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PHARMACEUTICO-ANALYTICAL STUDY OF *PRAVALAGARBHA POTTALI*

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ABSTRACT

Background: *Pravalagarbha Pottali* is a classical herbo-mineral formulation described in Rasashastra, indicated in Pandu Roga, which can be correlated with iron deficiency anemia. Its unique preparation method and therapeutic potency make it an important formulation in Ayurvedic practice. **Aim:** To carry out the pharmaceutical preparation and analytical evaluation of Pravalagarbha Pottali. **Materials and Methods:** Raw materials including Pravala, Mukta, Kaparda, Shankha, Godanti, Shuddha Parada, Shuddha Gandhaka, and Swarna Tanutantu were procured and authenticated. The formulation was prepared according to classical Rasashastra procedures involving Shodhana, Marana, Kajjali preparation, Bhavana, and Pottali paka. The prepared formulation was evaluated using classical methods, organoleptic characters, physicochemical parameters such as ash value, acid insoluble ash, pH, and loss on drying. Instrumental analysis was carried out using X-ray diffraction (XRD) and Energy Dispersive Spectroscopy (EDS) mapping. **Results:** Classical Bhasma tests including Rekhapurnatva, Varitaratva, and Unnama were positive. During Pottali preparation, classical paka lakshanas such as Vyoma varna of Gandhaka, metallic sound, and burning of silk cloth were observed, indicating proper paka. Physico-chemical analysis revealed ash value 87% w/w, acid insoluble ash 2.5% w/w, pH 8.31, and loss on drying 1.6% w/w. XRD analysis confirmed the predominance of crystalline calcium carbonate in calcite form with high phase purity and crystallinity. EDS mapping demonstrated uniform distribution of mineral constituents within the formulation. **Discussion:** The study demonstrated successful preparation of Pravalagarbha Pottali according to classical methods. Classical and analytical findings confirmed proper incineration, stability, purity, and homogeneity of the formulation. The predominance of calcite phase indicates retention of crystalline calcium compounds even after thermal processing, validating the effectiveness of the pharmaceutical procedures. **Conclusion:** Pravalagarbha Pottali was successfully prepared through classical and modern analytical parameters. The study provides preliminary pharmaceutico-analytical data for quality control and may serve as a reference for future pharmacological and clinical evaluation of the formulation.

KEYWORDS: Rasashastra, Pravalagarbha pottali, Pharmaceutico-analytical study, Bhasma characterization, XRD and EDS analysis.

INTRODUCTION

Rasashastra deals with the preparation of medicines which consist of metals, minerals and herbal drugs. These are processed under various procedures like *Shodhana, Marana etc* to make them suitable for administration purpose to overcome diseases. *Pottali Rasayana* is one among *Chaturvidha Rasayana* of *Parada*. *Pottali kalpas* are widely known for their smaller dosage, optimum potency, larger therapeutic applicability, specific method of preparation, unique end product and unique mode of administration.[1]

Pravalagarbha Pottali mentioned in Rasa Yoga Sagara-II, contains *Pravala Bhasma, Mukta Bhasma, Peeta kaparda Bhasma, Shankha Bhasma, Godanti Bhasma, Shuddha Parada, Shuddha Gandhaka churna* and *Swarna Tanutantu*. It is indicated in *Pandu, Udara, Kasa, Shwasa, Gulma and Balaroga.*[2] The formulation is prepared by following procedures such as shodhana(purification), marana(incineration), bhavana(levigation), amd pottali paka method.

A pharmaceutico-analytical study plays a crucial role in this context by documenting the preparation process and evaluating physicochemical parameters such as organoleptic characters, ash value, acid insoluble ash, loss on drying and ph value. Advanced analytical techniques like X-ray diffraction (XRD), EDS mapping help in understanding the structural and compositional aspects of the formulation.

The present study aims to systematically prepare Pravalagarbha Pottali as per classical guidelines and subject it to detailed pharmaceutical and analytical evaluation. This approach not only helps in establishing operating procedures but also bridges the gap between traditional knowledge and modern scientific validation.

6.2-REVIEW OFLITERATURE

Pravalagarbha Pottali has been explained in *Rasa Yoga Sagara-II.*[3]

DRUG REVIEW[4,5,6]

Table No. 01 Showing rasapanchaka of ingredients of *Pravaalagarbha Pottali*.

