

**SUDHA VARGA, THE CALCIUM SUBSTITUTES IN AYURVEDA: A REVIEW**Suman Bhandari¹, Shuchi Mitra², Usha Sharma³, Khemchand Sharma⁴

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<https://doi.org/10.46607/iamj3711112023>

(Published Online: November 2023)

Open Access

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Article Received: 09/10/2023 - Peer Reviewed: 25/10/2023 - Accepted for Publication: 10/11/2023.

**ABSTRACT**

Background: Branch of *Rasa Shastra* is a bundle of knowledge of the minerals which when purified meticulously are utilised for the betterment of humans. There is such a unique category of calcium rich or *Sudha Vargiya Bhasma* which has enormous collection of different calcium sources. **Aim & objectives:** To study detailed concept of the respective *Sudha Vargiya Bhasma* and understand the importance of each calcium derivative in the *Sudha Varga*. **Material and methods:** Various classical text references of *Sudha Varga* were studied from different *Rasa Shastra* texts for *Shodhan* and *Marana* and the calcium percentage was collected from different studies conducted on them individually. Further knowledge of calcium and its absorption was obtained from the google databases. **Conclusion:** The compounds of calcium derivatives are grouped under *Sudha Varga* and are the most efficient source of calcium in the body. Calcium is one of the abundant minerals required by the human body for its growth and repairment. Studies need to be conducted to find out the calcium percentage in all *Sudha Vargiya Bhasma* and use them accordingly at clinical levels in accordance with their calcium %.

Keywords: Calcium, *Sudha Vargiya Bhasma*

INTRODUCTION

The pharmaceutical branch of Ayurveda known as *Rasashastra* (Iatrochemistry) focuses on various aspects of *Rasa*, *Maharasa*, *Uprasa*, *Sadharan Rasa*, *Dhatu*, products of animal origin and toxic herbs, including their properties, medicinal applications and transformation into special formulations called “*Bhasma*” that aid in treating serious illnesses or acute conditions.^[1] The mineral calcium is the most prevalent in the human body. The recommended dietary intake of calcium for adolescents and adults to age 24 is 1,200 mg/day; for older adults, it is 800

mg/day. Humans require calcium to produce and maintain strong bones. It is also required for the brain and other areas of the body to communicate properly. It helps with muscle mobility and cardiovascular function^[2]. The cheapest source of calcium in *Rasa Shastra* is found in *Sudha Varga*. Literal meaning of the word “*Sudha*” is ambrosia or nectar.^[3] It is used to treat a number of illnesses, including *Amlapitta* (Acid peptic disease), *Grahani*(irritable bowel syndrome), *Parinaam Shula* (Duodenal Ulcer), *Annadrava Shula* (Peptic Ulcer) and *Asthi Kshaya* (osteoporosis) etc.^[4]

Table No.1: *Sudha Varga Dravyas*^[5]

S.no.	Name	Common Name	Origin	Chemical Constituents	Form
1.	<i>Sudha</i>	Lime	Mineral	CaO	Oxide
2.	<i>Khatika</i>	Chalk	Mineral	CaCO ₃	Carbonate
3.	<i>Godanti</i>	Gypsum	Mineral	CaSO ₄ .2H ₂ O	Sulphate
4.	<i>Shankha</i>	Conch Shell	Marine	CaCO ₃	Carbonate
5.	<i>Shambuka</i>	Australian snail	Marine	CaCO ₃	Carbonate
6.	<i>Mukta Sukti</i>	Pearl oyster shell	Marine	CaCO ₃	Carbonate
7.	<i>Kaparda</i>	Cowrie Shell	Marine	CaCO ₃	Carbonate
8.	<i>Kurmprista</i>	Turtle Shell	Marine	Calcite	Phosphate
9.	<i>Samudraphena</i>	Cuttle fish bone	Marine	CaCO ₃	Carbonate
10.	<i>Pravala</i>	Coral	Marine	CaCO ₃	Carbonate
11.	<i>Mukta</i>	Pearl	Marine	CaCO ₃	Carbonate
12.	<i>Mrigshringa</i>	Deer Antlers	Animal	CaCO ₃	Phosphate
13.	<i>Kukuttand twak</i>	Hens Eggshell	Animal	CaCO ₃	Carbonate
14.	<i>Ajasthi</i>	Goat's bone	Animal	CaCO ₃	Phosphate

