

Exploring the Role of Arsenic trisulfide in Ayurvedic Pharmacology: Insights from Bhaishajya Ratnavali

Premadevi Ramdasji Kalmegh¹, Bharat Rathi²

¹PhD Scholar, Mahatma Gandhi Ayurved College, Hospital & Research Centre, Datta Meghe Institute of Higher Education and Research (DU) Associate Professor, Dr. Rajesh kambe Ayurved college, Turkhed, Murtizapur, Email :dr.premadevichoudhari@gmail.com,

²Principal & Professor MD, MPhil (HPE), Fellowship in Ethno-Pharmacology Mahatma Gandhi Ayurved College, Hospital & Research Centre, Datta Meghe Institute of Higher Education and Research (DU) Add:- Salod (Hirapur), Wardha 442001, Email :bharatrathi174@gmail.com

Received: 09.01.2025

Revised: 07.02.2025

Accepted: 16.03.2025

ABSTRACT

Arsenic trisulfide (Hartala), a traditionally categorized DhatuJaVisha in Ayurveda, has long been incorporated in therapeutic formulations, especially within the classical compendium Bhaishajya Ratnavali. This review investigates the pharmacological applications, formulation prevalence, dosage patterns, and safety protocols associated with Hartala-based formulations. The paper underscores the significance of Shodhana (purification), methodical dosing, and Rasashastra principles ensuring therapeutic benefits with minimal toxicity. Contemporary pharmacological evaluations reveal promising antibacterial properties of Hartalabhasma, warranting further clinical exploration. The study attempts to synthesize traditional wisdom with modern research to facilitate future integration into evidence-based healthcare.

Keywords: Hartala, Arsenic trisulfide, Bhaishajya Ratnavali, Rasashastra, Ayurvedic formulations, Shodhana, Ayurvedic pharmacology, metallic drugs.

1. INTRODUCTION

Ayurvedic metallic medicines have been traditionally employed in the treatment of various ailments through the discipline of Rasashastra, which deals with the pharmaceutical processing of metals, minerals, gems, calcium compounds, and Vishadravyas (poisonous substances) into therapeutically useful forms [1,2]. These metallic preparations are used both internally and externally, often in combination with herbs to enhance efficacy and safety [3].

Hartala (Arsenic trisulfide, As_2S_3), a bright yellow mineral known as Orpiment, is classified as DhatuJaVisha by Acharya Sushruta and included under Sthavara Visha due to its mineral origin [4]. It belongs to the Uparasa category as per the Rasashastra classification and is also described among the Upadhatu group in Rasa Granthas [5,6]. Ayurveda recognizes three arsenic compounds with high toxicity—Hartala (As_2S_3), Manashila (As_2S_2), and Gauripashana (As_2O_3), corresponding to orpiment, realgar, and arsenic trioxide, respectively [7].

Two main types (Patra and Pinda Tala) and four subtypes (Patra, Pinda, Godanti, and Vakadala) of Hartala are described in Rasashastra texts [8]. Due to its inherent toxicity, classical purification (Shodhana) methods are mandated using media like Kushmandaswarasa (Benincasahispida juice) and Churnodaka (lime water) to render it safe for human use [9].

Classical references to Hartala span a wide historical range: Charaka Samhita mentions it in 14 contexts, Sushruta Samhita quotes it 29 times primarily as a toxic metal requiring detoxification, and Vagbhata employs it in nasal disorders, inflammatory conditions, and insect bites [10,11]. In Sharangadhara Samhita, it is classified under UpadhatuVarga [12]. Several medieval Rasashastra texts like Rasa Prakasha Sudhakar, Rasendra Sara Sangraha, Rasa Ratnakara, and Rasa Chintamani elaborated its alchemical and therapeutic processing. By the 18th century, Bhaishajya Ratnavali provided extensive therapeutic applications of Hartala after purification across a wide spectrum of diseases [13,14].

Hence, this review critically evaluates all Hartala-based classical formulations from Bhaishajya Ratnavali to assess its therapeutic potential in various disorders and analyze patterns of usage in traditional Ayurvedic pharmaceuticals.

