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Explorative Pharmaceutical Study and Physicochemical evaluation of Shodhana and Marana of Garudapacha- A rare mineral used in Ayurveda

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ABSTRACT:

Background: *Garudapacha* is an extra-pharmacopeial mineral drug used as an ingredient in a few formulations of *Ayurveda*. References and use of these formulations are confined to the regional practices of Kerala and Tamil Nadu. It is a white coloured stone resembling chalk. In the previous works, the mineral drug *Garudapacha* was identified as Magnesite based on its physical characteristics. There are also references on *Shodhana* (Purification) and *Marana* (Incineration) of this stone. But, data on pharmaceutical study and physicochemical characterization of *Garudapacha Bhasma* is lacking. **Methods:** Samples of *Garudapacha* were collected from raw drug vendors of Kerala. *Shodhana* was carried out through *Swedana* in *Kumari Swarasa* for 12 hours. *Marana* was carried out through three experimental trials: Trial I, II followed two variants of *Kukkutaputa* methods and trial III with *Gajaputa* method customized based on available references. **Results:** The temperature of around 650°C was used in *Kukkutaputa* and repeated five times, but was insufficient to generate *bhasma*(calx). The *Gajaputa* method could generate white *Bhasma* after five *Puta* satisfying all the classical tests. A temperature of above 900°C for over 2.5 hours was recorded during all the five *Gajaputa* with maximum temperature ranging from 952.9°C to 956.9°C. The final yield was 31.4% and the prepared *Bhasma* was a smooth, soft, white-colored fine powder without grittiness. The *Bhasma* passed through sieve number 120. During physicochemical analysis, loss on drying 0.2%, Total ash 72.34%, acid-insoluble ash 40.66%, water-soluble ash 6.8% and pH of 10.9 were recorded. **Conclusion:** *Garudapacha Marana* requires five *Gajaputa* with a temperature of around 950°C. The data obtained through physicochemical analysis can be considered as preliminary standard.

KEYWORDS: *Garudapacha*, magnesite, *Marana*, *Puta*, *Rasashastra*, *Shodhana*.

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1. INTRODUCTION

The raw materials used in *Ayurveda* pharmaceutics are broadly classified as *Jangama* (animal origin), *Sthavara* (mineral origin) and *Oudbidha* (plant origin). [1-2] It is said that every substance on this earth can be designed as a potential medicine by an intelligent physician. [3] The *sthavara* substances are categorized in to different groups namely *Rasa* (mercury), *Maharasa* (major minerals), *Uparasa* (secondary minerals), *Sadharana Rasa* (common minerals), *Ratna* (precious stones), *Uparatna* (semi-precious stones), *Dhatuvarga* (metals), *Sudhavarga* (calcium-containing materials), *Vishavarga* (poisonous substances), and *Sikatavarga* (siliceous materials). [4] *Ayurveda* pharmaceutics deals with a segment termed *Rasashastra*, where the majority of *sthavara* drugs and a few *jangama* drugs are employed in designing various formulations. [5]

There is a mineral drug used in *Ayurveda* formulations of Kerala, which is named as *Garudapacha*. It is called *Veluthagarudapacha, Palgarudapacha* in Malayalam language. It is a stone that can be used individually or in combination with other ingredients to make formulations. [6] *Marmani Gulika* is one of the renowned formulation of Kerala which is also included in *Ayurvedic* formulary of India. [7-8] In this context, *Garudapacha* is mentioned as a white coloured stone resembling chalk. Apart from this, there is no other information available on mineral nature of this raw drug. So far, six more formulations namely *Tarunabhaskara Gutika, Gorochanadi Gulika, Cheenapavu Ghritam, Kantashuddhi Gulika, Akkiradi Churnam* and *Povamkurunniladi Avanakkenna* have been found with *Garudapacha* as an ingredient. [9-12] These formulations are indicated for conditions such as *Visha* (poisoning) *Asthisrava*(leucorrhea), *Jwara* (Fever), *Netraroga* (eye disorders), *Asthishosha* (osteoporosis), and *Mutrakrichra* (dysuria). Preliminary studies on physical properties of this mineral have suggested that it is carbonate of magnesium (Magnesite) exhibiting a massive form, compact habit, white streak, and a hardness of 2.5–3.5 on the Moh's scale. [13] Because of not being included in any of major references of *Ayurveda* pharmacopeia this drug can be considered as an extra-pharmacopeial drug.

