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EXPLORING THE PHARMACOLOGICAL POTENTIAL OF MAYURCHANDRIKA BHASMA: A REVIEW OF TRADITIONAL AND MODERN EVIDENCE

Sushant S. Dhandore[1*], Sanjay K. Bais[2], Arati Molak[3]

Fabtech College of Pharmacy, Sangola.

***Corresponding Author: Sushant S. Dhandore**

Fabtech College of Pharmacy, Sangola.

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ABSTRACT

A traditional Ayurvedic formulation derived from peacock plumage has been historically indicated for managing emesis, hiccough, and disorders of the respiratory tract. Classical treatises like Bhaishajya Samhita and Siddhayoga Sangraha document multiple pharmaceutical methods for preparing this ash, commonly termed Mayur Piccha or Mayurchandrika Bhasma. In Ayurvedic pharmaceutics, the concept of Sanskara denotes transformative processing techniques aimed at potentiating efficacy and reducing toxicity of the raw drug. Bhasma is generally obtained from metallic or non-metallic precursors through sequential Shodhana and Marana procedures, subsequently subjected to Bhavana with herbal liquids. which incorporates herbal juices or liquid. These procedures aim to modify the raw materials and produce finely divided particles that may aid in the body's absorption and assimilation. The quality and suitability of Bhasma are assessed using various traditional Ayurvedic and Modern physicochemical evaluation methods. Mayur Piccha Bhasma has been described as having a lustrous or silky appearance with a greyish brown colour. The reported final yield of the prepared Bhasma was approximately 5 percent.

KEYWORDS: Mayur PicchaBhasma, Mayurchandrikabhasma, Pharmacological potential, Traditional and Modern Evidence.

INTRODUCTION

Ayurveda encompasses a distinct category of avian-origin substances utilized for varied therapeutic interventions. Traditionally, various bird parts and products—such as eggs, meat, oils, feathers, and nests—have been used medicinally. Nevertheless, there is still a dearth of systematic scientific research on these materials' potential for therapeutic use.

Ethnomedical reports from Punjab indicate the traditional practice of applying peacock feathers over infected wounds for wound healing. The fumes generated upon incineration of peacock feathers have been ethnomedicinally claimed to counteract snake envenomation.Similarly, the smoked “eye” portion of the long tail feathers of the peacock has traditionally been used as a remedy for rat bites. Processed or altered peacock feathers have also been employed in the management of certain ophthalmic disorders. The ash obtained by burning these feathers has been traditionally used for its antiemetic effect.[1]

In Ayurveda, raw materials and metals play a significant role in the classification of medicinal substances. Rasa Shastraprovides detailed descriptions of the therapeutic use and processing of metals such as gold, silver, iron, lead, tin, zinc, brass, and copper, along with mercury.[1] Etymologically Bhasma means ash, however in Rasashastra it signifies a processed material rendered into an irreversible, non-revertible state, termed Apunarbhava.

The utilization of medicinal substances derived from metals and other natural materials has roots extending back to the earliest Ayurvedic traditions.Use of mineral and herbo-mineral medicines for therapeutic purposes is also documented in ancient Chinese and Egyptian medical traditions. Since the earliest Ayurvedic literature, the medicinal application of metals has been documented. Archaeological and literary evidence suggests utilization of metal-based therapeutics since approximately the third millennium BCEand can be found in ancient Egyptian and Chinese civilizations.

Classical Ayurvedic texts, including the Charaka Samhita, Sushruta Samhita, and bhavaprakasha, describe the therapeutic use of various metals and minerals in the management of several diseases.[2,3]

Ayurveda primarily emphasizes disease prevention and elimination through purification and restoration of physiological balance, rather than focusing solely on killing pathogenic microorganisms. The restoration of Dosha equilibrium and enhancement of the body's natural defence mechanisms through Rasayana therapy are considered important factors in supporting the elimination of infectious agents.[4]



Fig. 1.1: Peacock Feather.[5]

SYNONYMS

1. Mayurchandrika Bhasma
2. Mayur Piccha Bhasma
3. Mayurapuccha Bhasma
4. Calx of Peacock Feather
5. Mayur Shikha Bhasma
6. Shikhipiccha Bhasma

METALS AND MINERAL DRUGS OF AYURVEDA

Bhauma Dravyas, the earth-origin drugs, comprise metals such as Suvarna, Tamra, Naga, Vanga, Lauha along with minerals like Manahshila, Gairika and Ratnas. In addition, animal products including Shringa, Shankha, and Piccha are processed into Bhasma form. According to Rasa classics, these are categorized into seven major Dhatus and seven subsidiary Upadhatus.[6] According to the Rasa Ratna Samuchchaya, these materials are further classified into different groups. Rasa preparations, particularly mercurial formulations, include Parpati, Rasa Yoga, Kupipakwa preparations, and Bhasma. Among these, the present discussion focuses specifically on Bhasma preparations.[7]