2. MATERIALS AND METHODS

A systematic textual review was carried out using the BhaishajyaRatnavali (BR), analyzing Hartala-based formulations across all chapters. The type of preparation (e.g., Vati, Taila), intended route (internal/external), therapeutic indications, and textual references were extracted.

Where explicit quantities were mentioned, the percentage of Hartala per 100 ml (for Taila) or per total formulation was calculated. When quantity was unspecified, standard averaging across the ingredient list was used for approximation. Formulations with complex multi-stage preparations were excluded from percentage estimation.

3. RESULTS

Table 1: Formulations of Hartala[15]

Sr.No	Name of Formulation	Type of Preparation	% Of Hartal	Internal \ External Use	Indication	References
1.	Navjawarebhankansh Ras	Vati	25	Internal	Jwara	BR\5\484, P-132
2.	Mahamrutyunjay Ras	Vati	9.9	Internal	Jwara	BR\5\512-522, P-135
3.	Jwarsinh Ras	Raskalpa	25	Internal	Jwara	BR\5\554-558, P-138
4.	JwarhariVati	Vati	25	Internal	Jwara	BR\5\561-562, P-139
5.	Vetal Ras	Vati	20	Internal	Jwara	BR\5\605-612, P-144
6.	Chakrika Ras	Vati	15	Internal	Jwara	BR\5\613-614, P-144
7.	Chakri Ras	Vati	12.5	Internal	Jwara	BR\5\615-616, P-144
8.	Bramharandhra Ras	Raskalp	6.25	Internal	Jwara	BR\5\617-619, P-144
9.	Mutotthapan Ras	Vati	7.69	Internal	Jwara	BR\5\627-631, P-145
10.	Mrutasanjivan Ras	Raskalpa	5.88	Internal	Jwara	BR\5\632-637, P-146
11.	PaniyavatikaSidhfala	Vati	9.9	Internal	Jwara	BR\5\668-687, P-149
12.	Rasrajendra Ras	Vati	11.10	Internal	Jwara	BR\5\696-702, P-151
13.	Pratapapras	Raskalpa	10	Internal	Jwara	BR\5\719-722, P-153
14.	SannipatBhairav Ras	Vati	6.25	Internal	Jwara	BR\5\731-733 P-154
15.	SannipatBhairav Ras (Divitiya)	Vati	5.88	Internal	Jwara	BR\5\734-742, P-154
16.	Trailokyachintamani Ras	Vati	4.5	Internal	Jwara	BR\5\766-772, P-157
17.	Sannipatsuryaras	Vati	4.76	Internal	Jwara	BR\5\773-775, P-157
18.	Vadvanal Ras-1	Raskalp	5.55	Internal	Jwara	BR\5\777-780 P-158
19.	Vadvanal Ras-3	Vati	21.42	Internal	Jwara	BR\5\785-788, P-159
20.	Prataplankeshwar Ras	Raskalp	6.6	Internal	Jwara	BR\5\823-841, P-162
21.	Shleshmakalana Ras	Vati	5.26	Internal	Jwara	BR\5\847-851, P-164
22.	Jwarmatangeshari Ras	Vati	5.55	Internal	Jwara	BR\5\857,862, P-165
23.	Rasraj Ras	Raskalp	54.84	Internal	Jwara	BR\5\894-897, P-168
24.	Sheetbhajji Ras	Raskalp	4.16	Internal	Jwara	BR\5\906-909, P-169
25.	Jwarakunsh Ras-2	Raskalp	62.5	Internal	Jwara	BR\5\913-915, P-170
26.	Jwarakunsh Ras-5	Vati	12.5	Internal	Jwara	BR\5\921-923, P-170
27.	Mahajawarkunsh Ras	Vati	7.14	Internal	Jwara	BR\5\936-939, P-171
28.	Jwarakunsh Ras	Raskalp	25	Internal	Jwara	BR\5\940-941, P-172
29.	Sheetbhajji Ras	Vati	20	Internal	Jwara	BR\5\959-960, P-173
30.	Chintamani Ras-3	Vati	5.88	Internal	Jwara	BR\5\989-994 P-176
31.	Chintamani Ras-4	Vati	6.89	Internal	Jwara	BR\5\995-999, P-176
32.	Chaturthkari Ras	Vati	20	Internal	Jwara	BR\5\1002-1005, P-177
33.	Jwarkalketu Ras	Raskalp	14.28	Internal	Jwara	BR\5\1014-1015, P-178
34.	Sheetari Ras	Raskalp	26.66	Internal	Jwara	BR\5\1023-1026 P-179
35.	Vaatpitantak Ras	Vati	12.5	Internal	Jwara	BR\5\1041-1042, P-181

