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A CRITICAL REVIEW OF HARITALA DESCRIBED IN RASASHASTRA

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ABSTRACT

Haritala is an important mineral described in Rasashastra. According to Rasa Ratna Samucchaya it comes under Uparasa category. The main aim of this article is to explore and elaborate information and concepts related with Harital. For this purpose various Rasa texts, Samhita, sources from various web sites from internet have been used as materials and all the information has been collected and categorized in to various categories. Literary Study of Harital from vedic period, Samhita period, Rasa period has been carried out by observing various texts. Various types of Haritala, various purification methods, process of marana, different opinions regarding rasa, vipaka, veerya, gunas of Haritala along with properties and therapeutic activities have been studied and discussed. Details of this has been given in the research article.

KEYWORDS: Rasashastra, Harital, Shodhana, Marana, Orpiment, Arsenic.

INTRODUCTION

Hetu, Linga and Aushadha these are basic pillars of Treatment. In ancient Ayurveda the more emphasis was given on Herbal originated Drugs it means the organic source of medicines i.e. the herbal medicines were in use and when the limitations of these herbal medicines were noticed then inorganic substances like Metals, Minerals were introduced along with herbs and animal originated drugs. After that Rasashastra the main branch of Ayurvedic Pharmaceutics was introduced in which main importance was given to Parada i.e. Mercury. Along with

Mercury other minerals were also involved in the manufacturing processing of medicines. The minerals were classified as Maharasa, Uparasa and Sadharana rasa on the basis of various criteria. According to Rasa Ratna Samucchaya, Harital is an important mineral described under Uparasa category. Mythologically Harital is considered as Harerbijam and Mineralogical, the substance Harital is equated with the orpiment of modern mineralogy. Acharyas described properties of Haritala as Kushtahara, Vishahara, Bhutabadhahara, vranahara etc Orpiment is a photosensitive mineral. Due to the instability of Orpiment, specimens should be stored enclosed and covered to prevent their exposure to light.

Orpiment and realgar have quite different chemical features and solubility from arsenolite/arsenic trioxide. The bioavailability of orpiment and realgar are low, but arsenolite/arsenic oxide is high.

AIM AND OBJECTIVES

1) To re-evaluate, discuss and elaborate the various information and concepts related to the mineral Haritala.
2) To understand the various shodhan and Marana processes of Haritala given in various text books of Rasashastra.

MATERIAL AND METHODOLOGY

This article is based on a review of Ayurvedic texts, Rasagranthas. Materials related to the derivation of Haritala and all related information related to Haritala is collected.

The main Ayurvedic and Rasagranthas or texts used in this study are Charakasamhita, Rasaratnasamucchaya, Rasatarangini, Rasendrasarasangraha, Rasayogasagara, Rasachandanshu, Ayurved prakash and available commentaries on these texts. We have also referred to modern books and searched various websites and Research Articles to collect information on the relevant topic.

Historical Background

Vedic Period

Vedic literature is not only having certain references of Haritala but there are descriptions regarding the use of Haritala for different purposes. Rig-Veda has given the use of Haritala in creating artificial rain. In Atharvaveda, Haritala is used for treating sexually transmitted diseases.

Samhita Period

In Ayurvedic literature, Brihatrayi has abundantly used Haritala for the treatment of several diseases. In Charak Samhita Haritala has been used for the treatment of kushta, unmada, swasa, kasa and in visa.[1] Moreover it is used for external application in skin diseases and for Murdha – virechana. Susruta has used Haritala in the treatment of diseases like vrana, upadamsa, arsa and ksudrarogas.[2] It is used for the purpose of Vrana shodhana Lomashatana, in diseases of eye, ear and in grahapida. Astanga Hridaya has also shown somewhat similar uses of Haritala. It is used in the treatment of Kushta for vranacurnana, lepa and preparation of oil in svitra for savarnatakarana, in Vricchikadamsa for lepana[3], in Nasaroga for nasavarti and so on. Acaryas of later period have followed Brihatrayi and it is observed that they have increased the use of Haritala.

