INTRODUCTION

Rasashastra texts contain description of metals and minerals, their processing techniques and their utilization in therapeutics etc. Ayurvedic pharmacopoeia has routinely been used in practice in different parts of India for many centuries. These preparations are safe and effective even in minute doses but only when they are manufactured under the classical guidelines.

Rajata

Rajata (silver) is a noble and famous metal, hence attracted attention of ancient Acharyas. The Latin name of silver is Argentum (Ag), atomic no. is 47, specific gravity of 10.5, with a melting point of 960°C. It is a bright shiny, lustrous white metal. In Ayurveda it is classified under Dhatu varga. Synonyms like Taara, Shubhra, Ruchira, Chandra, Roupya, Rupyaka, Chandraloha, Saudha etc are mentioned in the classics. Three types are mentioned by Rasa Ratna Samuchaya as Sahaja,Khanja, Krutima. The use of silver in therapeutics dates back to the period of Charaka and his contemporaries. Since ancient times it is used for the therapeutic purpose, references can be traced since Samhita kala. Rajata being cost effective, abundantly available and consists similar properties like medhya, rasayana etc as that of gold, can be used instead of gold in therapeutics.

Grahyak lakshanas

According to the classical text Rasa Tarangini, grahya lakshana are Swachha (clear), Guru (heavy), Snigdham (with metallic sheen), and Dahe Chede Samuprabham (which also become bright white on heating or cutting), Sphota rahitam (without any ridges or furrows) is genuine and can be considered acceptable for therapeutic purposes.

Rajata Bhasma

Silver metal cannot be directly indicated for consumption. It needs to undergo various classical procedures like shodhana (purification of the metal) and marana (incineration) to make it fit for the body when given internally. Various procedures for Shodhana and Marana of Rajata are explained to make it fit for consumption. This Rajata is converted into Rajata bhasma (nano particle) after it undergoes samanya, vishesha shodhana explained for the dhatu varga and then the bhasmikarana (incineration) procedures where it is processed with organic matter, followed by the puta samskara (quantum of heat). These are to convert it into micro fine powder through the specially designed process called marana (incineration). This helps to reduce the metal thereby decreasing the toxic effect and makes the Rajata therapeutically potent, fit for consumption with a proper anupana (vehicle) increasing the desired therapeutic effect. Emphasis is given to purification of metals and their conversion to micro-fine powders by following specified guidelines, processes which were termed Ayaskriti in Charaka samhita. Quantitatively Rajata Bhasma is a combination of metallic silver (52 to 59%), free sulphur (0.675%), ferric oxide (14.33%), calcium (10.769%), silver chloride (0.479%), and traces of sodium, potassium and aluminium etc is shown in the analytical study of Rajata bhasma carried out.

Properties of Rajata Bhasma

The guna (properties) of Rajata bhasma explained are Kashaya Amla rasa, Snigdhaguna, Sheeta virya, Madhura vipaka,
Vatakaphahara in nature. Various authors of Rasashastra texts have their opinions regarding the guna karma. According to the text Rasa Tarangini it is Vatapatitahara.

**Action of Rajata Bhasma**

Various karma (actions) mentioned are Balya, Rasayana, Medhya, Daahahara, Ayushya, Ojo Vardhaka, Vayah sthapaka, pramehahara, sukramehahara, shoshahara etc.

**Indications and dosage**

Rajata bhasma has a wide range of indications, like in smritinasha, unmada, apasmara, virya kshaya, vata rogas, netra rogas, amlapitta, aruchi, jwara, Suska kasa, dorbalya, etc. According to Rasa Chikitsa, it is indicated as shotha, prameha, vayu pitta vridhhi, kaasa, shwasa, gulma, karshya, rakta alpata, rasayana etc. The dosage range of Rajata Bhasma can be 30 mg to 125 mg given along with different anupana depending upon the disorders prevailing. Due to lack of clinical data, its therapeutic applications are also lacking.

