



ORIGINAL RESEARCH PAPER

Ayurveda

“QUINTESSENCE OF SILICON COMPOUNDS IN AYURVEDA- SIKATA VARGA”

KEY WORDS: Sikata varga, Silicon compounds, Ayurveda, Parada bandhas, Rasashastra.

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ABSTRACT

Rasa Shastra forms the core of the Ayurvedic treatment that predominantly deals with mercury and a huge number of metals, minerals and even animal products having therapeutic as well as alchemical importance. Rasa Shastra grouped metals and minerals depending on similar composition/properties to different “Vargas” (groups). Sikata varga are silicon compounds group of 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; binding of mercury (Parada bandhas) as well as internal administration were enumerated. Authors of 20th century have grouped these drugs under a specified class called Sikata varga. The current work is a quintessence of the Sikata varga dravyas, their classical references till date; inclusive of related modern aspects of this group.

Introduction:

Sikata varga includes Sikata, Dugdha pashana, Kausheyashma, Naga pashana, Badarashma.

Types, grahya lakshanas, shodhana and marana of Sikata are not mentioned

Table-1: Enumeration of Sikata varga dravyas

Name	Common name	Origin	Chemical constituent
Sikata	Sand	Earth material	SiO ₂
Dugdha pashana	Talc	Mineral	H ₂ Mg ₃ (SiO ₃) ₄ or Mg ₂ Si ₄ O ₁₀ (OH) ₂
Kausheyashma	Asbestos	Alkaline-Earth mineral	Mg ₃ Si ₂ O ₅ (OH) ₄
Nagapashana	Serpentine	Mineral	(Mg,Fe) ₃ Si ₂ O ₅ (OH)
Badarashma	Rock fossil	Mineral	Si ₂ CaO ₄
Trunakantamani	Amber	Resinous exudate	C ₁₀ H ₁₆ O

Properties: Sweet in taste (madhura), cold (sheeta), useful in burning sensation of skin (santhapa nasha), relieves tiredness (srama nasha), regulates Vata (sakha shritya anilapaha), scrapping of debris of wounds (lekhani, Vranagna).

Utility: Sikata is used as an Upakarana in Rasashala. It is used as a medium in Valuka yantra, Valuka puta and Bhudhara puta. In mixture of sand and loha (metals/iron), loha can be separated from sand using magnet before further processing. Sikatavalehya is prepared with white sand in 1 Prasrita (96 gm) quantity. Other ingredients like oil, ghee, honey, vasa and majja are to be taken in equal quantity along with Gruha dhuma (soot) and Triphala leha in equal quantity. All these ingredients are to be mixed well till the consistency of avaleha is obtained. Sikatavalehya is indicated in haemoptysis (rakta sthivana), bronchiectasis (urakshata) at a dose of 3-6 grams with milk as adjuvant. Scattered references of Krishna mrittika are also found.^[1,2]

Antiquity:

In Purana Kala, texts like “Shathapatha brahmana of Prajapathi”, states the “transformation of sand (Sikata) to gold (Hiranya), which infers the existence of the concept of conversion of metals (Loha veda), since Vedic period.

Sikata → Sharkara → Ashma → Ayas → Hiranya

The scattered references of Sikata, Kachaare present in classical texts like Ananda kanda, Ayurveda Prakasha and Rasendrapuranam. “Sikata varga” was mentioned for the first time in the text Rasamritam. This classification was done based on chemical composition as “silicon compounds”.^[1]

Sikata: It is commonly known as Valuka/Baluka. It is used in valuka yantra and also in Kupipakwa as a media. Silicon stones, when taken through the streams of rivers convert into white sand particles on breaking and that are known as Baluka. White sand particles are pure whereas yellow and red colour is due to the mixture of iron or minerals in sand.

Synonyms: Sikata, Sikta, Baluka, Baloo, Retha, Rethi, Rethaja, Rega, Beloo, Ramala, Sainda, Sharkara, Pravaha janitha, Paneeya churnaka, Sukshma.^[1,2]

Vernacular names:

- Sanskrit : Sikata, Baluka
- English : Sand
- Latin : Silica
- Hindi : Balu, Reta
- Arabi : Ramala
- Pharsi : Rega
- Marathi : Reti, Balu

