

# Sikata varga (Silicate-containing-compounds) in Ayurvedic Medicine: An Updated Review

Sharma Usha<sup>1</sup>, Karishma<sup>2</sup>, Mitra suchi<sup>3</sup>, Yadav Yadevendra<sup>4\*</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>MD Scholar, <sup>3</sup>Associate Professor, <sup>4</sup>Assistant professor, P.G. Department of Rasa Shastra & Bhaishjya Kalpana Uttarakhand Ayurved University, Rishikul Campus, Haridwar, India 249401

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\*Corresponding author: Yadevendra Yadav

## Abstract

Rasa Shastra forms the core of the Ayurvedic treatment that mainly deals with *Parad* and a vast number of minerals, metals and animal products having therapeutic as well as alchemical importance. In Rasa Shastra metals and minerals depending on similar composition/properties to different Vargas (groups). *Sikata varga* is compounds of silica-containing group of drugs having enormous therapeutic value. Classification of *Sikata varga* was not use in classical manuscripts, the scattered description of features, types and processing into formulation of these drugs and their usage in alchemy; various methods of binding of mercury (*Parada bandhas*) as well as internal administration were enumerated. Authors of 20<sup>th</sup> century have grouped these drugs under a specified class called *Sikata Varga*. The current work has been made to systemic compilation of all scattered information in one place for easy and better understanding of all *Sikata varga Dravya* in *Ayurveda*.

**Keyword:** *Sikata Varga*, Silicate, *Badrasham*, *Pisti*, *Akeeka*.

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## INTRODUCTION

Sikata varga is group of silicon-containing compounds drugs having alchemical as well as therapeutic value. Classification of Sikata varga was not done in classical texts, the scattered references of these drugs and their usage in alchemy; various methods of binding of mercury (*Parada bandhas*) as well as internal

administration were enumerated. Authors of 20<sup>th</sup> century have grouped these drugs under a specified class called Sikata Varga. Members of Sikata varga include Sikata, Dugdha Pashana, Kausheyashma, Nagapashana, Badarashma, Trinkanta, Akeeka that is mentioned in table no1.

**Table-1: Chemical constituent of Sikita Varga or silicon containing compounds**

S. No.	Traditional Name	Common name	Chemical constituent
1.	Sikata	Sand	SiO <sub>2</sub>
2.	Dugdha pashana	Talc	H <sub>2</sub> Mg (SiO <sub>3</sub> ) or (Mg.Fe) <sub>3</sub> Si <sub>2</sub> O <sub>5</sub> (OH)
3.	Kausheyashma	Asbestos	Mg <sub>3</sub> Si <sub>2</sub> O <sub>5</sub> (OH) <sub>4</sub>
4.	Nagapashana	Serpentine	(Mg.Fe) <sub>3</sub> Si <sub>2</sub> O <sub>5</sub> (OH)
5.	Badarashma	Rock fossil	Si <sub>4</sub> CaO <sub>4</sub>
6.	Trunakantamani	Amber	C <sub>10</sub> H <sub>16</sub> O
7.	Akeek	Agate	SiO <sub>2</sub>

Antiquity: In Purana Kala, Shathapatha Brahmana of Prajapathi, stated the transformation of sand (Sikata) to gold (Hiranya), which infers the existence of the thought of conversion of metals (Loha veda), subsequently in Vedic period Sikata → Sharkara → Ashma → Ayas → Hiranya [1]. The interspersed references of Sikata, are present in classical texts like

Ananda Kanda [ii] and Ayurveda Prakasha [iii]. In the text of Rasamritam[iv] Sikata varga was cited for first time. Dugdha Pashana was described by the authors of 20th century in texts Rasa Tarangini [v] Rasendra Sambhava [vi] and Rasamritam. Kausheyashma was described in texts Rasamritam, Ras Mitra [vii], Rasa

Bindu<sup>viii</sup> and Rasa Darpana [<sup>ix</sup>]. Various classification

of Sikata varga is illustrated in table 2.

