

Review on Praval Panchamrita Rasa: A Natural Calcium Supplement

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Abstract

Rasashastra (Itrchemistry), is a pharmaceutical subsidiary of Ayurveda that mainly deals with formulations containing minerals/metals. *Praval Panchamrita Rasa* is one of them which is a very versatile Ayurvedic formulation due to its multiple indications, mainly for *Vata* and *Kapha* diseases. This formulation is a combination of five *Bhasmas* i.e. *Praval Bhasma*, *Mukta Bhasma*, *Shankha Bhasma*, *Shukti Bhasma* and *Kapardika Bhasma* which are of marine origin and is triturated with *Arka Ksheer* (latex of *Calotropis procera* L.) and subjected to incineration. The latex of *Calotropis procera* L. plays an important role as a reducing and capping agent resulting in the green synthesis of nanoparticles. *Praval Panchamrita Rasa* has been mentioned in different classical texts such as *Yoga Ratnakara*, *Bhaishajya Ratnavali*, *AFI*, *Rasa Yoga Sagar* etc. Acharyas have described this formulation as “*Sarvagadapahari*” i.e. it can cure all diseases. XRD study of *Praval Panchamrita Rasa* revealed the maximum value of calcite form of calcium carbonate, while SEM study illustrated the smaller particle size range (max size $\leq 6\mu$) resulting in higher bioavailability of *Praval Panchamrita Rasa*. It has also been reported that calcium in calcite form is better absorbed as compared to other forms of calcium carbonate. It is a natural source of calcium which is a necessary nutrient for the proper functioning of the human body. Calcium is a crucial element that mediates muscle contraction, exocrine, endocrine and neurocrine secretion, cell growth, transportation and secretion of fluids and electrolytes.

Keywords: *Bhasmas*, Calcium carbonate, *Ark Ksheer*, calcite.

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INTRODUCTION

Rasashastra is one of the specialized branch of Ayurveda that deals substantially with herbo-mineral preparations for human use. In Rasashastra there is an important concept of the medicinal group known as *Bhasma* (calx) which is incinerated ash of metal and minerals [1]. The important properties of *Bhasmas* (calx) are *Rasayana* (rejuvenating), *Yogavahi* (target drug delivery), *Shighravaypti* (easily absorbable and assimilable in the body) and *Agnideepana* (stimulate digestive fire) too [2]. *Praval Panchamrita Rasa* is an esteemed herbo-mineral formulation mentioned in *Yoga Ratnakara* [3], *Bhaishajya Ratnavali* [4], *AFI* [5], *Rasa Yoga Sagar* [6] and *Rasatantrasara* and *Siddhayoga Sangraha* [7]. This formulation consists of five *Bhasma* (calx); *Praval Bhasma*, *Mukta Bhasma*, *Shankha Bhasma*, *Shukti Bhasma* and *Kapardika Bhasma* which are of marine origin & hence taken in one “*Sudha*” group [8]. When these shells are made into *Bhasma* they are

chemically identified as carbonates of calcium, which is an essential mineral for the body’s physiology [9].

Praval Panchamrita Rasa:

“*Pancha*” means five and “*Amrit*” is an elixir. *Praval Panchamrita Rasa* is an elixir consisting of five *Bhasmas* (calx); *Praval Bhasma*, *Mukta Bhasma*, *Shankha Bhasma*, *Shukti Bhasma* and *Kapardika Bhasma* which are triturated with *Arka Ksheer* (latex of *Calotropis procera*) to form paste-like consistency and rolled into circles. It is then dried in sunlight and kept in *Shrav Samputa* and then subjected to *Bhandputa* [10, 11]. *Rasatantrasara* and *Siddhayoga Sangraha* has mentioned the use of cow milk (*Go-dugdha*) instead of latex of *Calotropis procera* L. for trituration [7]. *Praval Panchamrita Rasa* is indicated in various diseases such as *Aanah* (bloating), *Udara* (Ascites), *Gulma* (Abdominal lump), *Pliha* (splenic disorders), *Kasa* (cough), *Shwasa* (asthma), *Mandagni* (dyspepsia), *Ajirna* (indigestion), *Udgara* (belching), *Hridroga*