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. The larger size class above sand is gravel. Sand particles range in diameter from 0.0625 (or ¹/₁₆ mm, or 62.5 micrometres) to 2 mm. An individual particle in this range size is termed a sand grain. The next smaller size class in geology is silt. Sand feels gritty when rubbed between the fingers (silt, by comparison, feels like flour). Sand is commonly divided into five sub-categories based on size: very fine sand (1/16 - 1/8 mm diameter), fine sand (1/8 mm - 1/4 mm), medium sand (1/4 mm - 1/2 mm), coarse sand (1/2 mm - 1 mm), and very coarse sand (1 mm - 2 mm). The most common constituent of sand, is silica (silicon dioxide, SiO₂), usually in the form of quartz, which, because of its chemical inertness and considerable hardness, is resistant to weathering. Some sands contain magnetite, chlorite, glauconite or gypsum. Sands rich in magnetite are dark to black in colour, as are sands derived from volcanic basalts and obsidian. Chlorite-glauconite bearing sands are typically green in colour, as are sands derived from basalt (lava) with high olivine content.^[3]

Dugdha pashana: Dugdha pashana was described by the authors of 20th century in texts Rasa Tarangini, Rasendra Sambhava and Rasamritam.

Synonyms: Dugdha pashana, Dugdha pashanaka, Dugdha, Dugdha Shila, Ksheera kshava, Vajrabha, Deeptika, Soudha, Gomedha Sannibha, Dugdhopala, Dugdha Drusha, Dugdhi

Vernacular names:

- Sanskrit : Dugdha pashana
- English : Talc, Magnesium Silicate (MgSiO₃), Soft stone
- Hindi : Sange jarahat
- Marathi : Sankha jiru
- Panjabi : Dugdhapathari
- Arabi : Hajruljarahata

Pharsi : Sange Jahahata
Sindhi : Singa jiro

Incineration: It is to be triturated with rose water and subjected to Gaja puta to obtain best quality bhasma.

Properties: Sweet in taste (madhura), effective in fever (jwarapaha) and Pitta disorders, reduces burning sensation of skin (twakdaha) and distension (aadmana), heart diseases (hrudayamaya hara), improves taste (ruchya), colic caused by Pitta (Pitta shula vinashini), effective in cough and dyspnoea (Kasaswasa hara), styptic in bleeding wounds (Vranaropaka, Shonitha sthapanana), effective in diseases of teeth-pyorrhoea-bleeding gums (Danta roga hara).

Utility: Application of (lepa) of Dugha pashana with alkaline preparation of barley (Yava kshara) along with water is indicated in conditions like pityriasis alba (sidma kusta) patches. 125mg of Dugha pashana with either water or milk would help in relief of fever (sayankala samuttitha manda vega Jwara). Dusting powder of Dugha pashana over traumatic (abhigataja vranas), bleeding injuries (sadhya vrana) helps arrest bleeding. Dugha pashana along with curd is helpful in diarrhoea and dysentery. In wounds 8 parts of Dugha pashana and 1 part of Khunakharaba and 1 part of Rasakarpura are mixed in 20 parts of Sikata taila to be used as ointment for healing and cleansing of wounds. In stomatitis and bleeding gums (Mukha and Danta rogas) a tooth powder made by mixing 4 parts of Dugha pashana, 1 part of laghu Ela, 1 part of Kavabachini, 1 part of khadira satva and 2 parts of Bakula bark is indicated. In Raktha pitta, Dugha pashana mixed with Nagakesara and Khunakharaba in equal parts are made into powder form to be used as styptic drug.^[1,2,4-7]

Talc is a mineral composed of hydrated magnesium silicate with the chemical formula $H_2Mg_3(SiO_3)_4$ or $Mg_3Si_4O_{10}(OH)_2$. In loose form, it is the widely used substance known as talcum powder. It occurs as foliated to fibrous masses. It is sectile and very soft, with a hardness of 1. It has a specific gravity of 2.5–2.8, a clear or dusty lustre, and is translucent to opaque. Talc is not soluble in water, but it is slightly soluble in dilute mineral acids. Talc is a metamorphic mineral resulting from the metamorphism of magnesium minerals such as pyroxene, amphibole, olivine and other similar minerals in the presence of carbon dioxide and water. This is known as talc carbonation or steatization and produces a suite of rocks known as talc carbonates.

Serpentine + Carbon dioxide Talc + Magnesite + Water
 $2Mg_3Si_2O_5(OH)_4 + 3CO_2 + Mg_3Si_4O_{10}(OH)_2 + 3MgCO_3 + 3H_2O$
Dolomite + Silica + Water Talc + Calcite + Carbon dioxide
 $3CaMg(CO_3)_2 + 4SiO_2 + H_2O \rightarrow Mg_3Si_4O_{10}(OH)_2 + 3CaCO_3 + 3CO_2$

Uses:

Talc finds use as a cosmetic (talcum powder), as a lubricant, and as filler in paper manufacture. Talc is used in baby powder, an astringent powder used for preventing rashes on the area covered by a diaper (see diaper rash). In medicine talc is used as a pleurodesis agent to prevent recurrent pneumothorax.^[8]

Kausheyashma: This drug was described in texts Rasamritam and Rasendra Vignana. It is a compound of Calcium magnesium silicate.