**Table-2: Sikata Dravya according to different ayurvedic texts**

Dravya	Rasaamritam	Rasendra Sambhava	Ayurveda Prakasha	Rasa Mitra	Rasa Tarangni	Rasa Bindu	Rasa Darpana	Ananda Kanda
Dugdhapashan	+	+	-	+	+	+	+	-
Badrashma	+	-	-	+	-	+	+	-
Kausheyashma	+	-	-	+	-	+	+	-
Nagapashan	+	-	-	+	-	+	+	-
Trinkantmani		+	-	+	-	+	+	-
Sikta	+	-	+	-	-	-	-	+

Author of Rasa Bindu placed Dugdhapashan, Badrashma & Kausheyashma under Sadharana Rasa [viii], while Nagapashan, Trinkant mani and Akeeka were categorized in Upratan (Semi-precious gems) [<sup>x</sup>]. Authors of Rasa Mitra kept all these drugs in Rata-uptrana (gems) [vii]. Rasadarpana placed Kausheyashma, Dugdhapashan, Nagpashan and Badrashma in Sudha Varga[ix] and Trinkantmani and Akeeka under Upratna[ix]. In Rasendrasambhava Dugdhapashan hoarded under types of Uprasa[vi]. Only Rasamritam[iv] considered Dugdhapashan, Badrashma, Kausheyashma, Sikata and Nagpashan in Sikata varga Dravya and Trinkantmani in Upratna Varga[xi].

1. Sikata: It is commonly known as Valuka/Baluka. Baluka is known as Silicon stones, when they take through the streams of rivers and convert into white sand particles after breaking. It is used in Rasa Shastra as regulator of thermal conduction in Valuka Yantra [<sup>xii</sup>] in Kupipakwa. In Panchkarma it is only used in dry hot fomentation [<sup>xiii</sup>].

Colour: White sand particles are in pure form while due to mixing of iron or minerals they become yellow and red in color.

Synonyms: Sikata, Sikta, Baluka, Baloo, Reta, Reti, Retaja, Rega, Beloo, Ramala, Sainda, Sharkara, Pravaha janitha, Paneeya churnaka, Sukshma[<sup>xiv</sup>-ii].

Common Vernacular names: Sanskrit: Sikata, Baluka, Retika[<sup>xv</sup>]; English: Sand; Latin: Silica; Hindi: Balu, Reta; Arabi: Ramala; Pharsi: Rega; Marathi: Reti, Balu.

In the mixture of sand and Loha (Iron), Loha can be separated from sand using magnet before further process [<sup>xvi</sup>] of Shodhana[<sup>xvii</sup>] and Marana[<sup>xviii</sup>]. Shodhana and Marana of Sikata are not required. Useful in burning sensation of skin (Santhapa Nasha), Relieves tiredness (Srama Nasha), Controls Vata (Sakha Shritya Anilapaha), Scrapping of debris of wounds (Lekhani, Vranagna).

2. Dugdha pashana: Availability of Dugdhapashana is in Italy, franc, Germany, Switzerland, New Zealand [<sup>xix</sup>]. Dudhiya Varna or Neelabh Sweeta Varna (white or

bluish-white colour) is mentioned in classical Ayurvedic text [xix].

Synonyms: Dugdha pashana, Dugdha pashanaka, Dugdha, Dugdhi, Dugdha Shila, Ksheera Kshava, Vajrabha, Deeptika, Soudha, Gomeda Sannibha, Dugdhopala, Dugdha Drushad [<sup>xx</sup>].

Vernacular names: Sanskrit: Dugdha pashana; English: Talc, Magnesium Silicate, Soft stone; Hindi: Sange jarahat; Marathi: Sankha jiru; Panjabi: Dugdhapathari; Arabi: Hajrul jarahat; Pharsi: Sange Jahahata; Sindhi: Singa jiro [<sup>xxi</sup>].

Shodhana and Marana: Both these procedures are not mention due to there is no requirement.

Dose (Matra): 1-2 Ratti (125-250mg) [v].

Pisti: To enhance its properties, fine powder of Dugdha Pashana triturated with rose water and used in various disease.

Pharmacological Properties: Rasa: Madhura; Guna: Snigdha, Seeta; Varya: Sheetta; Karma: Grahi, Vrana Ropaka, Raktastambhana, Danta Roga hara [xxi].

Indications: Jwara and Pitta disorders, Twakdaha Nasak and Aadmana Nasak, Hrudayamaya Hara, Ruchya, Pitta Shula Vinashini, Kasaswasa hara [v].