Rasa Period

The Rasa Granthas like Rasa Ratnakara, Rasachintamani, Rasa Sara, Rasendra Sara Sangraha and Rasa Prakasha Sudhakara of later period have given detailed description about theorigin, varieties, blemishes and therapeutic uses of Haritala.

Origin of Haritala

Mythologically Haritala is considered as Harerbijam and some has opined as sexual pleasure of Lord Siva. Minerologically, the substance Haritala is equated with the orpiment of modern mineralogy. Mineral Orpiment crystallizes in monoclinic system and distinctly prismatic with orthorhombic habit. It is usually in foliated or granular masses, sometimes as crusts.[4]

Table no. 1: The No. of Yogas present in different texts.

Sr.No.	Textbook	No. of Yogas
1.	Charak Samhita	13
2.	Susruta Samhita	28
3.	Astanga hridya	19
4.	Rasayogasagar	708
5.	Bhaishajya ratnavali	136
6.	Rasa Ratna Samucchya	54
7.	Rasendra Sara Sangraha	79
8.	Siddhabheshaja Manimala	02
9.	Rasendra Cintamani	34
10.	Yogaratnakar	17
11.	Modern Texts	66
	In all total no. of yogas	1156

Vernacular Names

Indian languages[5]

1) Hindi – Haritala, 2) Marathi– Haratala, 3) Guajarati– Haratala, 4) Bengali– Hartala, Hatel, Vasaputihartala, Hatil varki, 5) Punjabi– Hartala, Vansapatri hartala, Hattil pili, 6) Udiya – Haritala, 7) Tamil– Arridrama, Yelli kuda pasanandam, 8) Telugu – Daddi pasanam, 9) Kannada – Haridala, Haritala, Aradala, 10) Assami- Haritala.

Other languages

1) Arabian - Janikhe aspher[5], zarda Urasanigum, Zunikhazard, 2) English - Yellow Arsenic, orpiment, yellow arsenic Sulphide, 3) Latin - Auripigmentum, 4) Burmi - Hsaydan, Sheuaguea, 5) Europe - Auri Pigmentum, 6) Pharacy - Janikhe zard.

Synonyms

The synonyms of any substance in Ancient Literature specially in Sanskrit Literature have been considered as a reliable source of knowledge for identifying the substance and they are even helpful in resolving the controversies and so important for standardization.

Sanskrit Names and Their Vyutpattayah

1. Alati- Used for beautification of dancers.
2. Kanakprabham- Resembles with shining of gold.
3. Gaurilalitam[5] -Resembling with turmeric.
4. Talam[6]- Replace decomposed tissue and regains luster, health etc.
5. Pinjaram[5]- Exhibiting yellow color used for Rasa bandha.
6. Pitta gorochanam[5]- Resembling with yellow Gorochanam.
7. Mallagandhajam- Originated from combination of arsenic and sulphur.
8. Romashatanam- Removes hair.
9. Vangari- Kills or incinerates Vanga (tin) as an enemy.
10. Siddhadhatu- Helps in extraction of metals, Ready for destroying the diseases.
11. Haritalakam- Removes several diseases and maintains health.
12. Harerbijam- Originated from Lord Visnu or Indra, Eliminates disease of genetic origin.

Utpatti Evam Prapti

Mythologically Haritala is considered as some has opined as the sexual pleasure of Lord Siva.[7]

Minerologically, the substance haritala is equated with the orpiment of Modern Minerology, the name orpiment is derived from the Latin name 'Auripigmentum' which means 'Gold Point'.

Occurrence

Orpiment is found in India in very small quantities as in Almora district near the border to Bhutan (These mines are not operational). Chitral now a part of Afghanistan is known for Orpiment since pretty long time. Orpiment has been arriving in India from the mines of Iran (Bagdad) and Italy.[8] The countries like Italy, china, Sisley have the mines of both orpiment and realgar. Now a days Haritala is prepared artificially and is used for medicinal purpose.

In classification of Rasadravyas, most of the Acharyas classified, tala under uparasa category. According to Yogaratnakara Hartala comes under Upadhatu.[9]

Table no. 2: Types of Haritala.

