A SCIENTIFIC REVIEW OF RASAPUSHPA (NIRAGANDHA KUPIPAKVA RASAYANA) AND ITS MODERN ASPECT

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ABSTRACT
Rasapushpa is a Kupipakva drug which is of Nirgandha type. References regarding Nirgandha type of Kupipakva Kalpana were not found up to 13th cent. A.D. Rasendra Sara Sangraha is the first text in which Nirgandha type of Kupipakva Kalpana described. Overall it can be said that the origin of Nirgandha Yogas is 1300 A.D. Rasapushpa has properties like Pittahara, Mutrala (Diuretic, Vranadosahrta (antiseptic), Param Virecanakaram (Strong Purgative) and Bhutavisapaham (Antibacterial toxine). Rasapushpa and Rasakarpura were controversial regarding their independent (individual) formation and their chemical composition as well as their toxicity.

Keywords: Rasapushpa, Rasakarpura, mercurous chloride, mercuric chloride.

INTRODUCTION
Rasashastra is an important branch of Ayurveda which includes deals with drugs prepared from metals and minerals in combination with various plants and animal products. Rasayogas are basically classified into Kharaliya, Parpati, Kupipkwa and Pottali kalpanas. Among these preparations kupipakwa are found to be highly effective due to the extensive use of agni. The terminology ‘Kupipakwa’ itself denotes the pharmaceutical processing that is involved in these preparations by heating in glass bottle. It is first described by Acharya Sadananda Sharma in his text Rasatarangini. Rasapushpa is kupipakwa Kalpana, also it is a sagni, nirgandha moorchana (without sulphur) of Mercury prepared by adopting bahirdhuma procedure. Based on use of Gandhaka (sulphur) in the preparation of Kupipakwa Rasayana, they are called as sagandha & nirgandha kalpanas1. The two important nirgandha preparations mentioned in Rasa literature are Rasapushpa and Rasakarpura2. Rasakarpura and Rasapushpa are most controversial regarding their self existence. Most of the people supposed that both are same, but Acharya Sadananda Sharma was the first person who clearly differentiated them. He gave 3 different methods of preparation of Rasapushpa. But on careful study, those can be classified into two only viz. Bahirdhuma and Antarthuma Methods.

Synonyms: Synonyms of Rasapushpa are Rasasuma, Rasakusuma and Sudhanidhirasa.

Ingredients:
1. Hinguottha Parad (Mercury, Hg)
2. Kasis (Ferrous sulphate FeSO4)
3. Suddha Sphatika (Double potash of allum, K2SO4,
AI2O3, 24 H2O)
4. Saindhav (Rock Salt, NaCl)

First three ingredients are mentioned in the rasa-tarangini which is a Bahirdhuma (Kupipakva) method of preparation while Suddha Sphatika (Five Tolas) is also an additional 4th ingredient mentioned in the which is Antardhuma (Damaru Yantra) method of preparation.

Methods of preparation:
First method: Equal quantity of Hingulotha Parada, purified Kasisa and Saindhava 5 Tolas each. Mix them together in mortar and triturate well till it becomes Sumasrma, fill up the powder (Kajjali) in a glass bottle (having 7 layers of clay smeared cloth). Placing that bottle in Sikatayantra, heat it for two Yamas (6 hours). After this collect Rasapushpa which is like snow/fog in the upper part of bottle. While giving heat, when watery vapors expelled out, corking should be done with a cork by moving aside the sand from neck of the bottle so that Rasapushpa can deposited there. As this drug obtains in the bottle neck like a flower so it is known as Rasapushpa.