Utility: Application of Lepa (skin ointment or lotion) of Dugdha-pashana with Yava Kshara (Alkali made by Hordeum vulgare L.) along with water is indicated in Sidma Kusta [a kind of Skin diseases [v]. 125mg of Dugdha-pashana with either water or milk would help in relief of Sayankala Samuttitha Manda Vega Jwara [mild grade fever] [v]. Dusting powder of Dugdha-pashana over Abhighataja Vranas [Injury wound], Sadhyo Vrana [Fresh wound], helps to stop bleeding [v]. Dugdha-pashana along with curd, helpful in diarrhea and dysentery [xxi]. In Sadhyovrana [<sup>xxii</sup>] 8 parts of Dugdha-pashana and 1 part of Khunakharaba (Daemonorops darco) and 1/4th part of Rasa karpura [Hg<sub>2</sub>C12] are mixed in 20 parts of Sikata taila (ointment like mixture of sesame oil and bee wax) and used to

making ointment which helps for healing and cleansing of wounds [xxi]. To cure stomatitis and bleeding gums (Mukha and Danta rogas), a tooth powder which is made by mixing 4 parts of Dugdha pashana, 1 part of Laghu ela (*Elattaria Cardamum* Linn. Maton), 1 part of Kavabachini (*Piper cubeb*), 1 part of Khadira Satva (Hard wood of *Acacia catechu* Linn.) and 2 parts of Bakula (*Mimusaps elengi* Linn.) bark is to be used [xxi]. In Raktha pitta (*Urticaria*), Dugdha-pashana mixed with Nagakesara (*Mesua ferrea*) and Khunakharaba (*Daemonorops darco*) in equal parts and used to stop the bleeding [xxi].

3. Kausheyashma: It is a soft stone, just like the compressed threads of silk [xxiii]. It is a bad conductor of heat, that's why it is used as a guard from fire, in the form of cloths.

Colour: Yellowish or reddish white in color [xxiv].

Vernacular names: Sanskrit: Kausheyashma; English: Asbestos; Hindi: Resmi patthar; Pharsi: Sange resam; Telugu: Ratinara [xxv].

Shodhana: This process is not mentioned due to there is no requirement.

Bhasma: Kausheyashma is triturated with Arkasheera (*Calotropis procera*) and kept in Sarav samput (Mud smeared cloth earthen pot), subjected to Gaja Puta (underground baking chamber having size 185193 cm<sup>3</sup>, in which cow dung cake is used as fuel), after 3 Putas we obtain white colour Bhasma [xxvi].

Pishti: fine powder of Kausheyashma, triturated with rose water, for 3-4 days [xxvii].

Pharmacology Properties: Varya: Sheeta and Raktastambak Properties [xxviii].

Dose (Matra): 2-6 ratti (250-500mg) with milk and water [xxviii].

Utility: Dantamanjan (Tooth powder) is prepared with Kausheyashma as ingredient, indicated in teeth and gum problems (Danta Rogas, Danta Shithilya, Danta Puya). It is also used in Raktodgama (Bleeding disorder), Puyodgma, Pyorrhoea, Prameha and Pradara Rogas (Dysmenorrhea [xix]). It cures fever, asthma and cough [xix].

4. Nagapashana: Nagashama is Available in China, Tibet, Laddak, Garhwal and Nepal mountains [xxix].

Colour: Harita (green), Peeta (yellow) and Swethabha Yukta Varna (White tinged) [xxix].

Synonyms: Nagapashana, Nagashma

Vernacular names: Sanskrit: Nagapashana, Nagashma; English: Serpentine, Ophite; Pharsi: Jahara mohar; Arabi: Phada jahar madani; Telugu: Salagrama Sila [xxx].

Shodhana and Marana: Both these procedures are not mentioned due to there is no requirement.

Pishti: Nagapashana is to be triturated with Taruni Jal (rose water), for 3-4 days. Pishti has been ruksha and ushna guna [xxxi].

Properties: It acts as Medhya (Intellect promotor), Saumanasya janana (Attractive), Mastishkya (Neuro-tonic), Yakrith balakar (tonic for Spleen), Ojovardhaka (Immuno boster), Visha hara (Antidot), Atisara hara (Antidiarrhoeal), Hrudhaya dhourbalya hara (Cardio-tonic) and Vamanahara (antinauseatic) [xxxii].

Dose (Matra): 2-8 ratti (250mg-1gm) with rose water or milk as Anupama (Vehicle drug) [xxxiii].

Physical Properties: Lustre: Waxy; Transparency: Translucent; Hardness: 2.5 - 4 Density: 2.5-2.8 [xxxiii].

5. Badarashma: Availability of Badar-Pashana is in Arab, Siria, Mishra, Iraq, Afghanistan, Jordan, India and Pakistan. Its shape resembles the Jujube fruit; hence the name is Badarashma. Hajrul yahood (Jew's stone/ Lapis judaicus) is the petrified spines of the sea urchins (*Cidaris* sp.), found in the geological stratum of the Jurassic period (100 million years ago) [xxxiv]. Its size and shape have been described to be little bigger than small Betel Nut. The references were found regarding two varieties male and female of Hajrul Yahood which differs widely in their dimensions. The male variety was identified to have more slender spines with tuberculation and longitudinal elevations, while the female form was rather more expanded, smooth surfaced and reddish or blackish in color. It could be easily ground (triturated) in water [xxxv].