The raw drugs of herbal origin seldom require *Shodhana* and *Marana* except for a few drugs of poisonous nature (*Visha & Upavisha*). But in case of most of the metal and minerals the probability of impurities or toxicity is higher as they are collected from earth's crust. *Shodhana* and *Marana* are most common procedures adopted in cases of metals and minerals to convert them into nontoxic and biocompatible substances. [14] *Shodhana* is a purificatory technique adopted to make the substances free from physical chemical or biological impurities. *Marana* is the pharmaceutical procedure of converting them into *Bhasma*. The purpose of these pharmaceutical techniques is to convert the metal and minerals into nano-sized organic nontoxic and biocompatible complex. [15]

A few references of *Shodhana* and *Marana* of *Garudapacha* are also available. [16-20] However, the methods mentioned in these references are not clear and are not detailed. This study aims to identify and select the appropriate *Puta* (incineration method) required for the preparation of *Garudapacha Bhasma* and to establish the results of preliminary physicochemical tests of the *Bhasma* prepared using the optimized procedure.

2. MATERIALS AND METHODS

Collection and Authentication of Raw drugs:

Raw *Garudapacha* was procured from traditional drug vendors of Kerala. The samples were authenticated based on their physical and mineralogical properties from the experts of Geology. The authentication was done based on its physical properties like massive compact form, white streak, and 3.5 hardness. Other herbal ingredients like *Nimba* (*Azadirachta indica* A. Juss.), *Kumari* (*Aloe vera* (L.) Burm.f.) and *Nimbu* (*Citrus limon* (L.) Osbeck) were procured from local sources and authenticated from experts of *Dravyaguna*. The authentication was done based on morphological and organoleptic features. *Shodhana* was

done using *Dolayantra* (swing apparatus) and *Marana* was carried out in Electric muffle furnace with PID control.

***Garudapacha Shodhana*:** *Shodhana* of *Garudapacha* was carried out through *Swedana* (Boiling in liquid media) in *Kumari Swarasa* (Aloe vera juice). [16] Weighed quantity of *Garudapacha* was tied in a cora cloth into a *Pottali*(bundle). It was hanged in a stainless-steel vessel filled with *Kumari Swarasa*. This *Dolayantra* was heated on mild fire for 12 hours (Table 1). The temperature was recorded every half an hour using a digital pyrometer. After completion of the procedure, the apparatus was allowed to cool, the contents were carefully removed from *Pottali*, washed with warm water and dried in shade.

Garudapacha Marana: *Marana* of *Garudapacha* was tried with three different methods:

***Marana* with *Kukkutaputa* (Sample 1):** *Shodhita Garudapacha*(purified) was soaked in *Nimbu Swarasa*(lemon juice) for 3 hours and dried. These dried pieces of *Garudapacha* were placed between layers of *Nimba Patra Kalka* (paste of Neem leaves) in a *Sharava Samputa*(earthen crucible) and subjected to *Kukkutaputa* in temperature pattern simulated using an electric muffle furnace equipped with a PID (Proportional Integral Derivative) temperature controller. [17] Based on the temperature pattern from preliminary trials, the furnace was programmed to attain a maximum temperature of 650°C. Gradual increase of temperature at the rate of 130°C per hour was set to reach maximum temperature within 5 hours. The maximum temperature was maintained for 30 minutes to facilitate uniform heat distribution. Then the cooling cycle was programmed with forced air circulation using the inbuilt exhaust fan of the furnace until it is cooled completely. The total duration of one cycle was set to 20 hours. After completion of the cycle in EMF the *Sharava Samputa* was taken out and carefully opened. The resultant product was triturated with *Nimbu Swarasa*, *Chakrika*(pellets)were prepared, dried, kept in *Sharava Samputa* amidst *Nimba Patra Kalka* and *Kukkutaputa* was given. The procedure was repeated for five times (Table 2).