PHARMACOGNOSTIC INVESTIGATION

Bird Part- Based on ethnomedical data and a review of the literature, the current study focused on the bird part Pavo cristatus.[8]

Bird Feather Collection: Peacock feathers were collected at a farm in Khambhale (BHA), Tal-Khanpur, Dist-Sangli, between November and March 2019. They were found naturally, according to a zoologist from Pune University's Department of Zoology. A sample was burned in an earthen pot over a ghee flame, and the ash was heated in a muffle furnace until it turned into a black powder. After that, this powder was gathered and kept in an airtight glass container.[9]

Macroscopic Characterization: The organoleptic properties of Pavo cristatus were investigated for macroscopic studies.[10]

SEM and EDX: Mayurchandrika Bhasma was analyzed using Scanning Electron Microscopy (SEM) and Energy-Dispersive X-ray Spectroscopy (EDX) at the Department of Botany, Shivaji University, Kolhapur. To find functional groups or organic ligands in Mayurchandrika Bhasma, FTIR (Fourier Transform Infrared Spectroscopy) was used.[11]

Organoleptic Features: The feathers colours differed.

X-Ray Diffraction (XRD): Pune University's Department of Physics used XRD to analyse the Mayurchandrika Bhasma.[12]

ORGANOLEPTIC STUDY[13]

Sr. No	Characters	Observations
1.	Colour	Black powder form
2.	Odour	Unpleasant
3.	Taste	Tasteless
4.	Touch	Soft

INGREDIENT AND RAW MATERIALS

The primary ingredient of Mayurchandrika Bhasma is the feather of the Indian peafowl (Pavo cristatus), which is the national bird of India. The feathers mainly consist of beta-keratin, a structural protein also found in bird claws and reptilian scales. This protein contains sulphur-rich amino acids, particularly cysteine, which may contribute to the formation of sulphur-containing compounds in the final Bhasma preparation.

The organic keratin matrix breaks down during incineration, producing an inorganic ash rich in various bioactive components. A 2015 physico-chemical analysis published in the International Journal of Ayurveda and Pharma Research identified the following components in Mayur Piccha Bhasma.[15]

- Calcium(Ca) : Support for bone and tissue
- Potassium(K) : Electrolyte equilibrium
- Sodium(Na): Cellular function
- Iron(Fe): Oxygen transport
- Magnesium(Mg): Enzymatic reactions
- Sulphur(S): Produced from the cysteine residues in keratin

METHOD OF PREPARATION

Mayur Piccha Bhasma can be prepared using two different methods.

1. Ghee Flame Method (Siddhayoga Sangraha)

a) Collection: For the formulation, naturally shed peacock feathers are collected cautiously without causing harm to the bird.[16]

b) Purification: The collected plumage is cleaned thoroughly with water to remove extraneous matter and shade-dried.

c) Incineration: The dried feathers are burned over the flame of a ghee lamp until they are completely transformed into ash.

d) Collection of ash: The obtained white-to-grey ash is collected, finely triturated into a powder, and preserved for further use.[17]



Fig. 1.2: Bhasma and its Raw Material.[18]

2. Gajaputa Method (Bhaishajya Samhita)

a) Purification: The peacock feathers are thoroughly cleaned and cut into small fragments.

b) Bhavana (Levigation): The fragmented feathers are levigated with freshly expressed Swarasa of Palasha, Dronapushpi and Chakramarda till a uniform bolus is obtained.

c) Chakrikas (Pellet Formation): The obtained paste is shaped into small, flat, round pellets and left to dry in sunlight.

d) Sharava Samputa: The dried pellets are placed in earthen saucers, covered, and sealed with clay-smeared cloth to form Samputa.

e) Gajaputa: The sealed earthen crucible (Sharava Samputa) is then subjected to Gajaputa, involving incineration using approximately 1000 cow-dung cakes to achieve temperatures around 900-1000°C.[19]

f) Self-Cooling: Once the heating process is complete and the fire naturally subsides, the setup is left undisturbed until it cools completely.

g) Collection and Powdering: The resulting Bhasma is collected, finely pulverized, and preserved in airtight container.[20]



Fig. 1.3: Prepared Ayurvedic Formulation of Bhasma.[21]

COMPARISON OF BOTH METHODS[22]

Parameters	Ghee Flame Method	Gajaputa Method
Colour	Grey-white	White with slight yellowish
Moisture Content	Higher	Lower
pH	9.2	9.8
Particle Fineness	Moderate	Very fine
Total Ash Value	~ 78%	~89%

MECHANISM ACTION OF MAYURCHANDRIKA BHASMA[23]

1. Keratin Pyrolysis

Beyond 800°C, beta-keratin undergoes complete pyrolytic degradation, yielding inorganic nano-sized residues. This breakdown results in the release of carbon dioxide (Co_2) and leaves behind inorganic minerals in a nano-sized, amorphous form.