Colour: It is brownish in out-side and greenish white from inside [xxxvi].

Synonyms: Ashmabhid, Badrashma, Badaripashana, Pashana badara [xxxvii].

Vernacular names: Sanskrit: Badarashma, Ashmabhid; English: Fossile Norinite, Fossile Encrinite, Silicate of lime, Jew's stone, Lapis judaicus; Arabi: Hajrul yahud, Hajrujjaitun Pharsi: Sange jahudan, Sange yahud; Unani: Yahuda, Hajaratbera; Hindi: Bera patthar, Hajarath ber, Hajarath Jahoor, Pattharver; Gujarati: Hajarat bora [xxxviii].

Shodhana and Marana: Its Bhasma preparation is completed in two steps Shodhana and Marana. It has

to be heated red hot and then dipped in decoction of Kadlikanda Swarasa (Juice of *Musa paradisiaca* L.) or in radish (*Raphanus sativus* L.) juice for 7 times, taking care not to allow the pieces to get shattered. Trituration of Badarashma with Kumari Swarasa (Aloe vera pulp) and then subjected to Gajaputa Puta [<sup>xxxix</sup>].

Pisti: Fine powder of Sudha Badarasma is to be triturated with rose water or Chandanadi Arka (Distillate of *Santalum album*), for 3-4 days [<sup>xl</sup>].

Some Description of Badrashma mentioned in Unani text: Ibn al Baitar (1197–1248 CE) wrote that Galen (129–200 CE) claimed it to be a tested (Mujarrab) drug in treating nephrolithiasis (Renal Stone) but it was not found useful in cases of cystolithiasis (Gall Bladder stone) [<sup>xli</sup>]. Arabic scholar Theophrastus in the 4th century B.C. wrote that it stops bleeding per rectum, heals wounds, treats stings and snake bites. A review of historical text of medieval period revealed that it was extensively used for internal ailments and skin diseases [<sup>xlii</sup>]. Its powder treats wounds and when mixed with honey, softens calluses and hard skin [<sup>xliii</sup>]. Guna (Temperament) of Hajrul yahood has been described to be hot & dry, which is very opposite to the condition responsible for the stones formation in urinary system, therefore, it may be possible reason to shows lithotriptic agent [<sup>xliv</sup>]. In very fine powder form i.e., in the form of Bhasma/Calx/Kushta. (A formulation prepared by calcination of the metals or minerals.) Its general dose for average built man is 1.5–2 gm. It is commonly used in the dose of 125–250 mg twice a day with water. Hajrul Yahood has been described to be harmful to stomach, liver and spleen. Therefore, oil of *Prunus amygdalus* Batsch and honey are used as corrective agents to reduce the harmful effect on liver and spleen, respectively [<sup>xlv</sup>]. Some important classical Unani formulations in which Badarashma is one of the ingredients mentioned in National Formulary of Unani Medicine (NFUM). Kushta Hajr ul Yahood, Majoon Hajr ul Yahood, Majoon Yadullah, Majoon Sang Sarmahi, Sufoof Hajr ul yahood, Ikseer Atfal, Qurs Suzak, Dawa-e-Gurda and Majoon Ibne Sarafiyoon [<sup>xlvi</sup>].

Studies on Shodhana-Marana: Shodhana (Purification) of 300 gm of Badrashma requires 3500 ml of juice of root of *Raphanus sativus* L. for 7 similar phases of this step. After completion of this process yield was 94.66 %. In Marana process juice of root of *Raphanus sativus* L. was used in Bhavana (impregnation) and 10 series of thermal treatment was provided by Varaha Puta (Thermal treatment chamber having size 74088 cm<sup>3</sup>, in which tradition fuel is used). In this process yield was 54.51% [<sup>xlvii</sup>]. While in another study this method was adopted with slight modification and process of Marana was completed in two phases 180 gm of small pieces stones is placed in an

earthenware pot then pour 200 ml of *Raphanus sativus* L. leaf juice.