***Marana* with *Kukkutaputa* (Sample 2):** The procedure followed in this was similar to earlier method, but without covering of Neem leaves. *Shodhita Garudapacha* was soaked in *Nimbu Swarasa* for 3 hours kept in a *Sharava Samputa* and subjected to *Kukkutaputa* in Electric muffle furnace (EMF) The resultant product was triturated with *Nimbu Swarasa*, *Chakrika* was prepared, dried, kept in *Sharava Samputa* and *Kukkutaputa* was given. The procedure was repeated for five times (Table 3).

***Marana* with *Gajaputa* (Sample 3)** [16-17]: In this experiment, *Shodhita Garudapacha* was triturated with *Nimbu Swarasa, Chakrika* was prepared, dried, kept in *Sharava Samputa* and *Gajaputa* was given in EMF. The temperature profile of *Gajaputa* was simulated in an electric muffle furnace with PID temperature controller. The furnace was programmed to attain a maximum temperature of 950 °C, with gradual heating at rate of 120°C per hour, reaching peak temperature within 8–9 hours. The peak temperature was maintained for 60 minutes duration. Thereafter, controlled cooling was carried out using forced air circulation mechanism, enabling a gradual descending temperature pattern similar to that of *Gajaputa*. The complete heating–cooling cycle required around 24 hours. The procedure of *Bhavana*, *Chakrika Nirmana, Samputikarana* and *Marana* were repeated for five times (Table 4).

***Bhasma Pareeksha*:** There are a few general *Bhasma Pareeksha* which are commonly done for all *Bhasma* and a few contextual which are applicable only for few *Bhasma*. [21-22] Among these, a few *Bhasma Pareeksha* namely *Varitaratva* (Floating on water), *Rekhapurnatva* (Entering the lines of the fingers), *Apunarbhava* (Non-reducibility), *Niruttha* (Non-alloying with silver), *Nischandratva* (Lusterless), *Niswadutva* (Tasteless), *Nirdhuma* (smokeless of fire) *Dantagre kachakachabhava*(Non gritty on chewing) *Avami* (Nausea-free), and *Amla pareeksha* (Stability in acid) were carried out in this work (Table 5). [23-25]

Physico chemical analysis: The raw drug before and after *Shodhana,* and the prepared *Bhasma* after *Marana* were

subjected to following physicochemical tests, namely Organoleptic characters, Particle size, Loss on Drying (LOD), Total Ash, Acid-Insoluble Ash (AIA), Water-Soluble Ash, and pH as per standard guidelines (Table 6). [26-27]

3. RESULTS

It is observed that the *Shodhita Garudapacha* turned brittle after *Shodhana*. Both variants of *Kukkuta Puta* were not sufficient to generate the *Bhasma* even after repeating the *Puta* five times. The *Gajaputa* on the other hand could generate a white coloured *Bhasma* qualifying all the classical *Bhasma Pareeksha* done after repeating the *puta* five times. Other observations during *Shodhana* and *Marana* are tabulated as below:

Table 1: Results of *Shodhana*

Sl	Particulars	Results
1	Total quantity of *Kumari* collected	11 kg
2	Quantity of *Kumari* obtained after cleaning	8.6 kg
3	Quantity of *Swarasa* obtained from *Kumari*	5800 ml
4	Quantity of *Swarasa* used for *Swedana*	5150 ml
5	pH of *Kumari Swarasa* before *Shodhana*	4.05
6	pH of *Kumari Swarasa* after *Shodhana*	5.69
7	TSS of *Kumari Swarasa* before *Shodhana*	1.9
8	TSS of *Kumari Swarasa*after *Shodhana*	3.8
9	Quantity of *Garudapacha* before *Shodhana*	2 kg
10	Quantity of *Garudapacha* after *Shodhana*	1.940 kg
11	Total duration of *Swedana*	10 AM to 10 PM (12 hours)
12	Range of temperature maintained during *Shodhana*	81.8°C - 85.1°C