36.	Vidyavallabh Ras	Raskalp	33.33	Internal	Jwara	BR\5\1059-1061, P-182
37.	Sheetari Ras	Raskalp	25	Internal	Jwara	BR\5\1062-1063, P-183
38.	Tallang Ras	Raskalp	28	Internal	Jwara	BR\5\1081-1082, P-184
39.	JwarariAbhra	Vati	8.33	Internal	Jwara	BR\5\1115-1118, P-187
40.	Sarvajwarharloh	Vati	8.33	Internal	Jwara	BR\5\1158-1170, P-190
41.	Purnachandradoya Ras	Vati	24	Internal	Atisar	BR\7\130-133, P-249
42.	BruhatKasisadya Tail	Taila	1.56	External	Arsha	BR\9\204-206, P-327
43.	BhaktavipakVati	Vati	4.5	Internal	Agnimandya	BR\10\157-162, P-351
44.	BhaktavipakVati 2	Vati	3.3	Internal	Agnimandya	BR\10\163-165, P-351
45.	Ajirnakalananal Ras	Vati	3.5	Internal	Agnimandya	BR\10\176-186, P-352
46.	Krimikashthanal Ras	Vati	6.6	Internal	Krimi	BR\11\26-28, P-368
47.	VidangLoh	Raskalp	2.7	Internal	Krimi	BR\12\48-50, P-370
48.	Raktapittantak Ras	Raskalp	14.28	Internal	Raktapitta	BR\13\48-49, P-393
49.	KshaykesharirasBruhad	Raskalp	4.34	Internal	Rajyakshma	BR\14\91-100, P-415
50.	Bruhatrasendragutika	Vati	11.11	Internal	Rajyakshma	BR\14\124-131, P-418
51.	Rajmrugank Ras	Raskalp	18.18	Internal	Rajyakshma	BR\14\158-161, P-421
52.	Kanak Sundar Ras	Vati	11.76	Internal	Rajyakshma	BR\14\197-203, P-425
53.	ManshiladiDhum	DhoomPaan	16.67	Internal	Kas	BR\15\39-40, P-442
54.	Vijaybhairav Ras	Vati	1.63	Internal	Kas	BR\15\80-83, P-447
55.	BruhadRasendraGutika	Gutika	7.69	Internal	Kas	BR\15\91-97, P-447
56.	Laxmi Vilas Ras	Vati	7.74	Internal	Kas	BR\15\130-137, P-450
57.	Mahodadhiras	Vati	20	Internal	Trushna	BR\20\29, P-489
58.	Bhutanksh Ras	Raskalp	4.93	Internal	Unmad	BR\24\46-51, P-505
59.	Chaturabhurjas	Raskalp	16.66	Internal	Unmad	BR\24\52-57, P-506
60.	Bhutabhairavras	Raskalp	4.76	Internal	Apsmar	BR\25\23-25, P-514
61.	Vatkulantak Ras	Vati	-	Internal	Apsmar	BR\25\26-29, P-514
62.	Vatgajankush Ras	Vati	7.69	Internal	Vatvyadhi	BR\26\114-118, P-528
63.	VatgajankushBruhat	Vati	5.26	Internal	Vatvyadhi	BR\26\119-121, P-528
64.	Mahavatgajankush Ras	Vati	7.69	Internal	Vatvyadhi	BR\26\122-123, P-528
65.	Kubjavinod Ras	Vati	9.9	Internal	Vatvyadhi	BR\26\128-130, P-529
66.	Talkeshwar Ras	Gutika	3.33	Internal	Vatvyadhi	BR\26\176-177, P-533
67.	Vaatviddhavansa Ras	Raskalp	28.57	Internal	Vatvyadhi	BR\26\178-184, P-534
68.	Vaatnashan Ras	Raskalp	9.9	Internal	Vatvyadhi	BR\26\185-187, P-534
69.	Navgraha Ras	Raskalp	11.11	Internal	Vatvyadhi	BR\26\203-206, P-536
70.	Navratnarajmruganka Ras	Raskalp	3.84	Internal	Vatvyadhi	BR\26\207-212, P-536
71.	Vatraktantak Ras	Vati	4.76	Internal	Vatrakta	BR\27\42-46, P-576
72.	Sarveshwar Ras	Raskalp	12.97	Internal	Vatrakta	BR\27\58-63, P-578
73.	Taamra-Taalbhasma	Bhasma	-	Internal	Vatrakta	BR\27\73, P-579
74.	Taal Bhasma	Bhasma	16.94	Internal	Vatrakta	BR\27\74-79, P-579
75.	Mahataleshwar	Raskalpa	25	Internal	Vatrakta	BR\27\80-81, P-580
76.	Sutatail (Vijaybhairav Tail)	Taila	25	Ext\Int	Aamvaat	BR\29\203-207, P-612
77.	Gulmakalananal Ras-1	Raskalp	7.14	Internal	Gulma	BR\32\90-94, P-656
78.	Gulmakalananal Ras-3	Raskalp	25	Internal	Gulma	BR\32\101-103, P-657
79.	GulmavajriniVati	Vati	16.66	Internal	Gulma	BR\32\125-127, P-660
80.	Mutrakuchhantak Ras-2	Raskalp	33.33	Internal	Mutrakruch	BR\34\43-45, P-681
81.	Vadvagniloh	Vati	25	Internal	Medorog	BR\39\29-30, P-725
82.	Chulikavati	Vati	1.81	Internal	Udar	BR\40\82-84, P-738
83.	Varishoshan Ras	Vati	2.66	Internal	Udar	BR\40\93-108, P-739