(cardiovascular disorders), *Grahani* (sprue), *Atisar* (diarrhea), *Prameh* (diabetes mellitus), *Mutrakatroga* (urinary tract disorder), *Mutrakrichha* (dysuria), *Ashmari* (calculi), *Kapha* and *Vataj roga* etc. Sapiient Acharyas has described this yoga as “*Sarvagadapahari*” which can cure all diseases. It is prescribed to be taken

along with honey, *Gulkanda* (rose petal jam), lemon juice and juice of pomegranate twice daily with a dosage of 250 mg [5, 7]. It is *Shweta* (white) in *Varna* (colour), *Kshariye* in Taste and *Nirgandh* (odorless) in *Gandh* (odour) [4].

Table 1: Ingredients of Praval Panchamrita Rasa

Ingredients	Common name	Constituents	Quantity [5]
<i>Mukta</i>	Pearl	Calcium Carbonate, Pearlin, Keratin,	1 part
<i>Shankha</i>	Conch Shell	Calcium Carbonate, Phosphorus, Iron, Magnesium	1 part
<i>Shukti</i>	Pearl Oyster shell	Calcium Carbonate, Iron, Magnesium	1 part
<i>Kapardika</i>	Cowry Shell	Calcium Carbonate, Magnesium phosphate, Sodium chloride, Manganese	1 part
<i>Praval</i>	Coral	Calcium Carbonate, Iron oxide, Magnesium Carbonate	3 parts / 2 parts [7]
<i>Arka Ksheer</i>	Latex of <i>Calotropis procera</i>	Calotropin, Uscharin, Calotoxin	7 parts/ 6 parts [7] for <i>Mardana</i>

Table 2: Marana and XRD study of Ingredients of Praval Panchamrita Rasa

Ingredients	Marana (Calcination)	XRD Study
<i>Mukta</i>	It is ground well in rose water, <i>chakrikas</i> are prepared and subjected to <i>Gajaputta</i> three times [12].	The strongest peak identified in the raw material was CaCO ₃ in aragonite form whereas in the final product, CaCO ₃ was found in Calcite form [13].
<i>Shankh</i>	It is placed in <i>Shrava Samputa</i> , <i>Sandhi Lepa</i> is done and subjected to <i>Gajaputta</i> two times [14].	It clearly indicated that the raw conch is aragonite in nature, while after incineration this aragonite structure got rearranged to calcite form. It has been reported that calcium in calcium carbonate calcite form is better absorbed as compared to its aragonite form [15].
<i>Shukti</i>	It is ground with <i>Kumari Swarasa</i> (juice of <i>Aloe barbadensis</i> Mill.), <i>chakrikas</i> are prepared and two <i>Gajaputta</i> are given [16].	Raw material <i>Mukta Shukti</i> (mother of pearl) is an organo-mineral matrix containing calcium carbonate in aragonite form. The aragonite form of calcium carbonate transforms into a stable calcite form during the process of <i>Bhasma</i> formation and forms the main crystalline component of <i>Mukta Shukti Bhasma</i> . The heat treatment does result in the partial conversion of calcite to calcium oxide, which appears as calcium hydroxide (not more than 2% w/w) in the final product [17].
<i>Kapardika</i>	It is placed on Charcol fire and heated till each piece swells. Then these are ground well and kept in bottle when cooled [18].	XRD study showed the calcite phase of calcium carbonate and indicate the nanometric nature of the <i>Bhasmas</i> . Such nanometric Size could be responsible for the excellent therapeutic properties of the <i>Bhasmas</i> . Further presence of organic matter as shown by IR and TG is likely to influence the bio accessibility of the <i>Bhasma</i> [19].
<i>Praval</i>	It is ground with <i>Kumari Swarasa</i> (juice of <i>Aloe barbadensis</i> Mill.), <i>Chakrikas</i> are prepared and three <i>Gajaputta</i> are given [20].	XRD revealed that raw material contained CaCO ₃ whereas in the final product of <i>Bhasma</i> CaO was found [21].