Table 2: Observations of *Kukkutaputa* (Sample1)

Sl	Particulars	*Puta* 1 Results	*Puta* 2 Results	*Puta* 3 Results	*Puta* 4 Results	*Puta* 5 Results
1	Weight of *Garudapacha* (in gms)	250	129	101	78	55
2	Weight of *Nimba Kalka* (in gms)	250	129	101	78	55
3	Quantity of *Nimbu Swarasa* used for *Bhavana* (in ml)	NA	105	80	65	50
4	Average weight of *Chakrika* (in gms)	NA	5.38	6.8	5.4	5.5
5	Weight of *Bhasma* Obtained (in gms)	139	111	88	65	31
6	Yield %	55.60	86.04	87.12	83.33	56.36
7	Max Temperature recorded (°C)	645.1	659.1	660.9	660.7	660.2
8	Max Temperature reached At Hrs from starting point (hh:mm)	05.10	04.30	04.52	04.50	04.24
9	Consolidated yield %	55.6	44.4	27.2	26	12.5

Table3: Observations of *Kukkutaputa* (Sample 2)

Sl	Particulars	*Puta* 1 Results	*Puta* 2 Results	*Puta* 3 Results	*Puta* 4 Results	*Puta* 5 Results
1	Weight of *Garudapacha* (in gms)	250	116	76	57	42
2	Quantity of *Nimbu Swarasa* used for *Bhavana* (in ml)	220	105	60	50	40
3	Average weight of *Chakrika* (in gms)	NA	5.75	5.65	5.42	4.8
4	Weight of *Bhasma* Obtained (in gms)	126	86	67	52	36

5	Yield %	50.4	74.13	88.15	91.2	85.71
6	Max Temperature recorded (°C)	660.9	660.7	660.2	658.2	648.6
7	Max Temperature reached At Hrs from starting point (hh:mm)	04.52	04.50	04.24	04.46	04.32
8	Consolidated yield %	50.4	34.4	26.8	20.8	14.4

Table 4: Observations of *Gajaputa* (Sample 3)

Sl	Particulars	*Puta* 1 Results	*Puta* 2 Results	*Puta* 3 Results	*Puta* 4 Results	*Puta* 5 Results
1	Weight of *Garudapacha* (in gms)	1000	705	513	397	342
2	Quantity of *Nimbu Swarasa* used for *Bhavana* (in ml)	1200	500	500	350	325
3	Average weight of *Chakrika* (in gms)	5.8	5.5	5.6	6.0	6.2
4	Weight of *Bhasma* Obtained (in gms)	715	523	407	352	314
5	Yield %	71.5	74.18	79.3	88.6	91.8
6	Max Temperature recorded (°C)	956.9	956.1	952.9	956.6	956.3
7	Max Temperature reached At Hrs from starting point (hh:mm)	08.14	09.16	07.20	08.22	08.00
8	Consolidated yield %	71.5	52.3	40.7	35.2	31.4

Table 5: Results of Classical *Bhasma Pareeksha*

Sl. No.	Name of the Test	Sample 1	Sample 2	Sample 3
1	*Varitara*	Negative	Negative	Positive
2	*Rekhapurna*	Positive	Positive	Positive
3	*Apunarbhava*	Positive	Positive	Positive
4	*Niruttha*	Positive	Positive	Positive
5	*Nischandra*	Positive	Positive	Positive
6	*Niswadu*	Negative	Negative	Positive
7	*Nirdhuma*	Positive	Positive	Positive
8	*Dantagre Kachakachabhava*	Negative	Negative	Positive
9	*Avami*	Positive	Positive	Positive
10	*Amla Pariksha*	Positive	Positive	Positive
11	*Varna*	Negative (Black)	Positive (White)	Positive (White)