Classification of *Sudha Varga*

In the Ayurvedic classics Caraka Samhita and Susrutha Samhita, *Sudha* has been included under *Parthiva Dravyas*. *Sudha Varga* includes *Khanija Dravyas* (medicine derived from minerals), such as *Khatika*, *Godanti*, etc., and *Pranija Dravyas* (goods derived from animals), such as *Kukuttandatwak*, *Shankha*, *Shukti*, *Shambuka*, *Kaparda*, etc.^[6] The 20th-century text *Rasamritam* was the first to solely

classify all calcium compounds in a single group based on their chemical makeup as “*Sudha Vijnaneeyam*”.^[6] Among these *Kaparda* has been grouped under “*Sadharana Rasa*” (group of minerals depending on their role in alchemical processing of mercury) whereas *Pravala* and *Mukta* were grouped under “*Ratna varga*” (group of gems). Various author has described different number of *Sudha Varga Dravyas* are as follows:^[7]

Table No.2: Classification of Sudha Varga

S.no.	Name	Rasarnava ^[7] and Rasratnakar ^[8]	Anandkand ^[8]	Rasamrita ^[8]	Ayurvedic Rasshastra ^[8]
1	Sudha	+	--	+	+
2	Khatika	--	--	+	+
3	Godanti	--	--	+	+
4	Shankha	+	+	--	+
5	Shambuka	--	+	--	+
6	Mukta Sukti	--	+	--	+
7	Varatika	+	--	--	+
8	Kurmprista	+	--	+	+
9	Samudraphena	--	--	+	--
10	Pravala	--	--	--	+
11	Mukta	--	--	--	+
12	Mrigshringa	--	--	--	--
13	Kukuttand twak	--	--	--	+
14	Ajasthi	--	--	--	+
15	Badrashma	--	--	--	+
16	Swetanjan	--	--	--	+
17	Vanslochan	--	--	--	--
18	Hastidanta	--	--	--	--

Preparation of Sudha Vargiya Bhasma

- The powder of substance obtained by calcinations is called *Bhasma*. Metals, minerals and animal products are, by special processes, calcined in close crucibles in pits and with cow dung cakes. By these specific processes the source material is converted into a dosage form that is not only acceptable to the body but also extremely efficacious and safe.^[9]

- The process of *Bhasma* is divided into two stages:^[9]

1. *Shodhana* 2. *Marana***Shodhana of Sudha Varga Dravya-**

Shodhana is a process of purification and detoxification by which physical and chemical blemishes and toxic materials are eliminated and substances are subjected to further processing. Some kinds of changes also take place apart from these, which may be beneficial for therapeutic purposes.

Table No.3: Shodhana of Sudha Varga Dravya

S.no.	Name	Shodhana Dravya	Shodhana Procedure
1.	Sudha ^[10]	-	-
2	Khatika ^[11]	Distilled Water	Filtration
3	Godanti ^[12]	Nimbu Swaras	Swedana
4	Shankha ^[13]	Jambiri Nimbu Swaras	Swedana
5	Shambuka ^[14]	Amla Kanjika	Swedana
6	Mukta Sukti ^[15]	Any Sour Liquids	Swedana
7	Kaparda ^[16]	Nimbu Swaras	Swedana
8	Kurmprista ^[17]	Any Sour Liquids	Swedana
9	Samudraphena ^[18]	Nimbu Swaras	Bhawana
10	Pravala ^[19]	Jambiri Nimbu Swaras	Bhawana
11	Mukta ^[20]	Jayanti Swaras	Swedana
12	Mrigshringa ^[21]	Kshara Jala	Swedana

13	<i>Kukkuttand twak</i> ^[22]	Distilled Water	<i>Prashalan</i>
14	<i>Ajasthi</i>	-	-

Marana of Sudha Varga Dravya-

The process which converts purified metals and minerals into ash (*Bhasma*) after subjecting them to levigation and incineration is called *Marana*.