Table 3: Rasa Panchaka (Ayurvedic Pharmacology) Ingredients of Praval Panchamrita Rasa

Ingredients	Rasa	Guna	Virya	Vipaka	Dose
<i>Mukta Bhasma</i> [22, 23]	<i>Madhur</i> (sweet)	<i>Laghu</i> (light), <i>Sheeta</i> (cold)	<i>Sheeta</i> (cold)	<i>Madhur</i> (sweet)	125mg
<i>Shankh Bhasma</i> [24]	<i>Kshaya</i> (astringent), <i>Katu</i> (pungent), <i>Kshariya</i>	<i>Laghu</i> (light), <i>Sheeta</i> (cold)	<i>Sheeta</i> (cold)	-	250-300mg
<i>Shukti Bhasma</i> [25]	<i>Katu</i> (pungent)	<i>Snigdha</i> (unctuous)	-	<i>Madhur</i> (sweet)	250-500mg
<i>Kapardika Bhasma</i> [26]	<i>Katu</i> (pungent), <i>Tikta</i> (bitter)	<i>Guru</i> (heavy), <i>Ushna</i> (hot)	<i>Ushna</i> (hot)	-	250mg
<i>Praval Bhasma</i> [27]	<i>Madhur</i> (sweet)	<i>Laghu</i> (light),	<i>Sheeta</i> (cold)	-	250mg
<i>Arka Ksheer</i> [28]	<i>Katu</i> (pungent), <i>Tikta</i> (bitter)	<i>Laghu</i> (light), <i>Ruksha</i> (dry), <i>Tikshna</i> (sharp)	<i>Ushna</i> (hot)	<i>Katu</i> (pungent)	250-750mg

Modern aspect of *Praval Panchamrita Rasa*

This formulation consists of five *Bhasma* (calx); *Praval Bhasma*, *Mukta Bhasma*, *Shankha Bhasma*, *Shukti Bhasma* and *Kapardika Bhasma* which are of marine origin and chemically identified as carbonates of calcium. Calcium carbonate is known to have six polymorphs i.e. calcite, aragonite, vaterite (anhydrous crystalline), crystalline monohydrocalcite and ikaite (hydrated), and amorphous calcium carbonate (hydrated amorphous). The most thermodynamically stable of these forms is calcite, whereas the least stable is amorphous calcium carbonate (ACC) [29]. Most shells are constructed of calcite and aragonite in various arrangements with small amounts of protein, up to about 5% by weight. Higher protein levels would be expected to increase the toughness of the shell but at the expense of reduced stiffness. It can be assumed that particular shell structures are adapted to the particular lifestyles of the animals and the stresses encountered.

Calotropis procera L. has various uses in Indian traditional medicinal system. The milky white latex of this plant exhibits diverse curative properties. Particularly latex of this plant is rich in protein including anti-oxidant enzymes (AOEs), cysteine protease with free thiol (SH) group and tryptophan. Anti-oxidant

enzymes (AOEs), cysteine protease with free thiol (SH) group and tryptophan present in the latex of *Calotropis procera* L. play an important role as reducing and capping agent, thus resulting in the green synthesis of nanoparticles. The capping agents are stabilizing agents that give colloidal stability along with precluding agglomeration and stopping unbridled growth. Proteins can bind to metal nanoparticles through the free amine groups or carboxylate ions of amino acid residues and get adsorbed on the surface of the nanoparticles, therefore making these nanoparticles biocompatible [30].

Analytical Parameters of *Urdhwaga Amlapitta Rasa*:

It includes Organoleptic characteristics, physicochemical parameters, XRD study, SEM study and EDX Study.