Two types – Patra Pinda	**Four types- Patra, Pinda, Godanta, Bakadadi**	**Eight types**
Rasendra Cudamani Rasa ratna samucchya Ayurveda Prakasa, Rasendra sara samgraha, Rasarnava, Rasaprakasa sudhakara, Rasapaddhati, Rasakamadhenu, Dhanwantari Nighantu, Bhavaprakash Nighantu, Rasacandamsu, Rasatarangini	Ayurveda prakasa (commentary) Rasajalanidhi[10]	Saligrama Nighantu

The table no. 3: Differences between the main two types i.e. Patra and Pinda tala.

PATRATALA	**PINDATALA**
Golden colour	Yellow Colour
Lustrous	No luster
Thin layered	No layers, stone like
Quite heavy	Less heavy
Beautiful in look	Not good in appearance
Smooth	Rough
Qualitatively better	Less good
Rasayana, Tridosaghna	Stripushpa
Kushtaghna	Swalpasatwa

1) Patra Tala –Guru, snigdha, thin layered, having Rasayana property.[11]

2) Pinda Tala –No layers, as a solid mass, guru, having less satva and Stripushpahara.[11]

3) Godanti Haritala-The term Godanti shows the similarity of crystal formation with cows teeth.[12]

4) Bakadala Or Tabaki Haritala – Snigdha, Layered, guru, Kusthahara.[12]

Table no. 4: Blemishes Produced Due To Internal Administration of Impure Haritala.

Doshas	R.R.S	Ra.Rt	Ay.Pr	Va.Ra	R.S.S.	Ra.Ka	Bh.Pr	Yo.Rt	Dh.Ni	Ra.Ca	Ra.Ta.	R.J.N.	Ra.Ma	Sa.Ni
Aruchi-kara	-	-	-	-	-	+	-	-	-	-	-	-	-	-
Dahakara	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Tapakara	+	+	+	+	+	+	+	+	+	+	-	+	+	+
Sphota-kara	+	+	-	+	+	-	-	+	+	+	-	-	+	+
Anga-sankoch-kara	+	+	+	-	+	-	+	+	+	+	-	+	+	+
Pidakara	-	-	+	-	-	-	+	-	+	-	-	+	-	-
Kampa-kara	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Todakara	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Kshobh-kara	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Balahani-kara	-	-	-	-	-	+	-	-	-	-	-	-	-	-
vataroga-kara	+	+	+	+	+	+	+	+	+	+	+	+	+	++
Kapha-kara	+	+	+	+	+	+	+	+	+	+	+	+	+	++
Pittakara	-	-	-	-	-	-	-	-	-	-	-	-	-	-+
Angadipti kara	-	-	-	-	-	+	-	-	-	--	-	-	-	-
malini karoti gatram	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Kushta- kara	-	-	+	-	-	-	+	-	-	-	+	+	-	+
Meda- kara	+	+	+	+	+	-	-	+	+	+	-	+	+	+
Meha-kara	-	-	-	-	-	+	-	-	+	-	-	-	-	-
Asma-kara	-	-	-	-	-	+	-	-	+	-	-	-	-	-
Pangutva	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Kara														
Ayur-ghnam	+	+	-	-	+	+	-	-	+	+	+	-	+	+
Deha-nasakara	-	-	-	-	-	-	-	-	-	-	-	-	-	-+
Mrtu-sankakar	-	-	-	-	-	-	-	-	-	-	+	-	-	-

The toxic effects of improperly purified Haritala are Tapakara, Spotakara, Angasankochakara, Pidakara, Vatarogakara, Ayurghna.[13]

Purification of Haritala

Haritala Shodhana is performed by subjecting it to svedana as well as by giving Bhavana and sometimes both. From 18 texts of Rasashastra it is observed that 14 materials are used for this purpose. Their names are arranged as per the number of references using each material.

Table No. 5: Materials used for purification of Haritala and their number of references.