84.	Vidyadhar Ras	Vati	16.66	Internal	Pliha-Yakrut	BR\41\72-73\,P-753
85.	Plihari Ras-2	Raskalp	7.54	Internal	Pliha Yakrut	BR\41\92-95\,P-754
86.	MahamrutunjayLoh	Vati	1.045	Internal	PlihaYakrut	BR\41\147-156\,P-759
87.	Kshetrapal Ras	Vati	12.5	Internal	Shoth	BR\42\67-69\,P-774
88.	Vaidyanaathvati(Dadhivati)	Vati	8.33	Internal	Shoth	BR\42\86-94\,P-775
89.	Bhaktotar Ras	Raskalp	2.72	Internal	Vruddhi	BR\43\58-63\,P-794
90.	Vruddhivatika Vati	Vati	3.44	Internal	Vruddhi	BR\43\74-78\,P-795
91.	Nityanand Ras	Vati	2.94	Internal	Shlipad	BR\45\28-36\,P-812
92.	Vranrakshas Taila-1	Taila	12.5	External	Nadivran	BR\47\69-71\,P-826
93.	Vranrakshas Taila-2	Taila	6.59	External	Kandu, Vichrachika	BR\47\72-76\,P-827
94.	Paradadidhupan -1	Vrandhoopan	2.38	External	Upadanshaj	BR\52\19-21\,P-849
95.	Paradadidhupan -2	Dhoopan	6.25	External	Upadanshaj	BR\52\22-31\,P-849
96.	SavrnakarLep	Lepa	20.38	External	Shwitra, Kushta	BR\54\46\,P-864
97.	AushthaShwitrashnarth Lepa	Lepa	14.28	External	AushthaShwitra	BR\54\51\,P-865
98.	Talkeshwar Ras -1	Raskalp	40	Internal	Kushta, Vatrakta, Dushtavran	BR\54\90-93\,P-869
99.	Talkeshwar Ras-2(Taalbhasma)	Bhasma	-	Internal	Kushta , Vatrakta	BR\54\90-93\,P-869
100.	Talkeshwar Ras-3	Raskalp	50	Internal	Kushta , Vatrakta, Visarp	BR\54\98-106\,P-870
101.	Mahatalkeshwar Ras	Raskalp	2.38	Internal	Kushta	BR\54\107-110\,P-870
102.	Rasmanikya	Raskalp	-	Internal	Kushta Vatrakta, Bhagandar	BR\54\120-125\,P-872
103.	Manikya Ras	Raskalp	32.25	Internal	Kushta ,Kandu	BR\54\126-134\,P-872
104.	Rajrajeshwar Ras	Raskalp	25	Internal	Dadru ,Kitimkushta	BR\54\135-138\,P-873
105.	Lankeshwar Ras	Vati	14.28	Internal	Kushta	BR\54\140-142\,P-873
106.	Sarveshwar Ras	Raskalp	13.14	Internal	Suptikushta ,Mandalkushta	BR\54\162-167\,P-876
107.	Haritaleshwar Ras	Raskalp	31.57	Internal	Kushta	BR\54\168-174\,P-877
108.	KachchhurakshasTaila	Taila	1.22	External	Kachchhu, Pama	BR\54\261-265\,P-886
109.	Aargwadhaditaila	Taila	3.6	External	Shweta Kushta	BR\54\269\,P-886
110.	Aaditya Pak Taila	Taila	2.66	External	Pama	BR\54\272\,P-886
111.	KushtakalanalTaila	Taila	6.25	External	VatajKushta	BR\54\283-284\,P-888
112.	KushtarakshasTaila	Taila	3.2	External	Kushta	BR\54\285-289\,P-889
113.	ShadabinduTaila	Taila	2	External	Kushta ,Vicharchika	BR\54\290-291\,P-889
114.	Marichaditaila -1	Taila	3.6	External	Kushta ,Dadru	BR\54\292-293\,P-889
115.	Marichaditaila -2	Taila	1.53	External	Kushta ,Dadru	BR\54\294-301\,P-890
116.	SomrajiTaila -2	Taila	1.6	External	Kushta ,Krumi	BR\54\305-310\,P-891
117.	VicharchikaTaila	Taila	1.6	External	Vicharchika ,Nadivarna	BR\54\315-317\,P-892
118.	Rudra Taila	Taila	3.06	External	Dadru ,Kushta	BR\54\318-325\,P-892
119.	Mahatrunaktaila	Taila	1.51	External	Kushta	BR\54\327-333\,P-893
120.	KaranjbijadiLepa	Lepa	14.28	External	Alas	BR\60\18\,P-934
121.	Kasisadilepa	Lepa	20	External	Vrushankachchhu, Ahiputana	BR\60\85\,P-940
122.	LomapatanLepa	Lepa	50	External	Lomshatan	BR\60\166\,P-949
123.	LomapatanLepa	Lepa	8.33	External	Lomshatan	BR\60\169-170\,P-949
124.	LomapatanLepa	Lepa	50	External	Lomshatan	BR\60\171\,P-949
125.	LomapatanTaila	Taila	4.8	External	Lomshatan	BR\60\174\,P-950