Second method: First, heat Puspakasisa on mild fire (Mandagni) to evaporate watery portion present in it. Similarly convert Sphatika into its flower like form (i.e. Purify it) by heating it. Then mix this Kasisa, Vanhibharjita Sphatika, Hingulotha Parada and Saindhava in the quantity five Tolas each in a mortar and triturate effortfully to make it as Slaksna form Churna. Then keep this Niscandra Churna into the Damaru yantra and heat it on very mild fire (Atimandana) for two Yamas (6 hours). When it becomes Swangasita, remove it below, open it and collect the white, shiny and Saradindu (moon in the season of Sarada) like Rasapushpa deposited in the upper pot of Damaru Yantra.

Properties of Rasapushpa: Rasapushpa has properties like Pittahara, Mutrala (Diuretic, Vranadosahra (antiseptic), Param Virecanakaram (Strong Purgative) and Bhutavisapaham (Antibacterial toxin), Swasthikaranamayantam (Health giving / good curing). Jaliyansa-visosanam (Dehydrating); Malapittapasarakam (Secretes conjugated bile by irritating the gallbladder). It kills bacteria’s causing Visuchika and Phiranga (which are Vibrio cholare and Treponema pallidum respectively). Also, it curves Hicca, Jalodara etc. very quickly.

Dose of Rasapushpa: Generally, for internal use, Rasapushpa is given in the dose of ½-2½. Ratti /Gunja (60-300 mg). Rasapushpa should be given in the full dose of 2½ Ratti, i.e. 300 mg for Virechana purpose. For the treatment of Hicca, it should be given in the dose of 1/2th Ratti i.e. 15 mg. while for the treatment of Phiranga its dose is considered as 1/4th Ratti i.e. 30 mg. Its pediatric dose for Virechana is considered as 1/4 th Ratti i.e. 30 mg.

Therapeutic uses of Rasapushpa: Rasapushpa in the dose of 2½ Ratti (300 mg) when given with Svarjika starts purgation after two Yamas (6 hrs.) In the initial stage of Visuchika, if Rasapushpa is given with water in the dose of 1/4th Ratti i.e. 30 mg, kills the pathogenic bacteria of Visuchika which are Vibrio cholarae. Bhissaja who does not have thorough knowledge of Rasasasatra should never prescribe Rasapushpa especially for longer duration.

Examination of Rasapushpa: To test/examine the Purity and genuinely of Rasapushpa, take a clean, shiny Iron pan and put a drop of water on it. Then add a pinch of Rasapushpa on that drop. After a moment throw away the water drop and it there is blackening at the drop site then the Rasapushpa sample should be known as pure.

Formulations (Yogas) of Rasapushpa: Chandanadivatika, Rasapushpamalalaha, Rasapushpadyamalaha. Other Nirgandha Kupipakva Kalpana described in Rasa classics is Rasakarapura. Rasakarpura is one of the mercurial preparations prepared with different ingredients and pharmaceutical procedures. On literary survey, 45 formulae are found described for its preparation. These formulae reveal that it may be prepared from Parada with sulphate compounds like Gandhakamla, Kasisa, Tuttha, Sphatika etc. on this basis, according to sir P. C. Ray, Rasapushpa and Rasakarpura preparatory methods are of mix compound.

Confirmatory Test of Rasapushpa: A pinch of Rasapushpa was taken and dissolved in distilled water in a test tube. Then 3drops of ammonia was added to
this solution. Black precipitate was found at the bottom of the test tube. This confirms that the compound formed is Mercurous Chloride (\(\text{HgCl/ Hg}_2\text{Cl}_2\)) and \textit{Rasapushpa} is known as Calomel (Mercurous chloride)\(^9\)

**Mercurial salts in modern aspect:** Rasapushpa is also a mercurial salt mercury forms two series of compounds, the mercurous compound and the mercuric compound. So, two varieties of mercury salts are there viz. mercurous chloride (\(\text{HgCl/ Hg}_2\text{Cl}_2\)) and mercuric chloride (\(\text{HgCl}_2\)). These salts are prepared by the process of sublimation.

**Mercurous Chloride:** The word calomel is probably derived from the Greek word Koros. Calogreen subchloride of mercury.