Sr. No.	Name of Material	No. of References
1.	Kushmanda Swaras	15
2.	Kanjika	10
3.	Tilatala	9
4.	Triphala Kvatha	8
5.	Curnodaka	8
6.	Nimbu swaras	6
7.	Tila Ksara Jala	4
8.	Salmali Mula Kwatha	4
9.	Palasa Mula jala	2
10.	Grhadhuma jala	1
11.	Snuhikshara	1
12.	Katukalabu rasa	1
13.	Mahisi Mutra	1
14.	Balamula kvatha	1

It is observed that some Acharyas have prescribed to do purification in two or more liquids. The liquids like Tilaksara jala, Salmali mula Kwatha, Nimbu rasa, Balamula Kwatha are also used by one or two Acharyas for the purification of Haritala either for Swedana or Bhavana.

Purification Methods

Shodhana – 1) By Swedana
2) By Kshalan (washing)
3) By Bhavana

1) Swedana -Haritala curna should be kept in a pottali and this pottali should be placed in dolayantra containing various type of liquids. The dolayantra should be subjected to fire for given time.[14]

2) Kshalan (Washing) -Another method is by adding 1/10th part of tankana, Haritala powder should be washed by Jambira jala and by kanji.[14]

3) Bhavana - Purification can be done by giving Bhavana by prescribed liquids.[15]

Haritala Marana

In all there are 136 references from 32 various texts are available for Haritala Marana. But these are not independent processes, there are several repetitions. Excluding these repetitions with slight changes, 41 references remain as original process.

Table no. 6: Drugs used for Marana according to their origin.

Origin	Name Of The Drugs
Herbal (36)	Apamarga , Arka, Ardraka, Ankola, Eranda, Kantakari, Kakamachi, Kumari, Kulthi, Kusmanda, Guduchi, Gopalika, Cikkani, Tambuli, Dadraghna, Dronapushpi, Dhatura, Nagarjuni, Nimba, Palasa, Palandu, Pippala, Punarnava, Bramhadandi, Bala, Bhringaraja, Malakangani, Rohitaka, Rasona, Vata, Vatsanabha, Sarapunkha, Sigrupatra, Sahacara, Sugandhavala, Snuhi
Metals And Minerals (6)	Curna, Tamra, Navasadara, Parada, Saindhava, Hingula
Animal(6)	Ajakshira, Dadhijala, Mahishimutra, Sukti, Samudraphena, Ksira
Others (2)	Kanji, Grhadhuma

Bhasma Pariksha

Shweta Varna and Nirdhuma Bhasma these two tests are important regarding bhasma pariksha.[16]

Nirdhumatva

This is a special Bhasma pariksha meant for such substances which evolve smoke in the raw form like haritala and Manashila. The state of Nirdhumatva shows that either the evaporative contents are lost during the Marana process or it has been chemically converted in to such a compound which is thermostable.

Table no. 7: Rasa of Haritala.

Text	Rasa	Text	Rasa
Astanga hridaya	Kashaya, Katu	Yogaratnakara	Kashaya, Katu
Rasendra Cudamani	Katu	Dhanvantari Nighantu	Katu
Rasa ratna samucchaya	Katu	Raj Nighantu	Katu
Rasaprakash sudhakara	Katu	Madan Vinoda	Kashaya, Katu
Vasavarajiyam	Katu	Siddha Bheshaja	Katu
Rasendra sara Samgraha	Kashaya, Katu	Manimala	Kashaya
		Rasa Jala Nidhi	Katu
Rasacandansu	Katu	Ayurveda Prakasha	Kashaya, Katu
Rasakamadhenu	Kashaya, Katu,Tikta	Bhavaprakasha	Kashaya, Katu

Table no. 8: Guna of Haritala.