Table No.4: Marana of Sudha Varga Dravya

S.no.	Name	Marana Dravya	No. of Putas
1	<i>Godanti</i> ^[23]	<i>Kumari Swaras, Nimba Patra Rasa</i>	1 <i>Gajputa</i>
2	<i>Shankha</i> ^[24]	<i>Kumari Swaras</i>	2 <i>Gajputa</i>
3	<i>Shambuka</i> ^[25]	<i>Kumari Sawara</i>	2 <i>Gajputa</i>
4	<i>Mukta</i> ^[26]	<i>Rose distilled water/ Cow milk</i>	3 <i>Laghuputa</i>
5	<i>Kurmpriya</i> ^[27]	<i>Changeri Rasa</i>	2-3 <i>Gajputa</i>
6	<i>Pravala</i> ^[28]	<i>Jayanti Swaras, Kanya</i>	3 <i>Gajputa</i>
7	<i>Mrigshringa</i> ^[29]	<i>Kumari Swaras, Arka Kshira, Kumari Swaras, Ravi Dugdha</i>	3 <i>Gajputa</i>

Table No.5: Percentage of Calcium

S.no.	Name	Raw Form	Bhasma Form	% of Calcium in Bhasma Form (w/w)
1.	<i>Godanti Bhasma</i> ^[30]	Dihydrate	Anhydrite	28.69
2.	<i>Shankha Bhasma</i> ^[31]	Aragonite	Calcite	39.81
3.	<i>Kukkuttand Twak Bhasma</i> ^[30]	Calcite	Portlandite Ca (OH) ₂	60.83
4.	<i>Mukta Bhasma</i> ^[30]	Aragonite	Calcite	40.04
5.	<i>Kapardika Bhasma</i> ^[32]	Aragonite	Calcite	44.31
6.	<i>Praval Bhasma</i> ^[33]	Aragonite	Calcium Oxide CaO	38.60

Mechanism of calcium metabolism^[34]

Calcium metabolism is regulated in large part by the parathyroid hormone (PTH)–vitamin D endocrine system, which is characterized by a series of homeostatic feedback loops. The rapid release of minerals from the bone is essential to maintain adequate levels of ionized calcium in serum. During vitamin D deficiency states, bone metabolism is significantly affected as a result of reduced active calcium absorption. This leads to increased PTH

secretion as the calcium sensing receptor in the parathyroid gland senses changes in circulating ionic calcium. Increased PTH levels induce enzyme activity (1 α -hydroxylase) in the kidney, which converts vitamin D to its active hormonal form, calcitriol. In turn, calcitriol stimulates enhanced calcium absorption from the gut. Not surprisingly, the interplay between the dynamics of calcium and vitamin D often complicates the interpretation of data relative to calcium requirements, deficiency states, and excess intake.

Table No.6: Rasapanchaka of Sudha Varga Bhasma^[35]

S.No.	Bhasma	Rasa	Guna	Virya	Vipaka	Karma
1.	<i>Shankha</i>	<i>Kashaya, tikta</i>	<i>Laghu, Sheeta</i>	<i>Sheeta</i>	-	<i>Grahi, deepan</i>
2.	<i>Shukti</i>	<i>Katu, tikta</i>	<i>Snigdha</i>	<i>Sheeta</i>	<i>Madhura</i>	<i>Deepan, Ruchikar</i>

3.	<i>Pravala</i>	<i>Mahura</i>	<i>Laghu</i>	<i>Sheeta</i>	-	<i>Deepan, Pachana</i>
4.	<i>Godanti</i>	<i>Lavan</i>	<i>Sheeta</i>	-	<i>Madhura</i>	<i>Deepan, Jwarhar</i>
5.	<i>Samudraphena</i>	<i>Kashaya, tikta</i>	-	<i>Sheeta</i>	-	<i>Deepan, Pachana</i>
6.	<i>Khatika</i>	<i>Madhura, Tikta</i>	-	<i>Sheeta</i>	-	<i>Pittahar, Atisarnashak</i>

