutical study of Pandurogaghna Arka demonstrates that the integration of Triphala Arka and Trikatu Arka with loha bhasma through sequential bhavana samskara yields a formulation of both stability and therapeutic relevance. The process ensured consistent distillate volumes, confirming methodological reliability, while the transformation of Loha Bhasma during bhavana highlighted the role of herbal media in modulating physicochemical attributes.

Analytical parameters, including low moisture content, high total ash, and appreciable water-soluble fractions, establish the mineral richness and preservation of quality of the preparation. The distinct contributions of Triphala a digestive and antioxidant support and Trikatu as an enhancer of absorption and bioavailability collectively strengthen the hematinic potential of Loha Bhasma, addressing both iron deficiency and impaired digestion characteristic of Panduroga.

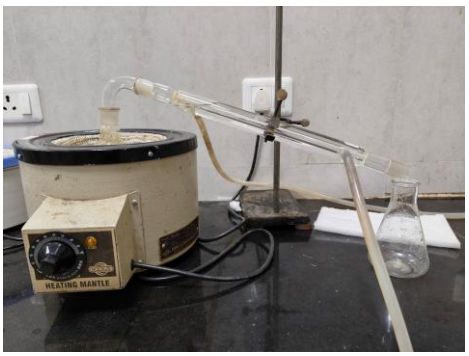
Overall, the study validates Pandurogaghna Arka as a pharmaceutic and therapeutic formulation for the management of Panduroga. Further studies need to be carried out to bring evidence to the pharmaceutic and conceptual part of its utilization in the management of anemia.

Triphala kwatha churna

Trikatu kwatha churna

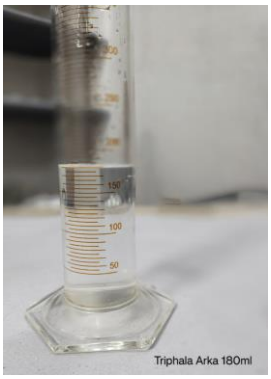


Water ratio

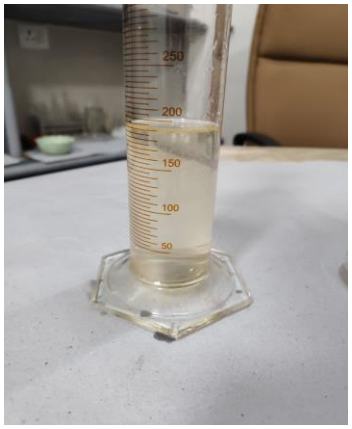


Distillation process

Starts of arka process



Triphala arka



Trikatu arka

Initial Loha bhasma

Bhavana of Loha bhasma

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Declaration of AI-AI assisted tool- Nil.

Author's contribution

First author- Review of work, preparation of drug, analysis and interpretation of data.

Corresponding author- Editing the work.

Second author- Final approval of work for publication.

Data availability statement: The author declines that the data supporting the finding of this study are available within the paper and its supplementary information file.

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