2. Enhanced Bioavailability

SEM analysis reveals formation of nano-dimensional particles that may enhance mucosal permeation, which may cross biological membranes more readily than larger particles found in conventional mineral supplements.This indicates that the body can absorb them more effectively.

3. Alkaline Buffering

The resultant Bhasma shows alkaline pH (9.2-9.8), potentially contributing to acid neutralization in Amlapitta in the stomach. This helps address the symptoms of Amlapitta, a condition similar to acid reflux, which causes vomiting.

4. Smooth Muscle Relaxation

Calcium and magnesium ions are essential for regulating smooth muscle contraction and relaxation, particularly in the bronchi and diaphragm. This modulation can aid in respiratory functions.

5. Mucolytic Action

Sulphur-containing compounds may help reduce mucus thickness in the bronchial passages, promoting easier expectoration and clearing of the airways to support improved breathing.

TRADITIONAL EVIDENCE Vs MODERN EVIDENCE

Traditional Evidence	Modern Evidence
Traditionally indicated for Chardhi (vomiting)	Physicochemical properties have been investigated
Traditionally used in Hikka (hiccup)	Elemental composition has been evaluated
Used traditionally for respiratory complaints	XRF, AAS and other analytical methods have been employed
Mentioned in classical Ayurvedic literature	Scientific pharmacological studies are relatively limited
Prepared using different classical pharmaceutical procedure	Modern standardization studies are gradually developing
Administered traditionally with an appropriate vehicle	Its exact pharmacological mechanism is not yet clearly established

HEALTH BENEFITS[24]

1. Management of Chronic Atisara (Persistent Diarrhea)

Traditionally, Mayura Chandrika Bhasma is indicated for chronic and recurrent Atisara. Its Grahi and absorbent properties assist in improving stool consistency by reducing excessive intestinal secretion and strengthening intestinal integrity. Rather than causing abrupt bowel suppression, it supports gradual restoration of bowel regulation, particularly beneficial in cases of chronic digestive debility.

2. Deepana Action - Enhancement of Digestive Fire

In Ayurveda, impaired Jatharagni (Mandagni) is considered the root cause of numerous disorders. Inadequate digestion leads to incomplete food breakdown, resulting in bloating, heaviness, accumulation of Ama, and gaseous distension. This Bhasma exhibits Deepana-Pachana properties, stimulating digestive capacity, improving appetite, alleviating post-prandial discomfort, and enhancing overall metabolism and vitality.

3. Role in GrahaniRoga (Malabsorption Syndrome)

Grahani is characterized by deranged Agni, malabsorption, irregular bowel habits, and presence of mucus in stool. Mayura Chandrika Bhasma is traditionally believed to improve enzymatic function and absorptive capacity by stabilizing intestinal tissues and correcting Agni. This action helps in managing chronic malabsorption-associated disturbances and promotes regular bowel function.

4. Potential Use in Pediatric Digestive Debility (Under Medical Supervision)

Classical practice describes its use in children with delicate digestion presenting with Aruchi, Ajirna, and recurrent loose motions, strictly under supervision of a qualified Ayurvedic physician. Due to its potency, pediatric administration requires careful dose titration. It is traditionally considered to support digestive competence and thus contribute to healthy growth when Agni is impaired.

5. Management of Chhardi and Hrillasa (Nausea and Vomiting)

Recurrent vomiting is often associated with Kapha accumulation in Amashaya and Agni disturbance. Through its Kapha-shamaka and Deepana properties, Mayura Chandrika Bhasma helps stabilize gastric function, reduce gastric irritability, improve food tolerance, and regulate the emetic urge, thereby promoting gastric comfort.

6. Support in Kapha Disorders and Chronic Kasa

Beyond its digestive benefits, it is traditionally attributed with Kapha-shamana action. Excessive Kapha is linked with mucus accumulation and persistent cough. By enhancing digestion and minimizing Ama formation, it indirectly supports respiratory health and may reduce excessive mucus production, thereby improving resilience against recurrent respiratory complaints.