This pot was sealed with mud smear cloth after covering with another pot. The pot is placed in a pit having 10 kg of cow's dung cake for baking. This baked Badrashma was ground in a Pashana Kharala (stone mortar) after adding 100 ml of *Raphanus sativus* L. leaf juice and 25gm of Yawakhar (An alkali salt made by *Hordium vulgare*) to make it dried and acquire semisolid consistency. Then the small cake of approximately 10 g each are prepared and keep it dried. These cakes were again fired in the formerly described way with 5 kg of cow dung cake [<sup>xlviii</sup>].

Studies on Pisti Nirmana: Bhadrashma Pisti was prepared by impregnation of Taruni Parisut Jal or Gulab Arka (rose water or Distillation of *Rosa Cetifolia*). For process 197 gm of Pure Bhadrashma requires 263 ml of rose water for 6 similar steps to make very fine powder. The amount of final formulation was 209 gm. That means it gained weight by impregnation and yield was 106.1 % [<sup>xlvii</sup>]. Majoon is a kind of semisolid confection, prepared by mixing Hajrul Yahood powder, made by adding purified honey or sugar syrup in a quantity of two to three times of the total weight of powdered. Other ingredient drugs of the formulation were *Physalis alkekengi* L., *Cucumis melo* L., *Cucumis sativus* L., *Cucurbita maxima* Duchesn. Powder of all drugs is added in sugar syrup with continuous stirring till homogenized.

Physicochemical studies: The Bhasma was pale yellow in color, having not any peculiar taste and odor. Acid solubility was high and extractive values in water and ethanol, were 4.33% and 5.00%, respectively. The pH in 1% or 10% solutions was found strong basic in nature. Elemental analysis shows that it contains carbon and hydrogen, while Gas Chromatography-Mass Spectrometry (GC-MS) did not show any organic compounds. X-ray fluorescence (XRF) showed that major components after ignition were CaO, MgO, SiO<sub>2</sub>, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>. Trace elements like phosphorus, chlorine, nickel, palladium, sodium, Sulphur, titanium, chromium, copper, potassium, manganese, gadolinium, bismuth, ruthenium, indium and cerium were also found. X-ray powder diffraction (XRD) qualitative analysis showed the presence of Calcite, Dolomite, Quartz, Boehmite and Muscovite, but no heavy metals were detected by atomic absorption spectrometer [<sup>xlix</sup>]. Another study shows that untreated sample of Badrashma reveals that it has Calcite (CaCO<sub>3</sub>), Increate (CaFeMgCO<sub>3</sub>) and Dolomite (CaMgCO<sub>3</sub>) in major phase, while final sample of BB & BP has only Calcite (CaCO<sub>3</sub>). Physicochemical parameter viz, pH, Loss on drying Ash Value, Acid insoluble Ash, Water soluble extractive and Alcohol soluble extractive of BB & BP is mentioned in Table 3.



**Table-3: Physico-chemical parameter of Bhasma and its Pisti**

Analytical test	pH	LOD	A V	AIA	WSE	ASE
Badrashma Bhasma	12.02	0.978	78.93	11.45	19.96	0.19
Badrashma Pisti	9.014	0.236	86.01	0.35	0.55	0.84

Microbial limit test of BB & BP: All four Bile-tolerant Gram-negative Bacteria viz *E. coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Salmonella typhimurium* and *Aspergillus Brasiliense*'s, a fungal strain was also absent. Total Aerobic microbial counts (in cfu/ml) of three sample of BB were 03, 01 and 02 and BP was 03, 01 & 02 respectively. Total yeast and moulds count of (in cfu/ml) were 24, 18 & 08 respectively in BP and absent in BB [xlvi].

Pharmacological studies: Toxicity Study: Acute toxicity study of Badrashma Bhasma (Kushta hajar ul yahood) was conducted as per the OECD guidelines. No mortality was observed up to 5000 mg/kg, hence test formulation was regarded as safe (Category 5) as per OECD guideline 423. In sub-acute toxicity, Bhasma in doses of 1000, 500 and 333.33 mg/kg b.w. did not show any significant changes in hematological and biochemical parameters and not show any significant histo-pathological changes [l]. Sub chronic toxicity of the crude material of Badrashma and its Bhasma was administered in three different doses i.e., 250, 500 and 1000 mg/kg daily for 90 days oral administration in Wistar rats. The prepared Bhasma of Badrashma was found to increase elevation in liver injury markers only at the dose of 1000 mg/kg, while crude drug without processing the Badrashma was found to bring on an elevation of liver injury markers in all doses. The study also scientifically reveals that the method employed in processing of crude Badrashma into its Bhasma make it suitable for oral intake. Therefore, dose mention in Ayurvedic and Unani literature also confirms its dose safety [li].