**Formulations**

Rajata bhasma itself is used as an ingredient in various formulations like Bruhat vata chintamani rasa given in neurological conditions, Makardhwaja vati, Vasant kusumakara, Rajata Formulations anupana dependin bhasma can be 30 mg to 125 mg.

**Indications**

Free scrutiny makes it clear Rajata was well known for its anti-microbial activity and have held a significant place in Ayurvedic pharmacopoeia since antiquity. Silver nano particles are extensively used in the treatment aspect because of its antimicrobial activity. These are used in surgical sutures, prostheses for CVS, bandages, urinary catheters, endo-tracheal tubes, bone cement, dentistry etc to prevent infection. Other non therapeutic uses of metal silver are coins and bullions, vessels, containers, plates, spoons, idols of gods, temples, decorative silverware, mirrors, solar energy, musical instruments, infrared telescope, clothes work and designs etc., where it is extensively used.

Rajata bhasma has a wide range of indications in various disorders. Commonly Rajata bhasma is indicated in manovaha vikara like unmada, apasmara, mastikshka dourbalya, smritinasha, anidra, madatityaya and sukravaha vikara like virya kshaya, upadamsha etc. Various indications along with dosage and anupana are listed below in the following table:

**Table 1: Indications of Rajata bhasma**

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Indications</th>
<th>Dose of Rajata bhasma</th>
<th>Dravya given along with Rajata bhasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Unmada</td>
<td>1 Ratti (125 mg)</td>
<td>Vacha churna, ghrita</td>
</tr>
<tr>
<td>2.</td>
<td>Apasamara</td>
<td>125 mg</td>
<td>Vacha churna and ghrita</td>
</tr>
<tr>
<td>3.</td>
<td>Mastishka dourbalya, Shiro vikara</td>
<td>125 mg</td>
<td>Pravalapishiti 1 ratti and smritisagara rasi 1 ratti, then brahmi swarasa is given to drink.</td>
</tr>
<tr>
<td>4.</td>
<td>Smritinasha</td>
<td>125 mg</td>
<td>Bhramhi ghrita</td>
</tr>
<tr>
<td>5.</td>
<td>Anidra</td>
<td>125 mg</td>
<td>Swarna bhasma 1 ratti, pravala bhasma 1 ratti with hot milk</td>
</tr>
<tr>
<td>6.</td>
<td>Madatityaya</td>
<td>125 mg</td>
<td>Ghrita</td>
</tr>
<tr>
<td>7.</td>
<td>Virya kshaya</td>
<td>125 mg</td>
<td>Mukta bhasma 1 ratti, vanshlochan-2 ratti, ela, keshara churna- 2 ratti, madhu and godugdha</td>
</tr>
<tr>
<td>8.</td>
<td>Upadamsa (vataja)</td>
<td>125 mg</td>
<td>Vanga bhasma-1 ratti, shilajit-2 ratti with usha dudghi</td>
</tr>
</tbody>
</table>

[1 ratti - 125 mg]

The other indications of Rajata bhasma mentioned in the classics are as follows:

**Table 2: Indications of Rajata bhasma**

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Indications</th>
<th>Dose of Rajata bhasma</th>
<th>Dravya given along with Rajata bhasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kotha (gangrene)</td>
<td>1 ratti (125mg)</td>
<td>Ela, vamshalochana, guduchisatva, ma</td>
</tr>
<tr>
<td>2.</td>
<td>Pandu</td>
<td>125 mg</td>
<td>Lauha bhasma or mandura bhasma 1 ratti</td>
</tr>
<tr>
<td>3.</td>
<td>Prameha</td>
<td>125 mg</td>
<td>Madhu or shilajit-1 ratti for 21 days</td>
</tr>
<tr>
<td>4.</td>
<td>Jwara (vataja, pitaja)</td>
<td>125 mg</td>
<td>Pippali churna, ela, along with dhanyaka arka</td>
</tr>
<tr>
<td>6.</td>
<td>Amlapitta (vata pradhana)</td>
<td>125 mg</td>
<td>Ghrita</td>
</tr>
<tr>
<td>7.</td>
<td>Aruchi, Ajirna</td>
<td>125 mg</td>
<td>Gandhaka rasayana</td>
</tr>
<tr>
<td>8.</td>
<td>Arsha (vataja, pitaja, rakaja)</td>
<td>125 mg</td>
<td>Ghrita</td>
</tr>
<tr>
<td>9.</td>
<td>Trishna</td>
<td>125 mg</td>
<td>Ghrita</td>
</tr>
<tr>
<td>10.</td>
<td>Vata rogas</td>
<td>125 mg</td>
<td>Ghrita</td>
</tr>
<tr>
<td>11.</td>
<td>Netra roga (vata pradhana)</td>
<td>125 mg</td>
<td>Triphaladi ghrita-1 tola (12 g), sita-1 tola, given 2 times and eye wash with triphala kwatha, Pravala bh.</td>
</tr>
<tr>
<td>12.</td>
<td>Snayu dorbalya</td>
<td>125 mg</td>
<td>Abhraka bhasma-1 ratti</td>
</tr>
<tr>
<td>13.</td>
<td>Daasha</td>
<td>125 mg</td>
<td>Sita 1 masha (6 g) with dhanyaka hima.</td>
</tr>
</tbody>
</table>
Other formulations containing Rajata bhasma are Bhrihat kasturibhirava ras, Jayamangala rasa, Kumudeshwara rasa, Vijaya parpati, Indu vati, Ummada Bhjanaka rasa, Ratneshwara rasa, Maha Raj Nrupati Vallabha rasa, Vaari Shoshana rasa, Swachchanda Nayaka rasa, Sarwa Jwarahara loha, Navaratna Raja Mruganka rasa, Somnatha rasa, Mehantaka rasa, Suwarnabhipati rasa etc are mentioned in the classical texts of Rasashastra1 in the treatment aspect.

Various activities of Rajata bhasma like anti microbial20,27,28 and antioxidant29, immunomodulator etc. has been proven through various studies. Silver nano particles are extensively used in the treatment aspect because of its antimicrobial activity. These are used in surgical sutures, bandages, urinary catheters, bone cement, dentistry etc to prevent infection25. And can be applied to a range of other healthcare products as dressings for burns, scald, acne, cavity wounds, sanitary towels, hand wash, soaps etc. due to its natural anti bacteria and anti-fungal properties.

**DISCUSSION**

Silver is a well-known noble metal used externally as well as internally since ancient times due to its antimicrobial activity for water purification and therapeutically also. It becomes clear from screening the various classics that silver and other metals like gold, iron, copper, lead, tin etc as well as some alloys were used to treat a wide range of diseases. Fine powders of these metals were prescribed for both internal and external applications. Systemically, Rajata bhasma is prescribed in neurological conditions like acute headache, migraine, memory loss etc., psychological conditions like Unmada1, Apasmara, Smritinasha2 (memory loss), depression, stress, anxiety, Anidra (insomnia) etc., respiratory conditions like Kaasa3 (dry cough), digestive disorders like Amlapitta (hyperacidity), Aruchi (anorexia) etc., skin diseases like Kotha4 (gangrene), other infectious conditions like upadamsha5 (Gonorrea) and urinary tract infection etc. In reproductive system related conditions like Virya kshaya(oligospermia), increases the fertility rate, reduces any infection or pus if present, works as antibiotic. Therapeutic application4,5,6,39 of Rajata Bhasma is seen in Vata rogas, Sukranehagha, Daahahara, Mano vikaras, arsha, gulma, pund, agnimandhya, shotha, prameha,vykrut pleeha etc due to its Vatapittahara, lehna, Vrushya, Medhya, Rasayana, Balya, Hridya, Medhya, Vrushya properties and balances the tridoshas when given in a proper dosage and anupana or in combination with other herbal drugs. Its lehna guna (scraping property) is helpful in cardiovascular disorders. Due to sheeta Virya, acts as Pitta Shamaka and Daahahara2. Use of these metallic preparations with great authority is safe and efficacious when used judiciously. Reviewing the classical texts of Rasashastra, it reveals that emphasis is required while prescribing these metallic preparations for therapeutic benefits. The various pharmaceutical techniques explained in texts like shodhana etc have their own significance in detoxifying and increasing the therapeutic potential of any metal2.