Table 4: Organoleptic characteristics of *Praval Panchamrita Rasa* [31]

Parameters	Result
Appearance	Off white
Taste	Slight pungent
Touch	Smooth and fine
Odour	Odourless

Table 5: Physicochemical Analysis of *Praval Panchamrita Rasa* [31]

Parameters	Result
pH value (0.1% w/v solution)	12.55
Percentage of loss on drying (w/w)	0.04
Loss on ignition (%)	3.92
Percentage of acid insoluble ash (% w/w)	0.52
Percentage of water-soluble extractive (% w/w)	9.48
Percentage of alcohol soluble extractive (% w/w)	1.05
Percentage of calcium (wt%)	46

XRD and SEM study [31]

This study shows the maximum value of calcite form of calcium carbonate. In SEM study, the smaller particle size range (max size $\leq 6\mu$) shows the high bioavailability of *Praval Panchamrita Rasa*.

EDX Study [31]

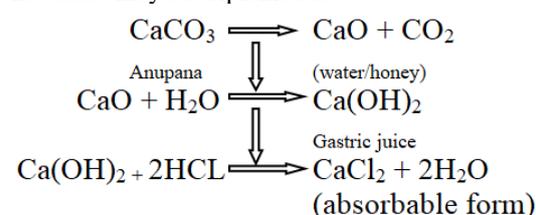
EDX study, heavy metal elements (As, Hg, Cd, Pb) were detected under the permissible limits. It proves that *Praval Panchamrita Rasa* is quite safe in internal administration. This study also reveals the presence of essential micronutrients such as Mg, Al, Fe, Mn and Cr in trace amounts which serve in the body for many physiological roles.

Metabolism and absorption of *Bhasmas* [32]

Calcium composites are alkaline in nature. Natural calcium medications like *Bhasmas* are more efficient than synthetic calcium due to certainty that they contain a fluently absorbable and assimilable form of calcium carbonate as well as other trace elements such as

magnesium, copper, zinc etc. Along with this, *Bhasmas* of *Suddha Varga Dravyas* also manifests numerous remedial conducts such as curing indigestion, other properties like antacid, ulcer mending and anti-colic properties which cannot be anticipated with synthetic molecules.

The absorbability of calcium compound containing *Bhasmas* may be explained as:



Calcium carbonate, one of the more promptly available calcium salts has been extensively used as a salutary supplement. Calcium carbonate is readily

soluble in acid rather than other calcium salts, such as calcium gluconate.

Some individuals have low gastric secretion of acid (hypochlorhydria) while some lack HCl in their gastric juice (achlorhydria). Studies have illustrated that when these individuals ingested a calcium carbonate tablet, they simply excrete the utmost of it rather than absorbing it. Such individuals are frequently diagnosed as having hypercalcemia i.e. blood has an excess of calcium because calcium leaves the bone tissue and circulates in the blood. It is believed that normal individuals, who secrete acid in their gastrointestinal tract, easily absorb the calcium from calcium carbonate. Thus, researchers have stated that individuals taking calcium carbonate orally apparently have to rely on their own gastrointestinal secretion of acid to convert this salt into a soluble form of calcium, namely, calcium chloride for absorption by the body [33].

Pharmacological Activities of *Praval Panchamrita Rasa*:

Praval Panchamrita

A study was conducted to evaluate the effect of *Laghusootshekhar Ras* and *Praval Panchamrit Rasa* in patients of *Urdhwaga Amlapitta*. The results showed that *Laghusootshekhar Rasa* and *Praval Panchamrit Rasa* have a significant role in the treatment of *Urdhwaga Amlapitta* [34]. Due to *Sheeta Virya*, *Madhur Vipaka* and *Ruksha Guna* of *Praval Panchamrita Rasa* it is very effective in *Amlapitta*. As it contains calcium carbonate (CaCO_3), it rapidly neutralizes oesophageal acid and may prevent reflux [35].