S.N	Drug	*Rasa*	*Guna*	*Veerya*	*Vipaka*	*Karma*
1	*Pravala Bhasma*	*Madhura, Amla*	*Laghu, Ruksha*	*Sheeta*	*Madhura*	*Deepana, pachana, balya, tridoshahara.*
2	*Mukta Bhasma*	*Madhura, Kashaya*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Kaphapittahara, deepena, dahanashaka, balya.*
3	*Kaparda Bhasma*	*Katu, Tikta*	*Guru, Ruksha.*	*Ushna*	*Katu*	*Rasayana, kaphavatahara, deepana, vrushya,*
4	*Shankha Bhasma*	*Kashaya, Katu,*	*Laghu, Ruksha.*	*Sheeta*	*Katu*	*Vatakaphahara, balya, grahi, lekhya, pachana, varnya, balavardhaka.*
5	*Godanti Bhasma*	*Lavana,*	*Laghu, Tikshna.*	*Sheeta*	*Madhura*	*Deepana, balya, shoolahara*
6	*Shuddha Parada*	*Shadrasa*	*Snigdha, Sara.*	*Ushna*	*Madhura*	*Yogavahi, rasayana, balya, Vrushya*
7	*Shuddha Gandhaka*	*Katu*	*Laghu,*	*Ushna*	*Madhura*	*Rasayana, deepana, pachana, krimighna*
8	*Swarnatanu Tantu*	*Madhura, Tikta, Katu, Kashaya*	*Snigdha, Guru.*	*Sheeta*	*Madhura*	*Medhya, pitta shamaka, viryavardhaka, deepana, agnimandhyahara, pachana.*

a. Dosage: 3 *Ratti* (375mg).
Anupana: *Ardraka swarasa*
Therapeutic indication: It is indicated in *Pandu, Udara, Kasa, Shwasa, Udara Gulma* and *Balaroga.*

AIM

To carry out the pharmaceutical preparation and analytical evaluation of Pravalagarbha Pottali.

METHODOLOGY

A. PHARMACEUTICAL STUDY OF *PRAVALAGARBHA POTTALI*

1. Collection of Raw drugs

The required raw materials for preparation of *Pravalagarbha Pottali* viz. *Pravala, Mukta, Kaparda, Shankha, Godanti, Parada, Gandhaka* was procured from Mrs. Dorle and sons and authenticated from experts.

Table No. 02: Showing ingredients and quantity of *Pravaalagarbha Pottali*.

S.N	Sanskrit Name	English Name	Quantity
1	*Pravala Bhasma*	Coral	2Pala
2	*Mukta Bhasma*	Pearl oyster	2Pala
3	*Peetakaparda Bhasma*	Cyprea	2Pala
4	*Shankha Bhasma*	Conch	2Pala
5	*Godanti Bhasma*	Gypsum	4Pala
6	*Shuddha Parada*	Mercury	1Karsha
7	*Shuddha Gandhaka*	Sulphur	1 Tanka
8	*Swarna Tantu Tantu*	Gold	6 Ratti

2. Method of preparation of *Pravalagarbha Pottali*

Shuddha Parada and *Shuddha Swarnatanutantu* were taken in *khalva yantra* and triturated to form *pishthi.* To this *pishthi*, *Shuddha Gandhaka* was added to form *Kajjali*. Then *Pravala Bhasma, Mukta Bhasma, Kaparda Bhasma, Shankha Bhasma, Godanti Bhasma* were added serially and triturated to form homogenous mixture. To this homogenous mixture, *Jala bhavana* was given and moulded to *lingakara*. After complete drying, it was wrapped in silk cloth and suspended in *dolayantra*

containing *gandhaka. swedana* was carried out till it attains *samyak pottali paka lakshana.* Later it was taken out and stored in an air tight glass container.

Table No. 03: Showing Temperature record during *Pravaalagarbha Pottali*.

Showing Temperature record observation during *Pravaalagarbha Pottali*			
SI. No	**Time**	**Temp(^{0c})**	**Observation**
1	10-45am	23	*Agni* was ignited, 1000 gms of *Shuddha Gandhaka* was taken.
3	11-30	142	*Gandhaka* started melting.
4	11-45	160	After complete melting of *Gandhaka. Pottali* was kept immersed in molten Sulphur.
5	12-00pm	176	
6	12-15	176	Sulphur fumes was started appearing.
7	12-30	180	Golden yellow colour of sulphur was observed.
8	12-45	182	200 gms of *Shodhita Gandhaka* was added to the molten Sulphur.
9	01-00	185	Reddish colour of the Sulphur was observed.
10	01-15	186	Sulphur turns brownish red in colour.
11	01-30	196	200 gms of Shodhita Gandhaka was added to the molten Sulphur.
12	02-15	202	Dark brown colour of Gandhaka was observed.
13	02-30	216	Sulphur fumes were increased.
14	03-00	224	Colour of Sulphur was dark brown with red tinge.
15	03-15	232	100 gms of *Shodhita Gandhaka* was added to the molten sulphur.
16	03-30	250	*Gandhaka* attained Dark brown colour.
17	04-00	270	Dense fumes of sulphur was seen.
18	04-30	268	*Vyoma varna* of *Gandhaka was* seen, metallic sound heard and burning of silk cloth was observed. All the *paka lakshanas* were clearly appreciated. *Pottali* was removed and collected.