7. Improving Nutrient Assimilation and Preventing Daurbalya

When Jatharagni is impaired, even a balanced diet fails to adequately nourish the Dhatus, leading to weakness, fatigue, and impaired growth in children. By improving intestinal absorptive capacity and digestive fire, Mayura Chandrika Bhasma facilitates efficient utilization of essential nutrients, supports tissue nourishment, enhances stamina, and reduces fatigue.

8. Support to Vyadhi-Kshamatva (Natural Immunity)

Ayurvedic concept correlates Bala and Vyadhi-Kshamatva with balanced Agni and minimal Ama accumulation. When digestion is optimized and toxic load is reduced, immune function is believed to perform optimally. By promoting gut health, reducing Ama, and improving nutrient assimilation, this Bhasma indirectly contributes to strengthening natural defense mechanisms.

9. Reduction of Intestinal Irritation

Chronic diarrhea often leads to mucosal irritation and inflammation of the intestinal lining. Its Grahi and Stambhana qualities are traditionally described to help soothe intestinal tissues, decrease excessive mucus secretion, restore intestinal stability, and provide relief from gastrointestinal discomfort and bowel urgency.

10. Promotion of General Vitality and Strength

By addressing intestinal debility and minimizing nutrient loss, improved digestion correlates with enhanced energy production, mental clarity, and proper Dhatu development. This comprehensive action is traditionally considered to improve physical strength and vitality in adults and support growth and development in children, reflecting the Ayurvedic principle that strong Agni is fundamental to long-term health.

DISCUSSION

Mayurpuccha Bhasma (calx prepared from peacock feathers) was subjected to organoleptic evaluation and assessment of physical constants after preparation by two different methods. The observations indicated that the prepared sample had an unpleasant smell, a soft texture, no noticeable taste, and appeared as a black, amorphous, powder-like substance. In the method involving four Gajaputas, the peacock feathers were subjected to healing at approximately 1000^0C using around 1,000 cow-dung cakes.[25] Quantitative estimation of the inorganic elements was subsequently performed using Atomic Absorption Spectrophotometry (AAS).

The presence of elements such as Cu, Fe, Zn, Na, K, Ca, Mg, Mn, and Al, within permissible limits, may be associated partly with the processing materials used during trituration. The expressed juice of cassia tora, which contains Na, K, Ca, Mn, and Fe, and Palasa Kwatha containing Na and K, were used during

preparation and may have contributed to the elemental composition of the final product.

By transforming the metal into its specifically desired chemical compound, the Bhasmikarana process removes the metal's toxicity and provide the required therapeutic benefits. Because of its smaller particle size, Bhasmikarana facilitates easy absorption and assimilation in the body and aids Dravya in obtaining sendriyatwa from nirindriyatwa. Bhasma pariksha denotes the authenticity of Bhasma. Analyzing the changes that occur from raw drugs to the finished product is made possible by modern parameters that allow for qualitative, quantitative, and structural analysis. This aids in both ensuring the degree of toxicity and interpreting the knowledge established by our ancient Acharyas.

CONCLUSION

With the procedure describes in SiddhayogaSangraha, 300g of Mayurpiccha Bhasma was prepared from 500g of peacock feathers. The prepared Bhasma appeared as a black, fine powder with an unpleasant odour and no distinct taste. X-ray fluorescence (XRF) analysis was carried out for the quantitative estimation of inorganic elements. The sample was found to contain CaO, SO_3, Fe_2O_3, SiO_2, Al_2O_2, ZnO, Cl, K_2O, TiO_2, CuO, MnO, Br, and O_2. Physicochemical evaluation of Mayurchandrika Bhasma was performed, and the obtained results may be useful for establishing its pharmacopoeial standards.

The method used for Bhasma preparation has an important influence on the charactristics of the final product. Therefore, specific physicochemical properties can serve as identifying markers for Bhasma prepared by a particular method. Processes such as Marana with Bhavana, Puta heating, and Sodhana involving roasting, quenching, and continuous stirring can considerably reduce particle size and modify the physicochemical properties of the material. These processes may also influence the elements and compounds present in the final preparation, which may contribute to its biological and therapeutic effects. Standardization of Bhasma is therefore important for establishing its identity, consistency, safety, efficacy, and quality for medicinal applications.

Mayurpuccha Bhasma (Calx of peacock feather), made using the Gajaputa method, has a natural p^H and contains important and healthy components like flavonoids, saponins, and electrolytes in greater quantites.

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