DISCUSSION

Praval Panchamrita Rasa is a mixture of five ultimate Bhasma which is no less than an elixir for human health and levigated with *Arka Ksheer* (latex of *Calotropis procera*) thoroughly. Acharyas have used cow milk instead of latex of *Calotropis procera* as cow milk is *Soumya* (coolant) in nature and *Pittashamak*. It has a lot of therapeutic importance as it is used in the treatment of *Aanah* (bloating), *Udara* (gastrointestinal disorders), *Gulma* (Abdominal lump), *Pliha* (splenic disorders), *Kasa* (cough), *Shwasa* (asthma), *Mandagni* (dyspepsia), *Ajirna* (indigestion), *Udgara* (belching), *Hridroga* (cardiovascular disorders), *Grahani* (sprue), *Atisar* (diarrhea), *Prameh* (diabetes mellitus), *Mutrakatroga* (urinary tract disorder), *Mutrakrichha* (dysuria), *Ashmari* (calculi), *Kapha* and *Vataj Roga*. *Praval Panchamrita* is a rich and natural source of calcium, which is widely used in Ayurveda as a calcium supplement from time immemorial. Calcium is an essential element in the human body and is necessary for many cell functions. Calcium is important for bone health, neuromuscular activity, blood coagulation, and normal cardiac function.

Calcium act as a linker in the mucus and in the intercellular association of mucosa. If calcium is

removed from the mucus and mucosa, it weakens the defense line of the gastrointestinal tract. Therefore, calcium ions released from calcium-based *Bhasmas* enhance the protective mechanism of gastric mucosa i.e. it is very effective in *Amlapitta* (Gastritis).

Calcium is essential for insulin-mediated intracellular processes in insulin-responsive tissues such as skeletal muscle and adipose tissue with a very narrow range of Ca^{2+} needed for optimal insulin-mediated functions. Calcium ions stimulate insulin release into the blood. Thus higher the blood sugar concentration, the more insulin is released by beta-cells; an effect mediated by Ca^{2+} and helps in regulating blood sugar levels. Therefore, *Praval Panchamrita Rasa* may be used in the treatment of *Prameh* (diabetes mellitus).

Praval Panchamrita Rasa is used in *Mutrakatroga*, *Mutrakrichha* and *Ashmari* as it contains calcium, which can alkalize the urine and prevent urine infections. Calcium slows down intestinal transit either indirectly or by a direct effect on neuromuscular function and helps in treating diarrhea (*Atisar*).

Praval Panchamrita Rasa drugs are of *Madhur*, *Tikta*, *Kashaya* and *Katu Rasa*, *Madhura Vipaka* and *Sheeta Virya* which are *Pittashamak*, hence symptoms like *Amla Tikta Udgara*, *Urakantha Daha* due to *Vidagda Pitta* get relieved. *Arka Ksheer* has *Dipana*, *Pachana Karma* due to its *Katu*, *Tikta Rasa* and pacifies the *Vata Doshas* due to its *Ushna Virya* which is responsible for different ailments like *Udara Roga* (gastrointestinal disorders), *Agnimandya* (digestive impairment), *Ajirna* (dyspepsia), *Grahani* (malabsorption syndrome), *Atisar* (diarrhoea) etc.

CONCLUSION

All the ingredients of *Praval Panchamrita Rasa* come under *Suddha Varga* and gained therapeutic importance as supplements for calcium deficiency. *Praval Panchamrita Rasa* has many advantages over synthetic calcium supplements as it is easily absorbable and assimilable. Irrespective of gastrointestinal conditions it exhibits its efficacy, unlike synthetic calcium supplements which cannot be absorbed in unhealthy gut conditions such as indigestion, chronic gut motility disorders and hormonal imbalances. So, *Praval Panchamrita Rasa* is very beneficial in its therapeutic dose in various disease conditions.

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