Fig 1: Ingredients of Pravalagarbha Pottali

Fig 2: Parada and swarnatanutantu

Fig 3: Paradaswarna pisti nirmana

Fig 4: Paradaswarna Gandhaka kajjali

Fig 5: Pottali tied in silk cloth

Fig 6: Agni has given

Fig 7: Molten Gandhak

Fig 8: Vyomashmavarna of Gandhaka

Fig 9: Final product of pottali

B. ANALYTICAL STUDY OF *PRVALAGARBHA POTTALI*

Collected sample of *Pravalagarbha Pottali* was subjected to following analysis.

1. Organoleptic Character

Colour, Odour, Form, Taste.

2. Physico-chemical Analysis

Loss on Drying, pH value, Total Ash, Acid insoluble ash.

3. Qualitative analysis by instrumental method

XRD, EDS mapping.

OBSERVATIONS AND RESULTS

Pharmaceutical results

Table No. 04: Showing Pharmaceutical results of *Pravaalagarbha Pottali*.

Procedure	Initial quantity(gm)	Obtained quantity(gm)	Loss (gm)	Loss %
Parada shodhana	600	544	56	5.6
Gandhaka shodhana	1500	1400	100	10
Pravala shodhana	300	295	5	1.7
Pravala marana	291	185	106	36.42
Mukta shodhana	300	298	2	0.7
Mukta marana	295	228	67	22.7
Shankha shodhana	350	346	4	1.1
Shankha marana	342	296	77	22.5
Kapardika shodhana	366	360	6	1.6
Kapardika marana	358	310	48	13.4
Godanti shodhana	200	197	3	1.5
Godanti marana	195	127	68	34.87

Table No: 05: Showing Analysis of Bhasmas by Ancient methods.

Sl.	TEST	OBSERVATION AND RESULT
1	Varna	Pravala Bhasma –Pinkish white, Mukta Bhasma- Shweta, Shnkha Bhasma –Eshatshweta, Kapardika Bhasma- Eshatshweta, Godanti Bhasma- Eshatshweta
2	Gatarasatvam	Nirasa
3	Sparsha	Mrudutva and Slakshnatva was felt by Simple touch with finger tips
4	Gandha	Nirgandha
5	Rekhapurnatva	The Bhasma was rubbed in between first finger and thumb It penetrates in to the furrows of the fingers–Positive
6	Varitaratva	A small amount of Bhasma was carefully sprinkled in beaker full of water. It was found that total portion of Bhasma was floating on the water surface – Positive
7	Dantagra kachkachBhava	Bhasma when kept in between teeth can not feel the kachkachbhava.
8	Unnama	A small amount of Bhasma was carefully sprinkled in beaker full of water and a grain is placed on the floating bhasma. It was found that the grain was floating on the water surface– Positive

Table No: 06 -Showing Physico-chemical Analysis of Pravalagarbha Pottali.

Test	Result
Ash Value.	87% w/w
Acid insoluble Ash	2.5% w/w
pH	8.31
Loss on drying	1.6% w/w

Instrumental analysis results

XRD Pattern

Interpretation of the XRD Pattern

1. Nature of the Pattern

The diffractogram shows multiple sharp, intense peaks → indicates high crystallinity.

Presence of well-defined Bragg reflections suggests a polycrystalline material.

2. Major Phase Identification

The most intense peak around ~29° (2θ) is characteristic of: Calcium carbonate ($CaCO_3$), specifically calcite phase.

- ***This confirms***

The dominance of Pravala (coral-derived $CaCO_3$) in the formulation.

The calcite crystalline structure is retained even after processing.

3. Other Significant Peaks

Peaks observed in ranges: 23°–26°,31°–36°,39°–48°,57°–65°,70°–80°

- *These correspond to: Different lattice planes of calcite ($CaCO_3$).*
- *Minor peaks may indicate: Aragonite/vaterite traces (other polymorphs of $CaCO_3$)*

Possible metallic/mineral traces from processing

4. Phase Purity

No broad humps → absence of amorphous phase.