DISCUSSION

Ayurveda employs a wide range of calcium rich *Dravyas* from various origins. The majority of calcium rich *Parthiva Dravyas* are *Sheetaveerya*. They are high in mineral calcium and can thus be used as calcium supplements. Depending on the chemical composition of the *Dravya*, the mineral medications are treated to *Swedana* and *Marana* processes using appropriate mediums^[36] The *Shodhana* of *Sudha Varga* is easy to follow and does not require complicate process in comparison to other *Vargas* such as *Maharasa*, *Uprasa* etc. and *Putra* requirement is also less as compared to other *Vargas*. Most *Sodhana Dravyas* are *Amla* (sour), which aids in the removal of impurities from *Sudha Varga Dravyas*, which are often alkaline in character. The *Marana* process further refines them into very small micro-level particles known as *Bhasma*. These *Bhasma* are calcium compounds that are more absorbable and assimilable. The *Dravyas* will be transformed to carbonates, regardless of their raw state form. Calcium carbonates, rather than other salts, are the most easily absorbed and assimilable form. Other trace elements, such as zinc and magnesium, will improve absorption of these substances.^[37] They are also given in conjunction with a proper *Anupana*, depending on the severity of the sickness, which aids in the absorption and assimilation of these compounds over current calcium supplements.

The calcium-rich *Bhasma* is mostly having *Katu*, *Kashaya*, *lavana Rasa*, *Snigdha*guna. *Tikta Rasa* is having *Strotoshodhak* property which acts on *Margavarana* and *Madhura*, *Lavana Rasa* pacifies *Vata Dosh*a and *Madhura*, *Tikta*, *Kashaya Rasa* pacifies *Pitta Dosh*a and *Katu*, *Tikta*, *Kashaya* pacifies *Kapha Dosh*a. The majority of the *Parthivadavyas* rich in calcium are *Seetaveerya*, *Grahi*, *Chakshushya*, *Deepana*, *Pachana*, *Vishaghna*. The *Bhasmas* of these drugs are mostly carbonates of calcium.

Hence, they help to correct conditions like *Amlapitta*, *Parinaam Shula* etc. These *Bhasmas* are widely used in *Amalapitta* (Acid Peptic disease). Parietal cells of the stomach contain large branching intracellular canaliculi. The HCl is formed at the villus like projection inside these canaliculi and is then conducted through the canaliculi to the secretory end of the cell. The main driving force for HCl acid secretion by the parietal cells is hydrogen- potassium pump.

The tight regulation of parietal cells ensures the proper secretion of HCl. The H⁺-K⁺-ATPase enzyme expressed in parietal cells regulates the exchange of cytoplasmic H⁺ for extracellular K⁺. The H⁺ secreted into the gastric lumen by the H⁺-K⁺-ATPase combines with luminal Cl⁻ to form gastric acid, HCl.^[38]

In case of Excess amount of HCl in the stomach, if CaCO₃ is given which is an alkali act as in acid base reaction where acid reacts with alkali and formation of a neutral salt take place.



Here in the presence of excess HCl after intake of CaCO₃ (*Sudha Vargiya Bhasma*), reaction will take place as mentioned above and forming a neutral salt CaCl₂ with the HCO₃ being released, which will also help in maintaining the acidity of stomach pH being alkaline in nature. Later on, CaCl₂ will be excreted out of the body through metabolism and excretion in the body and the primary function of the mucosal bicarbonate secretion is to neutralize acid diffusing into the mucus gel layer and to be quantitatively sufficient to maintain a near-neutral pH at the mucus-mucosal surface interface.

CONCLUSION

The compounds of calcium derivates are grouped under *Sudha Varga*. They are the most efficient source

of calcium in the body. Calcium is one of the abundant minerals required by the human body for its growth and repairment. Studies need to be conducted to find out the calcium percentage in all *Sudha Vargiya Bhasma* and use them accordingly at clinical levels in accordance with their calcium %.

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Source of Support: Nil

Conflict of Interest: None Declared

How to cite this URL: Suman Bhandari et al: Sudha Varga, The Calcium Substitutes in Ayurveda: A Review. International Ayurvedic Medical Journal {online} 2023 {cited November 2023} Available from: http://www.iamj.in/posts/images/upload/2894_2900.pdf