126.	LompatanarthAargwadhad iTaila	Taila	6.13	External	Lomshatan	BR\60\179-180\,P-950
127.	TaladiVarti	Anjaan	33.33	External	Netrarog	BR\64\152\,P-999
128.	Ratnaprabha Vati	Vati	8.33	Internal	Strirrog	BR\66\60-64\,P-1034
129.	PradarantakLoh	Vati	3.33	Internal	Pradar	BR\66\76-80\,P-1035
130.	Indushekhar Ras	Raskalp	14.28	Internal	Garbhinirog ,Sutikarog	BR\68\89-93\,P-1060
131.	Garbhchintamani Ras-3	Raskalp	11.11	Internal	Garbhinirog ,Sutikarog	BR\68\84-86\,P-1059
132.	Sutikaharras-2	Vati	12.5	Internal	Sutikarog	BR\69\76-78\,P-1069
133.	Rasshardul Ras-1	Vati	7.14	Internal	Sutikarog	BR\69\79-81\,P-1069
134.	Suttikavallabhras	Vati	9.09	Internal	Sutikarog	BR\69\89-92\,P-1070
135.	Suttikabharanras	Raskalp	7.69	Internal	Sutikarog	BR\69\93-96\,P-1071
136.	BibhitakadiTaila	Taila	6.31	External	Putikarna,Balrog	BR\71\89\,P-1085
137.	Kukunak-PothakiharAnjaan	Anjaan	14.28	External	Kukunak-Pothaki Balrog	BR\71\94\,P-1086
138.	HingwadiDravyasiddhapr ayog	Taila ,Ghruta	4	External Nasya ,Abhyang	Balrog	BR\71\171-176\,P-1094
139.	Vrushchik Vish Chikitsa	Lepa	50	External	VrushchikVishro g	BR\72\28\,P-1102
140.	Godha Vish Chikitsa	Vati	20	External	Godha Vishrog	BR\72\31\,P-1102
141.	MahadhdvishaghanYog	Vati Lepa	16.66	External	Vishrog	BR\72\45\,P-1104
142.	Bhimrudraras-2	Vati	11.11	Internal	Vishrog	BR\72\56-58\,P-1105
143.	Trailokyachintamani	Vati	7.69	Internal	Rasayan	BR\73\141-146\,P-1119
144.	Anangakusum Ras	Ras Kalp	25	Internal	Vajikaran	BR\74\72-75\,P-1132
145.	Mofrava	Awaleha	1.66	Internal	Vajikaran	BR\74\371-374\,P-1156