Study on Pharmacological mode of action: Magnesium is a protective agent in calcium oxalate crystal growth which is found in Badrashma. In vitro investigation of Badrashma powder can reduce the size of calcium oxalate stones also confirms it. Additionally, Magnesium can also form complexes with oxalate and decrease super saturation [lii]. Moreover, its basic pH nature could be another inhibitor for stone production. Furthermore, SiO<sub>2</sub> can change calcium oxalate-mono-hydrate into calcium oxalate dihydrate, which is more soluble [liii, liv, lv, lvi]. Calcium oxalate mono-hydrate is the most stable form while di and tri hydrate are less stable and more soluble in urine [lvii].

Clinical Study: In a randomized double-blind placebo controlled clinical trial, to assess the safety and efficacy of Badrashma on calcium kidney stones and some related biochemical factors in blood and urine, 60 patients older than 18 years with renal stones 5 mm or bigger kidney stone disease were enrolled. A group of 30 patients received daily dose of 2 gm of Badrashma

powder for 10 weeks, and another group of 30 patients received a placebo for same period. Ultrasonography was performed on patients, blood and urine samples were collected before and after the study to evaluate the efficacy and safety of Badrashma in calcium kidney stone patients. Badrashma powder completely dissolved the stone in 9 patients and significantly reduced the size of stone. Moreover, urine calcium concentration and specific gravity were reduced and urine magnesium was increased. Badrashma did not affect BUN, creatinine, ALT, or AST [lviii]. Similar type of study was conducted on same arm and sample size with Cystone, in which is Badrashma containing compound on patients having renal calculi of 5mm to < 12 mm. They received either 2 tablets of Cystone or placebo, twice daily for a period of 12 weeks. Clinical symptoms including frequency of micturition, hematuria, and tenderness over kidney, ureter and bladder (KUB) were improvement. Significant reduction in urine RBC, WBC and serum uric acid was observed in patients receiving Cystone. Statistical analysis displays that expulsion of kidney stones in 66.7% of the patients with in an average time period of 12.3 days. The results revealed that minimum 15 days treatment with Cystone is effective in patients having smaller renal stones [lix]. On contrary to this Cystone was been not effective in treating the recurrent renal stones. The two phased clinical study was carried out on ten recurrent calcium oxalate type of kidney stone. In the first phase a randomized double-blinded 12 weeks crossover trail was evaluated the effect of Cystone vs. placebo on urinary super saturation. While the second phase was an open label one year study that determined the effect on renal stone recurrence with Cystone. The results revealed that effect of Cystone on urinary composition is not significant [lx].

6. Trunakanta: Kehruba is Persian term for a substance which attracts dry grass or fodder after rubbing. Similarly, Trunkanta is Hindi term with similar meaning. Succinum is Latin term for a substance that is ultimately derived from sap (succus is meaning for juice or sap). It originates from the resin of ancient and long-extinct trees, including conifers, Fabaceae and other genera. Ambar is Arabic word, also call ambergris or grey amber (a secretion from whales found in small lumps washed up on the beach) [lxi]. This is a resinous exudate substance from rocks, solidified into semi-translucent and semitransparent stone; it is used as a minor gem stone. It is available in Varma, Rumaniya and Itly, In India Travankor, Kacha, Valtiksamudra and Nikobar [lxii]. Colour of Trunkanta is Swetta Pandu (whitish pale) and Peetabha Rakta (Yellowish red) Varna is mentioned in Ayurvedic texts [lxiii].

Synonyms: Trunakanta, Trunakantamani, Trunagrahi [lxiii].

Vernacular names: Sanskrit: Trunakanta; English: Amber; Pharsi: Kahrubaa; Latin: Succinum; Hindi: Trunakant, Kehrubaa[xi].

Shodhana and Marana process is not mentioned in any classical text. Pisti is used in the form of basic formulation.

Pishti: The stones are crushed to a fine powder, triturated along with rose water or Kevda (*Pandanus odoratissimus*) water for 3-4 days, results in Pandur Varna (pale colour), Sukshma (very fine powder) Pishti [xi].

Pishti properties: It is used in urinary disorders, feebleness of the heart and hemorrhagic disorders [lxiv].

Pishti Dose (Matra): 2-4 Ratti (250-500mg) with Madhu (honey), Makhana (raisins) and Mishri (sugar candy) as Anupana [lxv].

Physical Properties: Transparency: Semi-translucent; Melting point: 300° C; Hardness: 6 to 7.25; Sp. Gr.: 1.1[lxiv].