Text	Snigdha	Usna	Guru
Ashtang Samgraha			
RasaChandanshu	+	-	-
Rasa Ratna	+	+	-
Samucchaya	+	+	-
R.P.S	+	+	-
Ayurved Prakash	+	+	-
RasendraSara	+	-	-
Sangraha	+	+	+
Ra.Ka	+	+	-
Va.Ra	+	+	-
Dhanwantri Nighantu	+	+	-
Raj Nighantu	+	+	-
Bhavaprakash	+	+	-
Yogaratnakara	+	+	-
Ma.Vi	+	+	-
Rasendra chudamani	+	+	-
Rasajalanidhi	+	-	-
Rasa.Tarangini	+	+	-
S.B.M			

Table no 9: Karma and Prabhava of Haritala.

Texts/ karmas	Vata hara	Pitta hara	Kapha hara	Rakta hara	Bhuta badha hara	Visa hara	Swasa Hara	Kusht hara	Kandu hara	Mrtu hara	Kanti hara	Virya kara	Vrana hara
Ca.Sa	-	-	-	-	-	+	+	+	-	-	-	-	-
Su.Sa	-	-	-	-	+	+	-	-	-	-	-	-	+
A.Hr	-	-	-	-	+	+	+	+	-	-	-	-	+
Ra.Cu	+	-	+	+	+	+	-	+	-	-	-	-	-
Ra.Rt	-	-	-	-	-	-	-	+	-	+	-	-	-
R.R.S	+	-	+	+	+	+	-	+	-	-	-	-	-
Va.Ra	+	-	+	+	+	-	-	+	-	-	-	-	-
Ra.Ci	+	-	+	+	+	-	-	-	-	+	+	+	-
R.S.S	-	-	-	-	-	-	-	+	-	+	+	+	-
Ay.Pr	-	+	+	+	-	+	-	-	+	-	+	+	+
Ra.Ka	-	+	+	+	-	+	+	+	+	+	+	-	-
Bh.Pr	+	+	+	+	-	+	+	+	+	+	+	+	+
Yo.Rt	+	+	+	+	-	+	-	+	+	+	+	+	+
Dh.Ni	+	-	+	+	+	+	-	+	+	-	-	-	+
Ra.Ca	+	-	+	+	+	+	-	+	-	-	-	-	-
R.J.N	+	-	+	+	+	+	-	+	-	-	-	-	-
Ra.Ta	+	-	-	-	-	-	-	+	-	-	-	-	-
S.B.M	-	+	+	+	-	+	-	+	+	-	-	-	-
Ra.Ni	+	-	-	-	-	+	-	-	-	-	-	-	-
Ma.Ni	-	+	+	+	-	+	-	+	+	-	-	-	-
Sa.Ni	-	+	+	+	-	+	-	+	+	+	+	+	-

Properties of Haritala[16]

Rasa - Almost all acharyas are unanimous in the opinion of taste of haritala as Katurasa. Some have opined Kasaya as Anurasa.

Vipaka - Katu

Virya - Usna

Guna - Snigdha

Doshaghnata - Kaphavatahara, raktadosahara

Rogaghnata – Arsohara, upadamsahara, Katigraha, Kanduhara, Kantikaram, Kasahara, Galagrahahara, Jarahara, Jwarahara, Tvachyam, Nasarogahara, Netrarogahara, Bhutabadhahara, Mukharogahara, Mutrahara, rasayana, Vajikara, Vishahara, Visarpahara, Swasahara etc.

Almost all Acharyas who described about the properties of Haritala have stated the 'Kushtahara' property. Next commonly accepted one is Vishahara, Bhutabadhahara, vranahara, Kanduhara properties come the next some have accounted as Viryakara drug, some have rasayana and vajikara also.

Haritala Satvapatana

Bhavana of kullatha kwatha is to be given to shuddha haritala then equal amount of tankan is added and properly mixed with mahish ghrit and honey. the mixture is kept in a musha having hole and heat is given.[17] White coloured satva of Haritala is obtained i.e. Arsenic.

Considering the therapeutic use of Haritala satva it is not much important as its satva is arsenic.

ARSENIC MINERALS

ORPIMENT

One of the ore of arsenic As_2S_3 (As -60.90%, Sulphur- 39.10%).[18]

Hardness - 1.5 - 2

Sp.gravity - 3.45

Fracture - Quite sectile

Streak- pale yellow

Generally found in crystalline masses.