BR-BhaishajyaRatnavali

A total of **145 formulations** containing Hartalawere identified across BR. Among these:

- **109 formulations** were meant for internal use
- **35 formulations** were intended for external application
- **1 formulation** was used both internally and externally

Forms included

- Vati (tablets)
- Raskalpa (herbo-mineral compounds)
- Taila (medicated oils)
- Lepa (topical pastes)
- Bhasma (calcined ash)
- Anjana (collyrium)
- Awaleha (medicated jams)

Range of Hartala content

- Highest: 50% (e.g., Talkeshwar Ras, LomapatanLepa)
- Lowest: ~1.04% (MahamrutunjayLoh)
- Average use: 3–20% in most formulations

Conditions treated include

- Jwara, Rajayakshma, Kushta, Krimi, Unmada, Vatavyadhi, Vatarakta, Shwitra, Visharoga, and gynecological disorders.

4. DISCUSSION

4.1 Classical Understanding and Detoxification

Acharya Charaka stated that any substance, including poison, can serve as medicine if administered properly and judiciously [16]. Hartala (arsenic trisulphide), also known as yellow orpiment, is a potent mineral drug

extensively used in classical Ayurvedic formulations. Classified under DhatuJaVisha (metallic poisons), it mandates rigorous Shodhana (purification) prior to therapeutic use due to its inherent toxicity.

Unprocessed Hartala can induce Daha (burning), Kshobha (irritation), ShariraKampa (tremors), Raktadushti (vitiation of blood), Kushtha (skin disorders), and even life-threatening conditions involving Vata-Kapha aggravation [17]. Shodhana techniques include media such as Churnodaka (lime water) and KushmandaSwarasa (juice of *Benincasa hispida*), the latter being a recognized antidote due to its active compound, Cucurmosin, a ribosome-inactivating protein with apoptotic activity [18].

Our compilation reveals that Hartala features in 145 formulations (Table 1), used in diverse dosage forms like Vati (tablets), Kalka (paste), Churna, Taila, Rasakalpa, Anjana, and Lepa[19]. Among these, 109 are for internal use, 35 for external application, and one for both. The highest concentrations of Hartala are found in Rasamanikya, Talkeshwar Rasa, and Vrushchik Vish Chikitsa Lepa (up to 100%), whereas the lowest (1.04–1.5%) appear in MahamrutunjayLoha, MarichadiTaila, etc.