Majority peaks align with standard $CaCO_3$ (JCPDS data) → indicates:

- *High phase purity*
- *Proper incineration and transformation*

5. Crystallite Characteristics

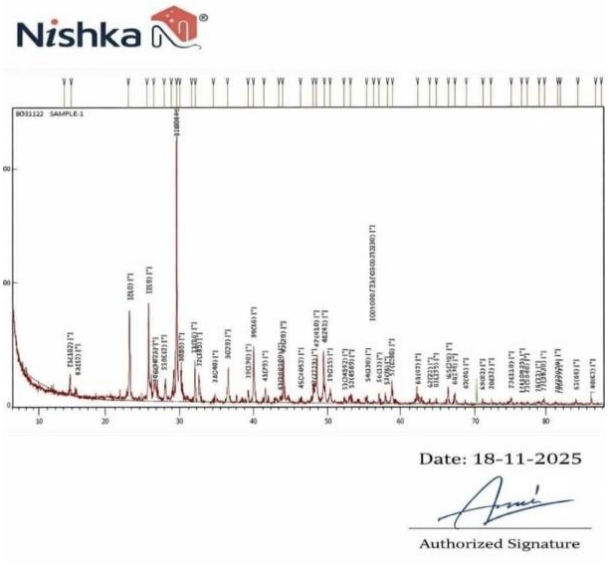
Sharp peaks = larger crystallite size + good crystallinity

Suggests: Effective Pottali paka (thermal processing)

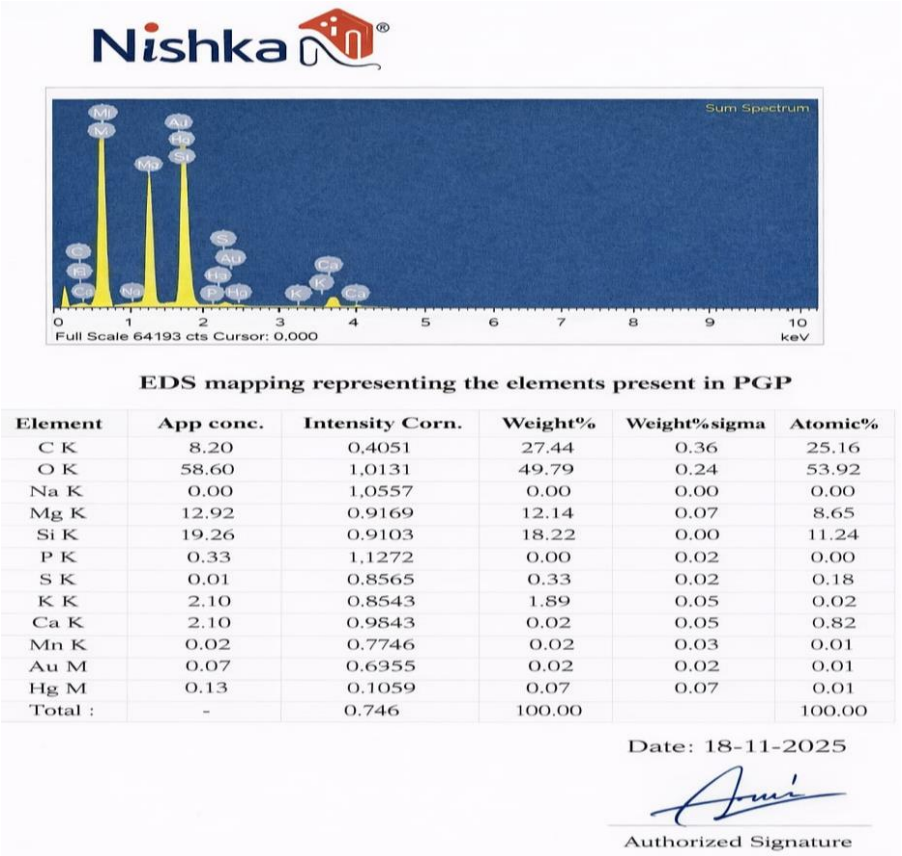
Proper particle stabilization

6. Effect of Pottali Processing

- *No major shift in peak position: Indicates structural stability of $CaCO_3$*
- *Slight variation in peak intensity: Suggests phase transformation or recrystallization*
- *Possible formation of Organometallic/mineral complexes (due to herbal media)*