It has an easy cleavage parallel to one of the side faces of the crystal and can often be split in to thin leaves which may be bent at will. The luster on the cleavage face is pearly, but elsewhere it is resinous.

Inorganic Arsenic In Therapy

This was formerly used extensively and indiscriminately, as an alternative and tonic in nutritional disturbances, neuralgia arthritis, rheumatism, asthma, malaria, syphilis, tuberculosis, diabetes, skin diseases and every kind of blood disturbances. Inorganic arsenic is capricious, unpredictable and uncontrollable both as to good and harm, but the harm is more certain and generally more frequent than the good. The most frequent was in leukemia, anemias and in skin diseases.

Skin – Arsenic is extensively used, externally and internally, to improve the nutrition of the skin and hair and in non-parasitic chronic skin diseases. It should never be used in acute inflammatory conditions. The result are often disappointing.

Pharmacology of Arsenic Compounds

Arsenic Compounds – Organic

Inorganic

1. Inorganic preparations are escharotics and destructive to malignant lesions.
2. Depressant to nitrogenous metabolic processes by inhibiting the chemical activity of the Cells and arresting cell division.
3. At first stimulant, then depressant to bone marrow.
4. Vasodilatation of the skin.
5. Continued administration leads to keratosis.
6. Destructive to Amebae, trypanosomes.
7. Toxic to parenchymatous organs especially liver, kidneys.

Uses

1) As a tonic in debilitating diseases.
2) Arsenic increases the vascularity of bone marrow and the hematinic effects of iron in Anemia.
3) Certain types of chronic eczema, psoriasis benefitted when arsenic used in inorganic Form.

4) As parasiticide, organic arsenicals are useful as- Antisyphilitic, Amoebicidal, Trypanosomacide etc.

5) In leukamias / Eythremia – Arsenic is of value by depressing hyperplastic bone marrow.

Fatal dose – 180-200 mg.[19]

Fatal period – 12-48 hrs.[19]

Organic Compounds of Arsenic

The organic compounds contain arsenic either in trivalent or in pentavalent combination. The organic arsenical compounds have arsenic linked to a carbon atom by a covalent bond and are less poisonous than the inorganic compounds of arsenic.

Symptoms - The symptoms of anaphylactic nature may occur. Malaise, nausea, giddiness, pain in chest and joints. dyspnea, cough, urticarial rashes. Slightdiarrhea. In severe poisoning – profuse vomiting, diarrhea with bloody stools, anuria, cramps, convulsions, coma leads to death.

Tolerance - Individuals who are in the habit of taking arsenic acquire a certain amount of tolerance to bear it. In India some people are in the habit of taking arsenic daily as a tonic or as or as an aphrodisiac.

Solubility of arsenic – When administered in a soluble form by mouth, arsenic gets absorbed into the blood almost in few minutes, but when taken in solid lumps, it may not be absorbed by the stomach and sometimes passes out through the faeces without producing any poisonous symptoms.

Arsenic oxide converted into yellow Sulphide of the bones, chiefly the long bones, owing to the conversion of their phosphates into arsenates.

Deposit of Arsenic

In acute poisoning arsenic gets deposited more in liver and in chronic poisoning it is also found deposited in the brain the spinal cord and the muscular and bony tissues.

The greatest concentration of arsenic is found in hair and nails, where it is stored permanently.

Treatment

1) Emetics can be given.

2) The stomach should be emptied and then thoroughly and repeatedly washed by the Stomach tube with large amount of warm water and milk.

3) Freshly precipitated hydrated ferric oxide (Arsenic antidote) is given in tablespoon dose at short intervals for 2 to 3 days. This forms a sparingly soluble ferric arsenite. The Antidote is prepared by mixing 45ml. of tincture ferric per chloride with 5 gm magnesium oxide or potassium carbonate in a glass of water. The precipitate is strained off and given suspended in water.

4) Tablespoonful doses of dialyzed iron may be used as a substitute.

5) If none of these is available, calcined magnesia mixed with an equal quantity of animal Charcoal may be given.