Pharmacological studies highlight HartalaBhasma's selective antimicrobial efficacy. It demonstrated significant activity against *Staphylococcus aureus* and *Candida albicans*, aligning with its classical indication in skin disorders [20]. Other in vitro data showed 75% inhibition of *Streptococcus pneumoniae*, 50% against *S. aureus*, and 25% against *Klebsiella pneumoniae*, but no significant effect on *Pseudomonas aeruginosa*, suggesting higher efficacy against Gram-positive organisms [21].

4.2 Pharmaceutical Trends and Dosage Strategy

Pharmaceutically, the dominance of Vati preparations suggests a focus on dosing precision, patient compliance, and ease of administration. The use of Anupana (adjuvants) like Ghrita, Madhu, and Gomutra aligns with the Ayurvedic approach to enhance efficacy and minimize toxicity [22].

The rational use of Hartala in BhaishajyaRatnavali reflects a pragmatic synthesis of classical principles and clinical applicability. However, due to arsenic's known toxicity, modern validation through pharmacokinetics, toxicology, and clinical trials is critical for its safe integration into contemporary healthcare.

Toxicological studies show that properly prepared Hartalabhasma, at classical doses, does not produce acute or sub-acute toxicity in experimental models [23]. This supports its safe usage within defined parameters. Toxic manifestations of raw Hartala—Daha, Sharirakampa, Kushtha, and Raktadushti—are mitigated post-purification, enabling safe incorporation in therapeutics [24].

4.3 Contemporary Insights

In vitro studies reveal antibacterial activity of Hartalabhasma, particularly against *S. aureus* and *Streptococcus pneumoniae* [25,26]. Less effect was seen against Gram-negative bacteria like *E. coli*, aligning with Ayurvedic indications for skin and upper respiratory infections.

5. CONCLUSION

Hartala remains one of the most versatile yet controversial mineral drugs in Ayurvedic pharmaceuticals. The 145 documented formulations in BhaishajyaRatnavali demonstrate its extensive therapeutic application, ranging from infectious to neurodegenerative and gynecological disorders.

This review underscores the extensive and strategic use of Hartala in Ayurvedic pharmaceuticals, particularly in the formulations described in BhaishajyaRatnavali. Despite its toxic nature, the classical texts demonstrate a significant understanding of its detoxification, dose calibration, and therapeutic applications. These insights warrant systematic scientific investigation. With proper purification and judicious use, it offers potent pharmacological effects. The integration of classical practices with contemporary toxicological and pharmacodynamic studies can pave the way for Hartala-based therapies to be scientifically validated and responsibly integrated into modern healthcare.

Acknowledgement

The author expresses sincere gratitude to the Rasashastra&Bhaishajya Kalpana Department, and the Ayurvedic Pharmacology and Toxicology research team for their invaluable support and access to classical texts.

Author Contributions

Conceptualization: Dr. PremadeviKalmegh

Data Collection for review: Dr Premadevikalmegh

Study Design Manuscript Setting: Dr. PremadeviKalmegh

Guidance for this PhD Trial: Dr Bharat Rathi

Funding

No external funding was received for this study.

Conflict of Interest

The authors declare no conflict of interest.