**CONCLUSION**

Studies carried out indicate that when metals and minerals are converted into medicines strictly adhering to the classical guidelines specified in ancient texts, they are devoid of any toxicity. The incinerated metal may contain associated compounds together with major elements, which have their own significance in the process of disease pacification. Rajata bhasma is used as an ingredient in various formulations prescribed in almost all systemic disorders, when prescribed in proper dose with proper anupana (vehicle) shows effective results. It is extensively prescribed in neurological, psychological disorders, infertility, degenerative disorders and infectious conditions etc. Due to its proven anti-microbial activity it has wide applications in the stream of medicine. Though various Rasa shastra texts like Rasa Tantra Saara, Siddhi Prayoga, Rasa Chikitsa etc explain their practical observations and experiences regarding the therapeutic applications of Rajata bhasma in treating various disorders. But due to lack of clinical scientific data, need of time is to carry out various scientific clinical trials and statistical data to prove its therapeutic efficacy in various disorders.

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<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Name of formulation</th>
<th>Ingredients</th>
<th>Indications</th>
<th>Dose and anupana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kumara bharana rasa24</td>
<td>Swarna bh, Rajata bh, praval, yashimatidhru, amlaki, ashwagandha, sunthi, pippali, haritaki, vach, guduchi swaras, brahmi, tulsi.</td>
<td>Bala rogas, Rasayana, balya, medhya etc</td>
<td>1 tab 500 mg. with ghiata in children 250mg lehya made with ghiata</td>
</tr>
<tr>
<td>2.</td>
<td>Manasa mitra vati26</td>
<td>Swarna bh, Rajata bh, praval, yashimatidhru, amlaki, ashwagandha, sunthi, pippali, haritaki, vach, guduchi swaras, brahmi, tulsi etc.</td>
<td>Mano vikaras, unmada, apasmara etc</td>
<td>1 tab/day with ghiata</td>
</tr>
<tr>
<td>3.</td>
<td>Bhrihat vata chintamani rasa34</td>
<td>Swarna bh, 1 tola, Rajata bh -2 tola, abhraka bh -2 tola, motukha bh -3 tola, praval bh -3 tola, loha bh - 5 tola, rasa sindoor - 7 tola.</td>
<td>Vata rogas, anidra, sannipatajy jwara, pakshaghata, ardisa etc</td>
<td>1 tab, 3-4 times/day with madhu</td>
</tr>
<tr>
<td>4.</td>
<td>Vasant kusumakar rasa35</td>
<td>Swarna bh, Rajata bh, vanga bh, naga bh, kanta loha bh, rasa sindoor, abhraka bh, praval bh, motukha bh, godadgha, vasa, ikshu etc.</td>
<td>Prameha, kasa, shwasa, rajakshamsa, vrushya etc.</td>
<td>1-2 tab 2 times with takra, madhu, usha jala.</td>
</tr>
<tr>
<td>5.</td>
<td>Makardwaja rasayana vati34,35</td>
<td>Swarna bh, vanga bh, kanta lauha bh., mautika bh., javitri, javyaphala, Rajata bh, rasa sindoor, praval, Bh, kastur., shu. Karpara, abhraka bh,1 tola each swarna sindoor-9 tola.</td>
<td>All types of prameha, hirdroga, swheta pradara, vata roga, kasa, shwasa, all types of jwara, unmada etc</td>
<td>2-2 ratti -2 times with adhraka rasas</td>
</tr>
</tbody>
</table>

Few of the formulations containing Rajata bhasma as one of the ingredient which are commonly practiced are listed below:

**Table 3: Various formulations of Rajata bhasma**
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