Vernacular names:

Sanskrit : Kausheyashma
English : Asbestos
Hindi : Resmi patthar
Pharsi : Sange resam
Telugu : Ratinara

Properties: It is a soft stone having yellowish or reddish white colour just like the threads of silk. It is a bad conductor of heat, hence may be used for protection from fire, in form of cloths. It is also a compound of magnesium silicate. In South India it is used for making tooth paste.

Purification process of Kausheyashma was not mentioned

Pishti: Pieces of Kausheyashma are to be triturated with rose water, for 3-4 days so that a soft paste consistency is obtained.

Incineration: Kausheyashma is to be triturated with aloe pulp and kept in mud plate and subjected to Gaja Puta. 4-8 such putas are required to obtain white colour Bhasma. Its Purification, incineration and pishti are similar to that of Mukta (pearl).^[9]

Properties and utility: Danta manjan is prepared with Kausheyashma as ingredient, indicated in teeth and gum problems (danta rogas, danta shitalya, danta puya). It is also used in Raktodgama, Puyodgaram, pyorrhoea, Prameha and Pradara rogas. It increases beauty and strength of body. It cures fever, asthma, cough, pain in chest region. It is sheeta veerya, rakta pitta nashaka and rakta sthambaka. Internal administration is done at a dose of 4-12 grains in a day; 2-4 ratti (250-500mg) with milk and water as adjuvant.^[1,2,4-7]

Magnesium silicate is a lightweight, very ductile, malleable, silver-white, metallic element with atomic number 12 and relative atomic mass 24.305. It is one of the alkaline-earth metals and the lightest of the commonly used metals. Magnesium silicate, carbonate, and chloride are widely distributed in nature. It is a necessary trace element in the human diet, and green plants cannot grow without it since it is an essential constituent of the photosynthetic pigment chlorophyll ($C_{55}H_{72}MgN_4O_5$). Asbestos is a naturally occurring silicate mineral with long, thin fibrous crystals. Asbestos is known to have toxicity. Inhalation of toxic asbestos fibres can cause serious illnesses, including malignant mesothelioma, lung cancer and asbestosis.^[10]

Nagapashana is a compound of Magnesium silicate.

Synonyms: Nagapashana, Nagashma

Vernacular names:

Sanskrit : Nagapashana, Nagashma
English : Serpentine, Ophite
Pharsi : Jahara mohar
Arabi : Phada jahar madani
Telugu : Salagrama sila

Properties and utility: It is Harita, Peeta and Swethabhi yukta varna, smooth and light stone having yellowish or greenish white colour. It is available in China, Tibet, Ladakh, Gadhawal and Nepal mountains. It acts as Yakruith vyadhihara, Medhya, Hrudhya, Snigdha, Laghu, Rooksha, Ushna, Saumanasya janana, Hrudhya, Mastishkya, Yakruith balakar, Ojovardhaka, Visha hara, Atisara hara in kauma, Hrudhaya dhourbalya hara and Vamanahara. Internal administration is given at a dose of 2-8 ratti (250mg-1gm) with rose water or milk as adjuvant.^[1,2,4-7]

Pishti: Purification and incineration process are not mentioned. Nagapashana is to be triturated with rose water, for 3-4 days till the soft paste consistency is obtained.

Serpentine ($Mg,Fe_3Si_2O_5(OH)_4$), Magnesium iron silicate hydroxide. Serpentine is a major rock forming mineral and is found as a constituent in many metamorphic and weather igneous rocks. It often colours many of these rocks to a green colour. Serpentine's structure is composed of layers of silicate tetrahedrons linked into sheets. Between the silicate layers are layers of $Mg(OH)_2$. These $Mg(OH)_2$ layers are found in the mineral brucite and are called brucite layers. It is olive green, yellow or golden, brown, or black. Greasy, waxy or silky, crystals are translucent and masses are opaque, hardness is 3 - 4.5 with specific gravity 2.2-2.6.^[10]

Badarashma: Its shape resembles the Jujube fruit, hence the named so. The stone is tapering on both ends, grey in colour, with lines on surface. It is tasteless and odourless. From inside, the colour of the stone is greenish-white. Chemically it is composed of lime and grit.

Synonyms: Ashmabhid, Badrashma, Badaripashana, Pashana badara.