Table 6: Physicochemical analysis of Raw, *Shodhita* and *Bhasma* of *Garudapacha*

Sl	Particulars	*Raw Garudapacha*	*Shodhita Garudapacha*	*Garudapacha Bhasma* (Sample 3)
1.	Description	Soft white stone	Soft white stone	Smooth, Soft white coloured fine powder without grittiness
2.	Colour	Whitish	Whitish	White
3.	Odour	Earthy	Characteristic	Characteristic
4.	Particle size	NA	NA	*Bhasma* particles passed through sieve number 120.
5.	Loss on drying (LOD)	0.6 % w/w	0.4% w/w	0.2% w/w
6.	Total ash	87% w/w	75% w/w	72.34% w/w
7.	Acid-insoluble ash	54 % w/w	66% w/w	40.66% w/w
8.	Water-soluble ash	0.8 % w/w	6.4% w/w	6.8% w/w
9.	pH	7.47	8.37	10.9

Raw Garudapacha | Garudapacha shodhana | Shodhita Garudapacha

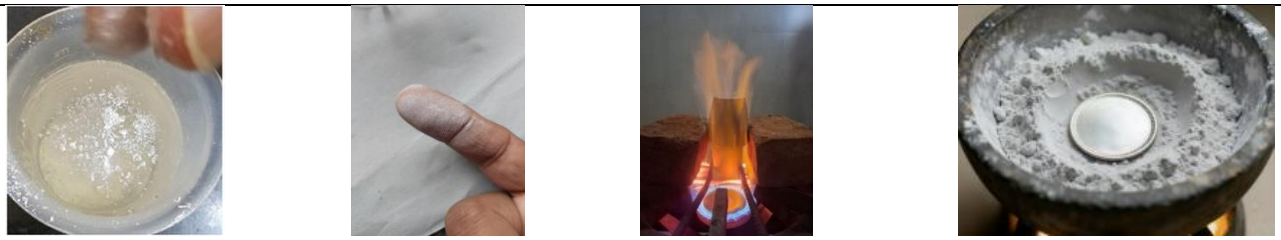
Figure 1: Garudapacha Shodhana

Nimbu | Nimbu swarasa | Nimba | Nimba kalka

Nimba kalka acchadana | Garudapacha bhasma – sample 1

Garudapacha bhasma – sample 2 | Garudapacha bhasma: Sample 3

Figure 2: Garudapacha Marana



Varitaratva | Rekhapurnatva | Apunarbhava | Niruttha

Figure 3: Bhasma pareeksha

4. DISCUSSION

Garudapacha is a rare mineral with medicinal properties traditionally used by practitioners of Kerala and Tamil Nadu. The availability of this mineral in the raw drug stores of Kerala, supports its use by the practitioners. The collected samples of *Garudapacha* were white, soft amorphous stone resembling chalk (Figure 1). Based on physical properties

like massive compact form, white streak, and hardness of 3.5 it was identified as Magnesite ($MgCO_3$).

Shodhana of *Garudapacha* was done by *Swedana* in *Kumari Swarasa*. 8.6 kg of *Kumari* could yield only 5800 ml (67.44 %) of *Swarasa.* Earlier studies on the preparation of *Kumari Swarasa* have recorded as high yield as 90% and also a very low yield of 49%. [28-29] The variation may be due to differences in plant maturity, seasonal variations and method of extraction. Increased TSS and viscosity of *Kumari Swarasa* after *Shodhana* was notable which indicates dissolution of a few contents from raw drug into the media of *Shodhana*. The weight of *Garudapacha* was reduced by 3% and water-soluble extractive value seen increased after *Shodhana* (Table 1). There were variations in the physicochemical parameters of drug before and after *Shodhana* indicating the chemical changes during the process. The slight alkaline pH of raw drug found to be increased after *Shodhana* may be because of influence of *Kumari Swarasa* (Table 6).