6) The stomach should be washed out at intervals to remove iron compounds and adherent arsenic.

7) Butter and greasy substances prevent absorption.

8) Alkalies should not be given as they increases the solubility of arsenic.

9) Antidotes – Chelation therapy is preferred medical treatment for reducing the toxic effects of metal.[20]

Chelators not only enhance excretion but in some cases also decrease toxicity by preventing it from binding to cellular target molecules.

1. BAL – British Antilewisite (2,3 – dimercaprol)

The recommended dose of BAL is 2.5 mg/kg. 4 doses / day for first two days followed by 2 doses / day for third day and finally 1 dose/day for next 10 days.

2. DMSA – Meso 2,3 – dimercaptosuccinic acid

Recently it has been recommended that for treating mild arsenic poisoning an oral dose of 10mg / kg. DMSA thrice a day for 5-7 days may be given followed by two daily doses of 10 mg/kg for another 10- 14 days. While, for severe arsenic toxicity an oral dose of 18mg/kg thrice a day for first 5-7 days followed by 2 doses of same strength for next 10-14 days are recommended.

3. DMPS – Sodium 2,3 dimercaptopropane 1- sulfonate

It has been reported that an oral dose of 100mg/kg DMPS thrice a day for 10-12 days is effective against mild arsenic poisoning.

10) An important aspect is the role of naturally occurring nutrients in protecting arsenic toxicity. Since some of these compounds (viz. thiamine, S- adenosyl L –Methionine, ascorbic acid, methionine) have been successfully tried in lead poisoning, there is no reason that they may not prove beneficial in arsenic intoxication and also literature indicates the beneficial role of methionine and that ascorbic acid reduces arsenic toxicity.

11) Glucose –saline with Sodium bicarbonate is helpful to combat shock and improve alkali reserve and symptomatic treatment should be given.

Orpiment is a photosensitive mineral and will eventually dull and develop a white powdery film upon prolonged exposure to light. Due to the instability of Orpiment, specimens should be stored enclosed and covered to prevent their exposure to light. Occasional exposure to look at a specimen will not cause damage; only prolonged or repeated exposure will cause deterioration.

Mineral arsenicals in traditional medicines: Orpiment, realgar, and arsenolite

Orpiment and realgar have quite different chemical features and solubility from arsenolite/arsenic trioxide. The bioavailability of orpiment and realgar are low, but arsenolite/arsenic oxide is high. Pharmacologic data indicate that the use of orpiment and realgar in traditional medicines may be desired in some cases, but the therapeutic basis in most instances remains to be fully justified. Arsenolite/arsenic trioxide has been a major breakthrough as a cure for a subset of human leukemias[21] and its use as a mineral arsenical in traditional medicines prompted this finding. Cardiovascular toxicity is the major concern for arsenic trioxide and realgar is much less acutely toxic than arsenic trioxide. Little is known about possible secondary cancers resulting from the long-term use of any of these arsenicals. Similar to the safety evaluation of seafood arsenicals, total arsenic content alone is insufficient for safety evaluation of mineral arsenical-containing traditional medicines and arsenic speciation, bioavailability and toxicity/benefit should be all considered in any such evaluation.

Chemical Formula - As2S3

Composition - Arsenic trisulfide

Color	-	Bright yellow, orange-yellow, orange, orange-red, and brown
Streak	-	Yellow
Hardness	-	1.5 – 2
Crystal System	-	Monoclinic

Crystal Forms and Aggregates- Individual Orpiment crystals are usually small prismatic or stubby and often have chisel-shaped or triangular pyramidal terminations. Crystals are commonly in dense grouping of small crystals rather than individual crystals. Typical habits include micaceous, grainy, encrusting, in veins and in foliated masses. Also drusy, botryoidal, in rosettes, in rounded balls and in small crystals radiating from a central core. Crystals are usually striated horizontally and are are occasionally slightly rounded.