**Preparation:** Whenever a soluble chloride is added to a soluble mercurous salt, mercurous chloride or calomel, \(\text{HgCl}_2\) is precipitated. It is also prepared by heating mercuric chloride with right proportion of mercury.

\[\text{HgCl}_2 + \text{Hg} = \text{Hg}_2\text{Cl}_2\]

A salt obtained as a sublimate when a mixture of mercurous sulphate and sodium chloride is heated.

\[\text{Hg}_2\text{SO}_4 + 2\text{NaCl} - \text{Na}_2\text{SO}_4 + \text{Hg}_2\text{Cl}_2\]

**Properties:**
- **Appearance:** Amorphous heavy powder
- **Taste:** Tasteless
- **Colour:** White
- **Solubility:** Sparingly soluble in water (0.0001%) and in Hot water (0.0007%) and in dilute acids. Insoluble in alcohol.
- **Molecular Wt.** 472.09
- **Sublimating Point:** 400°C - 500°C

**Toxicological Information**\(^10\): Orally LD 50 in rats 210 mg/kg

**Inhalation:** Causes irritation to the respiratory tract symptoms include sore throat, coughing, pain, tightness is chest, breathing difficulties, shortness of breath and headache. Pneumonitis may develop. Can be absorbed through inhalation with symptoms to parallel ingestion.

**Ingestion:** Toxic Average lethal dose for inorganic mercury salts is about 1 gm may cause burning of mouth and pharynx, abdominal pain, vomiting, bloody diarrhoea. May be followed by a rapid and weak pulse, shallow breathing, palloriness, exhaustion, tremors and collapse, delayed death may occur from renal failure.

**Skin contact:** Causes irritation symptoms include redness and pain. May cause burns and sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.

**Eye Contact:** Causes irritation to eyes, may cause burns and eye damage.

**Chronic exposure:** Chronic exposure through any route can produce CNS damage. May cause tremors, personality and behavioural changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage, can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn grey in colour.

**Aggravation of Pre-existing conditions:** Persons with nervous disorders or impaired kidney or respiratory function, or history of allergies or a know sensitization to mercury may be more susceptible to the effects of the substance.

**Mercuric Chloride (Corrosive Sublimate)**

The violet poison sublimate, mercuric chloride, first mentioned by Geber, were used by Paravelsus (1493-1541) and Iatrochemists.

**Preparation:** When mercury is heated in chlorine, mercuric chloride, \(\text{HgCl}_2\) is obtained. It is also prepared by heating a mixture of mercury, common salt, potash nitrate and ferrous sulphate (calcined). The reaction probably is that ferrous sulphate with nitrate gives nitrogen oxides which oxidise mercurous chloride (from common salt and mercury) to mercuric chloride. Nowadays, it is obtained commercially by heating dry NaCl and sulphate in presence of manganese dioxide to prevent the formation of calomel.

\[\text{HgSO}_4 + 2\text{NaCl} = \text{HgCl}_2 + \text{Na}_2\text{SO}_4\]

**Properties:**
- **Appearance:** Needle like rhombic prisms. Translucent mass.
- **Colour:** White
- **Solubility:** In water, 100 parts of which at 100°C dissolve in 54 parts of this salt Also dissolves in 3
parts of alcohol and in 4 parts of ether

Molecular wt.: 271.52 and Composition Hg 73.88% CL 26.12%

Melting Point: 275°C

Boiling Point: 301°C

Specific gravity: 5.41

pH of aqueous solution of HgCl₂: 4.7

Absorption: Readily absorbed from GIT and its effects are evident usually within 10-15 minutes.

Distribution: It is readily gain assess to the circulation on oral administration although a considerable portion of ingested Hg may remain fixed to the alimentary mucosa and the intestinal contents. In blood, it is first fixed to globulins and erythrocytes but later shifts to albumin, from which redistributed to each tissue with a half time about 15 days. There are some evidences that it can be stored in bones.