Considering the clarity of the description available, feasibility, and availability of the ingredients, three trials of *Marana* were attempted in this work. One reference from Malayalam treatise of *Ayurveda* suggests using *Gajaputa* for *Marana* of *Garudapacha* whereas another from *Siddha* literatures suggests use of 100 cowdung cakes. [16-17] 100 cowdung cakes is similar to the descriptions of *Kukkutaputa* and the temperature range for it was around 650°C. [30-31] For *Gajaputa* the temperature range of 910-1180°C was recorded in previous works. [32-35] Accordingly in this work, an attempt was made to prepare *Garudapacha Bhasma* with the temperature patterns of 650°C for *Kukkutaputa* and 950°C for *Gajaputa* in an EMF (Electric muffle furnace).

In First *Kukkutaputa* trial, a powder could be obtained but could not qualify to be called as *Bhasma* even after repeating five times. It could not pass many of classical *Bhasma Pareeksha*. In addition, the contents after *Puta* were black to grayish against the desired white *Bhasma* (Figure 2). Hypothesising that the *Nimbapatra Kalka* which was used as *Acchadana* may be the reason behind the colour, *Marana* of *Garudapacha* was attempted without *Nimba Kalka* in second trial of *Kukkutaputa*. The procedure followed was similar but without *Acchadana*. Resultant product from trituration of *Chakrika* after *Puta* was white coloured powder (Figure 2), but again not a completely formed *Bhasma* even after five *Kukkutaputa*. The contents in the *Sharava* were hard and brittle making it difficult to powder. So, it was established that the temperature profile of *Kukkutaputa* with a temperature of around 650°C was insufficient to yield a satisfactory *Bhasma*.

There was another reference of *Gajaputa* for *Marana* of *Garudapacha*. However, the *Bhavana Dravya* specified in that reference is a drug called *Vankaruga*, the identity of which is unclear. Extensive search of authoritative texts in *Dravyaguna Vijnana* and other literatures failed to yield conclusive information about this *Bhavana Dravya*. It is not possible to continue the steps of *Puta* without *Bhavana* because it significantly neutralizes any inherent toxic effects of raw drug. The pressure applied during the process of levigation enhances the drug's digestibility and assimilability. Upon completion of *Bhavana*, the drug attains a smoother consistency, which contributes to its non-irritating nature and facilitates better therapeutic action. [36-38] So, a hybrid approach of using *Nimbu Swarasa*, a *Bhavana Dravya* mentioned under the *Kukkutaputa* was adopted with temperature of *Gajaputa.*

Bhasma Pareeksha is a classical method of ensuring the quality of the final product (Figure 3). It is essential to confirm the absence of toxic elements, particle size, chemical composition and chemical properties for the intended use. [39] *Varitara Pareeksha* is a test which signifies the lightness of *Bhasma*. A successfully prepared *Bhasma* exhibits fineness, possesses low bulk density enabling flotation. [40] *Rekhapurnatva* suggests the small particle size which may facilitate better absorption, tissue penetration, enhanced bioavailability and quicker action. [41] *Apunarbhava Pareeksha* is a chemical test of *Bhasma* which ensures the irreversible transformation of

the mineral into a stablenon-reducible compound. Here, *Mitrapanchaka Gana* is used for its reducing and fluxing action that lowers the melting point forcing any elemental metal to reduce, coagulate, and become visible. [42] *Nirutha Pareeksha* is also a chemical method of evaluating absence of free elemental metal. The presence of unconverted portion of metal would form an inter-metallic compound with the silver upon heating. [43] Since luster is characteristic of elemental metals, its absence signifies the complete conversion of the substance into its non-metallic compound in *Nischandra Pareeksha*. [44] Usually nausea and vomiting are biological responses to toxic or irritating substances. If *Bhasma* is *apakwa* it will have elemental metal and *Avami* test will be positive and vice versa. [45] If the *bhasma* preparation is incomplete, during *Amla pareeksha* residual metal will react with the acid, leading to the formation of soluble metallic salts that cause a visible discoloration. This is more particular for metals like *Tamra, Swarnamakshika* and *Tuttha*. [46] In the present study sample3, a product after 5 *Gajaputa* qualified all these tests (Table 5). The maximum temperature range of more than 950°C could be achieved and a temperature of more than 900°C was maintained for more than 2 hours in all five attempts. However, the yield of 314 gms of *Bhasma* (31.4%) from 1 kg of raw drug is a matter of concern. Loss during trituration, volatilization of CO_2 during *Puta* and handling losses may be attributed for this loss.