EDS Mapping



EDS mapping representing the elements present in PGP

Element	App conc.	Intensity Corn.	Weight%	Weight%sigma	Atomic%
C K	8.20	0.4051	27.44	0.36	25.16
O K	58.60	1.0131	49.79	0.24	53.92
Na K	0.00	1.0557	0.00	0.00	0.00
Mg K	12.92	0.9169	12.14	0.07	8.65
Si K	19.26	0.9103	18.22	0.00	11.24
P K	0.33	1.1272	0.00	0.02	0.00
S K	0.01	0.8565	0.33	0.02	0.18
K K	2.10	0.8543	1.89	0.05	0.02
Ca K	2.10	0.9843	0.02	0.05	0.82
Mn K	0.02	0.7746	0.02	0.03	0.01
Au M	0.07	0.6955	0.02	0.02	0.01
Hg M	0.13	0.1059	0.07	0.07	0.01
Total :	-	0.746	100.00		100.00

Date: 18-11-2025

Authorized Signature

DISCUSSION

Pravalagarbha Pottali is a classical pottali Rasayana formulation described in Rasa Yoga Sagara and is indicated in diseases such as Pandu, Kasa, Shwasa, Gulma, and Balaroga. In the present study, an attempt was made to proper preparation of Pravalagarbha pottali and evaluate its analytical profile through classical and modern parameters.

The pharmaceutical procedures including Shodhana, Marana, Kajjali nirmana, and Pottali paka were carried out according to classical references. During the preparation process, characteristic Pottali paka lakshanas such as Vyoma varna of Gandhaka, metallic sound, and burning of silk cloth were observed, indicating attainment of proper paka. These observations validate the classical method of preparation and suggest adequate thermal processing of the formulation.

The percentage loss observed during various pharmaceutical procedures may be attributed to removal of physical and chemical impurities during Shodhana and reduction in weight after repeated incineration during Marana. Maximum loss was observed in Pravala Marana and Godanti Marana, which indicates conversion of raw materials into fine and stable Bhasma form.

Classical Bhasma pareekshas such as Rekhapurnatva, Varitaratva, Unnama, Nishchandratva, and absence of Dantagra kachkachabhava were positive for all prepared Bhasmas. These findings indicate proper incineration, fineness, lightness, and suitability for internal administration. The smooth texture and absence of odor further support the quality of prepared Bhasma.

Physico-chemical analysis revealed high ash value (87% w/w), indicating the predominance of inorganic mineral content in the formulation. Low loss on drying (1.6% w/w) suggests minimal moisture content, thereby contributing to better stability and shelf life. The alkaline pH (8.31) may be due to the presence of calcium-rich ingredients such as Pravala, Mukta, Shankha, Kaparda, and Godanti Bhasma. Acid insoluble ash value was found to be low, indicating minimal extraneous siliceous matter and acceptable purity of the formulation.

XRD analysis demonstrated multiple sharp and intense peaks, confirming the crystalline nature of the prepared Pottali. The prominent peak around 29° (2θ) confirmed the predominance of calcite form of calcium carbonate ($CaCO_3$), mainly derived from Pravala and other calcium-containing ingredients. Absence of broad humps indicated negligible amorphous content and good phase purity. The retained crystalline structure even after intense thermal processing suggests stability of the formulation.

Minor peaks observed in the XRD pattern may indicate traces of other calcium carbonate polymorphs such as aragonite and vaterite or mineral transformations occurring during Pottali paka. Slight variations in peak intensity may be due to recrystallization and possible formation of organometallic complexes during trituration and heating procedures. EDS mapping further confirmed the elemental distribution within the formulation and demonstrated homogeneous dispersion of mineral constituents. This indicates proper mixing and uniformity achieved during pharmaceutical processing. Presence of calcium as a major elemental component correlates with XRD findings and validates the mineral composition of the formulation. Overall, both classical and instrumental analytical findings support the successful preparation of a properly processed, stable Pravalagarbha Pottali.

CONCLUSION

The present pharmaceutico-analytical study successfully established the standard method of preparation and analytical profile of Pravalagarbha Pottali. Classical pharmaceutical procedures such as Shodhana, Marana, Kajjali preparation, and Pottali paka yielded a formulation possessing all classical Pottali lakshanas and satisfactory Bhasma pareeksha results. Physico-chemical analysis showed high inorganic content, low moisture content, alkaline nature, and acceptable purity of the formulation. Instrumental analysis through XRD confirmed the predominance of crystalline calcium carbonate in calcite form with high phase purity and good crystallinity, while EDS mapping demonstrated uniform elemental distribution. The study validates the traditional pharmaceutical procedures using modern analytical techniques. These findings may serve as a reference for future quality control, standardization, and further pharmacological and clinical studies on this classical Rasashastra formulation.

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