### Study on Trinkanta Mani Pisti [lxvi]

Pharmaceutical study: Pisti is basic formulation of Trinkant Mani. It Shodhana was done by washing in Ushana Sandhav Yukta Jal (lukewarm saline water). 1 liter saline is enough for cleaning and washing of Trinkant mani in 3 phases. After Shodhana 1.5 % lose was found. Pisti formation requires 7 Bhavana (wet trituration) of Taruni Parisut Jal (Rose Water). Increase in weight was also found 1.84 %.

Microbial Load study: All four Bile resistant bacteria *Escheria coli*, *Salmonella*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* were not found in any sample. Total fungal count was not observed and Total bacterial count of all three sample after 5 day of was 23.6, 25.4 and 24.2 cfu/ml/gm respectably which quite small in permissible limit.

Physico-Chemical characterization: These parameters of Trinkant mani and two samples of Trinkant mani Pisti given in table 4 first sample is prepared by researcher itself and other was market sample. Parameter for characterization of sample was pH, Loss on drying, total ash, acid insoluble ash; water soluble extractive and alcohol soluble extractive were studied. Elemental composition was determined by SEM-EDAX which is illustrated in table 5

**Table-4: Physico-chemical parameters of Trinkant Mani & its Pisti**

Samples	Physico-Chemical Parameters					
	pH	LOD	TAV	AIA	WSE	ASW
Raw Sample	6.08	1.38 %	0.54 %	0.035 %	0.83 %	10.47 %
Research Sample	6.65	1.09 %	0.66 %	0.037 %	2.90 %	14.79 %
Market Sample	6.73	1.72 %	0.74 %	0.23 %	2.47 %	15.67 %

**Table-5: Elemental Evaluation of Trinkant Mani by EDAX**

Elements	Research Sample		Market Sample	
	wt %	at %	wt %	at %
C	80.56	83.88	85.19	88.31
O	15.45	11.91	14.89	11.57
Ratio	5.21	7.04	5.72	7.63

Xrd Study: It revealed that it was a mixture of four type of organic compounds viz, Benzophenone ( $C_6H_2$  CO, monoclinic Acetylsalicylic acid  $C_6H_4COHCO_2CH_3$ , catechol  $\beta$ -D Glucose  $C_6H_{12}O_6$ .

## 7. Akeek

Availability: In India Rajpipla area and further west between the mouths of river Tapti and Narmada in Bharuch district, Gujarat. Other occurrences are known at Amaravati, Aurangabad, Buldhana, Chandrapur, Jalna, Nasik and Pune in Maharashtra, beds of Krishna and Godavari rivers in Andhra Pradesh, Rajmahal and Sahebganj in Bihar, Dhar and Mandsaur in Madhya Pradesh and Jamnagar, Kutch and Surat in Gujarat [lxvii].

Colour: Varna of it has very wide range such as, Dugdhabh (milky white), Peetabh (yellow), Raktabh (reddish), Eshat Neel (Blue), Dhushar (Grey) and Raktav (Blood red) [lxviii].

Vernacular names: English: Quartz, Chacedony Hindi: Akeeka Punjabi: Mank, Akeeka Urdu: Aqeeq [lxvii].

Shodhna: Heat Akeeka till it becomes red-hot and quenching in Gulaba Jala or Arka, Vedamuška or Go-dugdha for 21 times [lxvii].

Marana: Sukshma Churna (fine powder) of Akeeka by triturated (Bhavana) of Gulaba Jala or Arka, till the appearance of Subhavit Lakshan (characteristic

feature of completion of Bhavana process). Round and flat Chakrikas (pellets) is prepared. After proper drying of pellets, it was placed in Sharava (earthen pot) and covered with another Sharava. The prepared mud smeared Samputa is subjected into Gajputa.

Pharmacological Properties: - It has Ruksha in Guna and Sheeta in Veerya properties, Rakta Stambhi, Dantadardhya and Vrisya in Karma [lxix].

Pishti: Akeeka grinded with rose water for 3-4 days, results is Raktabh -Varna (red in colour), Slakshana (smooth) and Atisuksma Pishti is prepared.

Dose (Matra) - 2-4 Ratti (250 -750 mg).

Physical Properties: Nature: Banded; Colour: White; Streak: White; Fracture: Conchoidal; Lustre: Waxy; Tenacity: Brittle; Transparency: Sub-translucent; Hardness: 6 to 7; Sp. Gr.: 2.5 to 2.65[lxvii].