The *Garudapacha Bhasma* (Sample 3) was smooth and soft white coloured fine powder without grittiness. This is an indication of effective trituration and incineration during *Bhasma* preparation. The absence of grittiness points to good fineness and homogeneity, which are essential for safe and effective absorption in the body. [47] White colour (Figure 2) confirms that the desired chemical transformations have taken place and the *Bhasma* is ready as per the textual references.[20] All particles of *Bhasma* passed through sieve number 120, indicating the fineness of the product resulted from repeated bhavana and heat treatment. [48] Loss on Drying (LOD) of0.2%, indicates a low moisture content in the final product. The low LOD helps prevent degradation reactions, thus ensuring the product remains stable for a longer period preventing spoilage. The extreme temperature during the process of *Marana* probably helps in reducing the moisture content in the *Bhasma*. [49] Total ash value is an indicator of purity of ingredients and final product, suggesting that the prepared product is free from organic matter and impurities. [50] A total ash content of 72.34% seen in the present study signifies a predominantly mineral composition, which is expected in any *Bhasma*. Acid-insoluble ash (AIA) in a *Bhasma* is the residue left after the total ash is treated with an acid, primarily indicating the presence of inorganic materials like sand, silica, and silicates. [51] The acid-insoluble ash of 40.66% is suggestive of soil particles that may be inherent to the natural habitat from which the drug has been collected. This may also suggest the presence of refractory mineral fractions formed during repeated *Marana*, which contribute to the physicochemical stability of the final product. In contrast, the water-soluble ash value of 6.8% indicates the presence of a limited fraction of water-soluble inorganic salts. This suggests that the majority of the inorganic content exists in comparatively stable and insoluble forms, which is a characteristic feature observed in many mineral-based *Bhasmas.* [52] The pH of 10.9 denotes that the sample is alkaline in nature, which is a relative value for a *Bhasma* derived from a mineral source like magnesium carbonate. (Table 6)

This work was an exploratory pharmaceutical study focused on baseline pharmaceutical feasibility of an extra-pharmacopeial drug *Garudapacha*. With scattered literature resources and unavailability of standard protocols of *Shodhana* and *Marana* for this drug, the current work was entirely focused on process validation than product validation which can be considered as a limitation of this work. Experimentations on standardization of these procedures, with validation of the product using sophisticated analytical instruments, remains as a scope of future works on same drug.

5. CONCLUSION:

This study was aimed at exploring the pharmaceutical procedure for the *Shodhana* and *Marana* of *Garudapacha* an extra-pharmacopeial mineral drug used in regional *Ayurvedic* practice. *Shodhana* done by *Swedana* in *Kumari Swarasa* for 12 hours, could bring in a few changes in physicochemical properties, indicating a chemical reaction. *Marana* with *Kukkutaputa* at temperatures of 650°C was inadequate to produce a *Bhasma* fulfilling quality parameters. A white, fine *Bhasma* satisfying all *Pareeksha* could be generated after 5 *Gajaputa* at temperatures around 950°C. The data of physicochemical parameters such as low moisture content, predominance of inorganic ash, moderate water-soluble fraction, and alkaline pH generated from this study may be considered as preliminary analytical values for *Garudapacha Bhasma*. This work has explored possible pharmaceutical processes of *Garudapacha* and paves a way for future studies on analytical characterization, safety evaluation, and therapeutic efficacy of the study drug.

Abbreviations:

°C- Degree centigrade, PID- Proportional Integral Derivative, EMF - Electric muffle furnace

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