Vernacular names:

Sanskrit	: Badarashma, Ashmabhid,
English	: Fossile Norinite, Fossile Encrinite, Silicate of lime
Arabi	: Hajrul yahud, Hajrujaitun
Pharsi	: Sange jahudan, Sange yahud
Unani	: Yahuda, Hajaratbera
Hindi	: Bera patthar, Hajarath ber, Hajarath Jahoor, Pattharver
Gujarati	: Hajarat bora

Properties and utility: This is a round or oval-shaped, grey coloured, fruit-like rocky fossil that originates from stone. This has rough surface with longitudinal striations. This breaks easily on pounding. Small ones look like cardamom fruit, while big ones 1-2 inches' length and 1/2 inch width appears like zzyphus fruit. This contains silica and lime. Si_2CaO_4 . It is available in Arabian countries, Egypt and Syria. It is imported from Arab countries to India and commonly used by unani physicians.

Purification: It has to be heated red hot and then dipped in decoction of horse gram (Kulattha kwatha) or in radish juice for seven times, taking care not to allow the pieces to get shattered.

Pishti: Badarashma grinded with rose or sandal water for 3-4 days' results in white (swetha varna), smooth (slakshana) and that floats on water (varitara pishti). It can also be prepared with kadali stambha juice or radish juice by grinding it for seven days.

Incineration: Trituration of Badarashma with aloe pulp (kumari swarasa) is done to obtain pishti and then subjected to Kukkutardha Puta.

Properties and utility: Mutrala, Pitta shaman, Ashmari bhanjaka, Vantigna, Hrith shula hara. It is choicest remedy in urinary disorders associated with burning sensation, frequency and difficulty of urination. It works well in oliguria, anuria, dysuria and in renal calculus. Internal administration of drug is prescribed at a dose of 500mg-1gm (4-8 ratti). Kadalikanda rasa, water or milk or rose water or sandal wood water is used as adjuvant.

Ela panchaka churna: Sukshma ela beeja, Pashana Bheda, Shilajatu, Pippali and Badarashma pisti of equal quantities are taken and used in a dose of 4-8 Ratti for 2-4 times per day would be very beneficial in cases of mutra kruchra, ashmari shula, sharkaradi disorders. In urinary obstruction, the paste of Badarashma is applied on the supra pubic region.^[1,2,4-7]

Trunakantamani:

Synonyms: Trunakanta, Trunakantamani, Trunagrahi

Vernacular names:

Sanskrit	: Trunakanta
English	: Amber
Pharsi	: Kahrubaa
Latin	: Succinum
Hindi	: Trunakant, Kehrubaa

Physico-chemical properties: This is aresinous exudate substance from rocks, solidified into reddish semitranslucent and semitransparent stones, it is used as a minor gem stone. This is used by Unani physicians for medicinal purposes; contains succinic acid with hardness 2.5 and specific gravity 1.1. This has a smooth feel but is stony hard; can be cut with knife, melts at about 300°C; burns on direct exposure to flame. This resinous stone attracts grass on rubbing against any cloth. It also emits lemon-grass odour while rubbing against cloth. Since this attracts dry grass it is named "Kah-ruba" in Pharsi language (Kah-dry grass; ruba-that which attracts). Trunakanta is the Sanskrit version coined by the Ayurvedists which has the same meaning Truna means grass and Kanta that which attracts. This is available in Myanmar, Italy, Romaina.

Pishti: The stones are pounded to a fine powder, ground along with rose water and used in urinary disorders, weakness of the heart and haemorrhagic disorders.^[2]

Discussion:

Transformation of Sikata to Hiranya, the transformation of Sikata to Sharkara, Sharkara to Ashma further to Ayas and Ayas to Hiranya is part of Loha veda, special aspect of Rasashastra along with Dehaveda. On the basis of particle size, sikata contains Sharkara, Ashma and Ayas mixed along with sand. It denotes the presence of metals and minerals in sand, ex: Sand is rich in magnetite cause dark or black in colour and chlorite and glauconite are typically green in colour. The Drug Kausheyashma is correlated to asbestosis (Tantupashana), in present day it is widely used in Epilepsy, which is most effective. Kacha (glass) is silica compound mentioned in the classics, though not exhaustively. Trunakantamani is listed in uparatnas (semiprecious stone) by few authors and few others consider under Sikata varga, though is not silicon compound. Hence it may be included in uparatnas than in Sikata Varga.

Conclusion:

In the classics of Rasa Shastra, the scattered references of Sikata varga can be found in the context of Lohaveda. The classification of Sikata varga was done in Rasamritam of 20th century on the basis of their chemical composition i.e. Silica compounds. As far as in the Dehaveda concept, Sikata varga though has medicinal value its clinical applicability is less. Sikata plays a needful role in the conventional methods of processing the drugs like in Kupipakwa Rasayana. Sikata varga dravyas also have medicinal value that need to be explored with supportive research.

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