REFERENCES

1. Rawat G, Yadav Y, Sharma KC. A review on Hartala (Orpiment) in classical ancient text of Rasa Shastra. *Sch Int J Tradit Complement Med*. 2022;5(5):85–94.
2. Singh PK, Sah MP, Sah MK, Mandal JK, Singh BK. Introduction and Chronology of Rasa Shastra from Vedic Period to Modern Era: A Review. *J Ayurveda Campus*. 2022;3(1):114–21.
3. Sud S, Sud KS. Efficacy and Usefulness of Vishadravyas in Rasaushadhis. *J Tradit Med Clin Natur*. 2018;7(1):267.
4. Sharma K, Inchulkar SR, Kaushik Y. An Ayurvedic review on Hartala: A DhātujaVisha. *J Ayurveda Integr Med Sci*. 2020;5(4):248–57.
5. Kale AS, Bhise DD. Comparative Analytical Pharmaceutical Study of Hartal Before and After Shodhana. *Int J Ayur Med*. 2021;12(4):250–8.
6. Jani KS, Bedarkar P, Shukla VJ, Patgiri B. Comparative Study of HaratalaShodhana Using Different Media. *BLDE Univ J Health Sci*. 2022;7(1):141–6.
7. Lochan K. BhaishajyaRatnavali. Vol. 1–3. Varanasi: ChaukhambhaPrakashan; 2008.
8. Agrawal R, Gavali J. Review on Lepa Kalpana in Skin Disorders wsr to Sharangdhara Samhita. *Int Ayurvedic Med J*. 2020;8(9):4418–25.
9. Gandhi PK, Ingole RK. Evaluations of Different Aspects in Preparation of HartalaBhasma. *Int J Ayurveda Res*. 2023;4(3):155–63.
10. Singh A, Singh SP. Rasashastra: An overview of metallic preparations in Ayurveda. *AYU*. 2015;36(2):123–8.
11. Sharma PV. Rasatarangini. Delhi: Motilal Banarsidass; 2013.
12. Tripathi I. Sharangadhara Samhita. Varanasi: ChaukhambhaSurabharati; 2017.
13. Dash V, Sharma R. Review on therapeutic and alchemical aspects of arsenicals in Ayurveda. *Int J Res Ayurveda Pharm*. 2020;11(1):31–6.
14. Padhy SN, Panda SK. History of Hartala usage in Indian medicine: A retrospective view. *Anc Sci Life*. 2021;40(4):219–24.
15. **Govind Das Sen**. BhaishajyaRatnavali (Vol. 1). Edited by Pandey GS. Varanasi: Chaukhambha Sanskrit Sansthan; 2010. Chapter 5, Verse 484, p.132.
16. Sharma PV. Charaka Samhita of Agnivesha, Vol. I, Sutra Sthana, Chapter 1, Verse 126. Varanasi: Chaukhambha Orientalia; 2014. p. 16.
17. Sastry JLN. DravyagunaVijnana (Volume 2). Varanasi: Chaukhambha Orientalia; 2005. p. 150–152.
18. Li H, She J, Bai D, Li X, Guo C, Liu T. Cucurmosin, a novel type I ribosome-inactivating protein from the sarcocarp of *Benincasa hispida*. *Cancer Lett*. 2003;189(2):177–183. doi:10.1016/S0304-3835(02)00647-9.
19. Pandey GS. BhaishajyaRatnavali of Govind Das Sen. Reprint ed. Varanasi: Chaukhambha Sanskrit Sansthan; 2010. Chapter 5, verses 484–522.
20. Patgiri BJ, Prajapati PK, Shukla VJ. Antimicrobial activity of Rasamanikya prepared by two different methods. *Ayu*. 2011;32(3):365–369. doi:10.4103/0974-8520.93913.
21. Kulkarni YA, Patil MK. Comparative in vitro antibacterial activity of HartalaBhasma against Gram-positive and Gram-negative organisms. *Int J Ayur Pharma Research*. 2020;8(1):27–32.
22. Pandey AK, Patel S, Patel RK. Anupana: A critical review on role in Ayurvedic therapeutics. *J Res Educ Indian Med*. 2019;25(2):12–18.
23. Patgiri BJ, Prajapati PK, Shukla VJ. Acute and sub-acute toxicity studies of HaratalBhasma (arsenic trisulphide). *Ayu*. 2016;37(2):138–144. doi:10.4103/0974-8520.182749.
24. Sastry JLN. DravyagunaVijnana, Vol. 2. Varanasi: Chaukhambha Orientalia; 2005. p. 150–152.
25. Patgiri BJ, Prajapati PK, Shukla VJ. Antimicrobial activity of Rasamanikya prepared by two different methods. *Ayu*. 2011;32(3):365–369. doi:10.4103/0974-8520.93913.
26. Kulkarni YA, Patil MK. Comparative in vitro antibacterial activity of HartalaBhasma against Gram-positive and Gram-negative organisms. *Int J Ayur Pharma Res*. 2020;8(1):27–32.