Study on akeeka:-[lxx]

**Table-6: Physico-chemical parameters of Akeeka, after Shodhana and its Pisti**

Sample	Physico-chemical Parameters				
	pH	Ash value	AIA	WSA	LOD
Raw Akeeka	7.84	99.0 %	97.50 %	2.00 %	0.15 %
Sudha Akeeka	7.78	99.0 %	98.80 %	0.5 %	0.50 %
Akeeka Pisti	6.87	48.50%	14.50%	33.00%	1.90%

**Table-7: Elemental Evaluation of Akeeka by EDAX**

Element	Raw Akeeka		Sudha Akeeka		Akeeka Pisti	
	wt %	at %	wt %	at %	wt %	at %
Si	69.47	56.45	61.1.	47.22	30.72	19.22
O	30.53	43.55	38.90	52.78	29.26	32.10
Ratio	2.27	1.29	1.57	0.90	1.05	0.60

Xrd Study of Akeeka: Raw sample of Akeeka has  $\alpha$ -quartz which has hexagonal crystalline geomatery. After Shodhana cubical shape Silica was in major phase and hexagonal shaped  $\beta$ -quartz was in minor phase. Akeeka Pisti has hexagonal shaped Quartz, Quartz high and Silicon dioxide.

## DISCUSSION

In 17<sup>th</sup> century, author of Ayurveda Prakash first time included Sikata is in the Rasa Dravya but most accepted categorization was done in Rasamritam of 20<sup>th</sup> century, i.e. Silica compounds on the basis of their chemical composition. This classification was also accepted by Rasa Mitra, Rasa Darpan and Rasa Bindu, but view of Rasa Darpan was very different than the previously mention all three authors due to acceptance of Dugdhapashan. Table 1 clearly shows that Sikata varga is primarily contains silica and oxygen and secondarily contains magnesium and calcium. Trunakantamani and Akeek are included in gem or semi-precious stone. Trunkant mani is absolutely organic compound, so it can't get place in Sikata Varga. Very little work was done on the Dravya of Sikata varga. Badarashma is only Dravya which has Physico-chemical and Pharmacological data. In Unani system of medicine all these Dravya are used. Due the soft nature of compound and influence of Unani system of medicine most of these Dravyas are used after formulating into Pisti. Another reason is cold and dry temperament of Dravya because Marana increases the dryness. Sikata is used as accessory material in various Yantra (Instruments) and procedure. It is not used for

medicinal purpose except external application in hot fomentation [xiii]. Dugdhapasana and Kausheyashma have important role in styptic action. So, it is used in bleeding dyscrasias. Nagapashana is known as Jahara mohara in Ayurveda and used in cardiovascular diseases. Characteristic and analytical profile of Badarashma is mentioned in National Formulary of Unani Medicine (NFUM). Badarashma is first choice of treatment in Renal Colic and Stone in Ayurveda and Unani System of Medicine. In Unani System Badarashma Pisti is basic formulation but Bhasma of it is also used. But the procedure of Making Bhasma is very different in both systems. Bhasma is made by triturating it with root [of Raphanus sativus L., while this step is performed with its leaf juice [xlvi]] in Unani system of Medicine. In Unani medicinal system it is also used in the blood and skin disease. It is good nephrolithiasis is proven by in-vitro method and Clinical trials. This medicine is not suitable for patient of hepatic disorders. Akeeka is equally important medicine in nervous and cardiac diseases. Akeeka is only discussed medicine get the place in Ayurvedic Pharmacopeia of India (API vol 8<sup>th</sup>).

## CONCLUSION

Medicinal use of Sikata varga starts since Samhita Period. But in the various texts book of medieval period considerable use of Sikata or silicate containing used in treating disease and iatrochemistry. A separate group of Sikata along with group of metals and minerals were found place in classical text of Rasa Shastra. But name and counting of Sikata members are

varied in all text. Though some author placed semi-precious stone like Akika in Sikata group and Trinkant mani is also kept in Sikata Varga, which is purely organic compound. All these drugs are also frequently used in Unani system of medicine. Most of the formulation is used in the form of Pisti not in Bhasma because melting point is low and softness in nature. In spite of great use in traditional use in folk medicine, very few researches done on physicochemical characterization, toxicity study, preclinical and clinical efficacy evaluation. Most surprising fact is that the drugs of this group are easy to avail, economical to formulate and has great therapeutic potential but its clinical applicability is very little due to lack of official data on efficacy and safety. Badarashma is only drug of Sikata group which is studied in details in all aspect.

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