Excretion: Excretion of mercuric salts takes place immediately after absorption mainly by way of kidney and colon and to a lesser extent via the bile and saliva.

Toxicity: It is highly toxic, corrosive to mucous membranes. Ingestion may cause severe nausea, vomiting, haematemesis, abdominal pain, diarrhoea, malena, renal damage, prostration. 1-2 gms is frequent by fatal poisoning and death also have occurred from intrauterine douches and application of alcoholic solution to large areas of skin.

**DISCUSSION**

Rasakarpura and Rasapushpa are Nirganda kupipakya products of Parada. They are closely related to each other. A controversy exists regarding the chemical nature of Rasakarpura and Rasapushpa. It was believed that both the products have chemical mixture of mercuric and mercurous chloride. So, a lot of controversy with regards to the chemical nature and composition of Rasakarpura and Rasapushpa. According to Vd. Shri V. M. Dwivedi, R. K. prepared by ancient method is mercurous chloride (Calomel) while by recent methods it is mercuric chloride. In Parada Vigyanium, Dr. Dwivedi has also mentioned few tests for the differential identification of Rasapushpa and Rasakarpura. Out of these colour test could not be said as significant in the differential identification point of view. Because when we look at the words mentioned to express the colour of Rasapushpa and Rasakarpura.

**Rasakarpura:** Karpurasannibham; Kundaendusannibham; Galadraupyanibham and Hirakavat etc.

**Rasapushpa:** Niharprabham; Kundavat; Saradindumanoharam; Puspavata etc.

These words are not very much distinguishing. Other important tests are as follows

According to Dr. Shri V. M. Dwivedi

<table>
<thead>
<tr>
<th>No.</th>
<th>Test</th>
<th>Rasapushpa</th>
<th>Rasakarpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Soluble in</td>
<td>• Nitric acid only</td>
<td>• 1/16th part in cold water</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• More than this in hot water</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Alcohol</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Either</td>
</tr>
<tr>
<td>2.</td>
<td>Precipitation in liquid ammonia</td>
<td>Mix 120 mg of Rasapushpa with distilled water and later few drops of liquid ammonia, it starts boiling slowly and blackish precipitation occurs.</td>
<td>Mix 120 mg of Rasakarpura with distilled water and later on add few drops of liquid ammonia, it starts boiling quickly and white precipitate occurs.</td>
</tr>
<tr>
<td>3.</td>
<td>Chemical composition</td>
<td>HgCl₂ or HgCl</td>
<td>HgCl₂</td>
</tr>
</tbody>
</table>

According to Vd. V. M. Desai

<table>
<thead>
<tr>
<th>No.</th>
<th>Test</th>
<th>Rasapushpa</th>
<th>Rasakarpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Soluble in</td>
<td>• Distilled water</td>
<td>• Conc-sulphuric acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ammonium chloride water</td>
<td>• Conc. Nitric acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Alcohol</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ether</td>
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</tbody>
</table>
2. Lime water test | RP when added in lime water gives yellow colour | RK when added in lime water gives black colour.
---|---|---
3. Precipitation in liquid ammonia | White coloured precipitate | Ash coloured or Kapish coloured precipitate
---|---|---
4. Shape of crystals | Octagonal crystals | Crystals of various shapes
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5. Chemical composition | HgCl₂ | HgCl or Hg₂Cl₂

**CONCLUSION**

The process in which a Rasayana product is prepared in a glass bottle by applying heat is known as Kupipakva Rasayana Kalpana. It is Bahirdhuma as well as Antardhuma type of Jarana process. Rasakarpura can be considered as Mercuric chloride (HgCl₂) chemically. Whereas Rasapushpa another Nirgandha kupipakva rasayana of Parada is Mercurous chloride (Hg₂Cl₂). Classical preparation Rasapushpa was found to be Hg₂Cl₂ which is almost insoluble in water.

**REFERENCES**


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