Transparency	-	Transparent to opaque
Specific Gravity	-	3.4 - 3.5
Luster	-	Resinous to pearly.
Cleavage	-	1,1
Fracture	-	Uneven
Tenacity	-	Sectile and slightly flexible in thin flakes.
In Group	-	Sulfides; Simple Sulfides
Striking Features	-	Striking color, environment, and frequent association with Realgar.
Environment	-	In low-temperature hydrothermal veins and volcanic hot springs and fumaroles. Less commonly in aridborate deposits and metamorphic marble pockets.
Rock Type	-	Igneous, Sedimentary, Metamorphic
Popularity (1-4)	-	2
Prevalence (1-3)	-	2
Demand (1-3)	-	2

DISCUSSION

Table no 1 shows that in all there are about one thousand one hundred fifty six formulations available in various text books of Ayurveda, out of that the maximum are described in the text Rasyogasagar followed by Bhaishajyratnavali and other Rasa texts along with modern texts also.

In classification of Rasadravyas, most of the Acharyas classified, tala under uparasa category. According to Yogaratnakara Hartala comes under Upadhatu.

Table no 2 Majority of Rasacharyas have described about two types of Haritala as well as the supremacy of Patra Haritala in all the varieties.

Table no 3 This table shows the main differences between Patra and Pinda Harital which are the most common types of Harital in which Patra Harital is qualitatively better.

Table no 4 The toxic effects of haritala if used without proper purification are several like Tapakara, Sphotakara, Anga Sankocakara, Pidakara, Vatarogakara, Kapharogakara, Medoraga kara, Kushtakara, Ayurghnam. Their ill effects due to the impurities are commonly accepted ones. There are several such symptoms described by various texts as shown in the table.

Table no 5 The prime importance has been given to Kushmanda Swarasa used for Swedana of Haritala by almost all the Acharyas. The next commonly used materials for Haritala Sodhana are decoction of Triphala, til tail, Lime water and Kanji. The above said liquids are mostly used for swedana but curnodaka and Kanji are used for Bhavana also.

Table no 6 It shows that majority (69.92%) of the substances used in the incineration of Haritala are from herbal origin out of that palasa has been used extensively either in form of Bhasma or Ksara.

Table no 7 After screening of most of the text books of Rassshastra it was observed that almost all Rasacharya mentioned Katu rasa followed by kshaya rasa for Haritala.

Table no 8 Almost all Acharyas mentioned Snigdha guna for Haritala followed by Ushna and Guru guna. Virya ushna – given by all Acharyas Vipaka –Katu given by all acharyas.

Table no 9 Haritala is having various karmas specifically related with Twacha, Rakta, so most of the Acharyas described its uses for skin diseases, Bhuta badha nashaka, Raktahara etc.

CONCLUSION

Vedic literature is not only having certain references of Haritala but there are descriptions regarding the use of Haritala for different purposes. In Ayurvedic literature, Brihatrayi has abundantly used Haritala for the treatment of several diseases. In Charak Samhita Haritala has been used for the treatment of kushta, unmada, swasa, kasa and in visa. The Rasa

Granthas like Rasa Ratnakara, Rasachintamani, Rasa Sara, Rasendra Sara Sangraha and Rasa Prakasha Sudhakara of later period have given detailed description about theorigin, varieties, blemishes and therapeutic uses of Haritala. Mythologically Haritala is considered as Harerbijam. There are about one thousand one hundred fifty six formulations prepared from Haritala available in various text books of Ayurveda. The toxic effects of haritala if used without proper purification are several. So there are many methods of purification described in texts. The prime importance has been given to Kushmanda Swarasa used for Swedana of Haritala by almost all the Acharyas. The next commonly used materials for Haritala Sodhana are decoction of Triphala, til tail, Lime water and Kanji. For the preparation of Harital bhasma more commonly useful substance is Palasha bhasma or Kshar. Almost all Acharyas who described about the properties of Haritala have stated the 'Kushtahara' property. Next commonly accepted are Vishahara, Bhutabadhahara, vranahara, Kanduhara properties, some have accounted as Viryakara drug, some have rasayana and vajikara also. So Haritala is an important mineral of Rasashastra which is very useful for many diseases

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